



Final

**Environmental Impact Statement
for Authorizing Changes to the
Falcon Launch Program at
Vandenberg Space Force Base, California
Appendices (Volume II)**

October 2025

Unique Identification Number: EISX-007-57-USF-1728547807

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at
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Appendices (Volume II)

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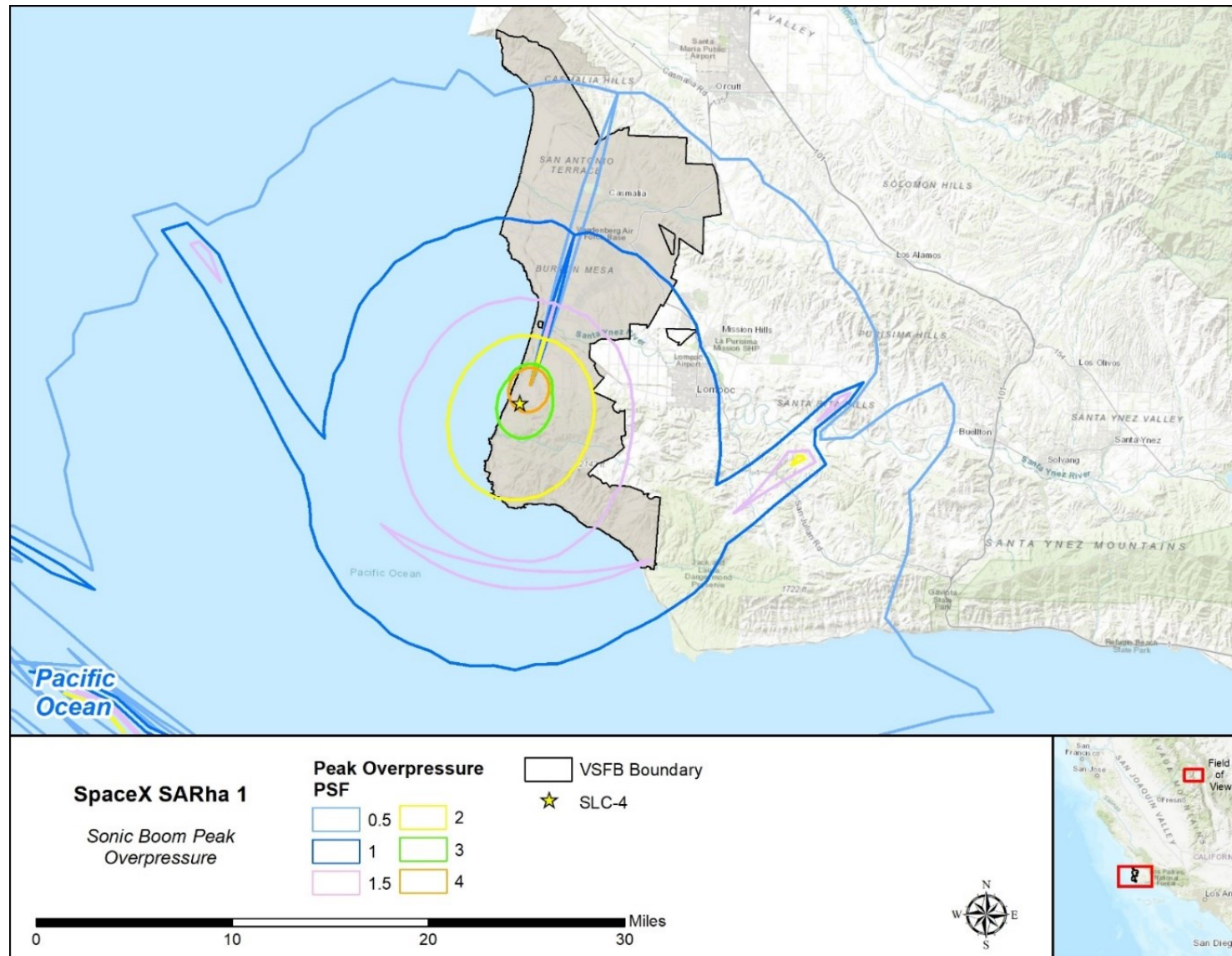
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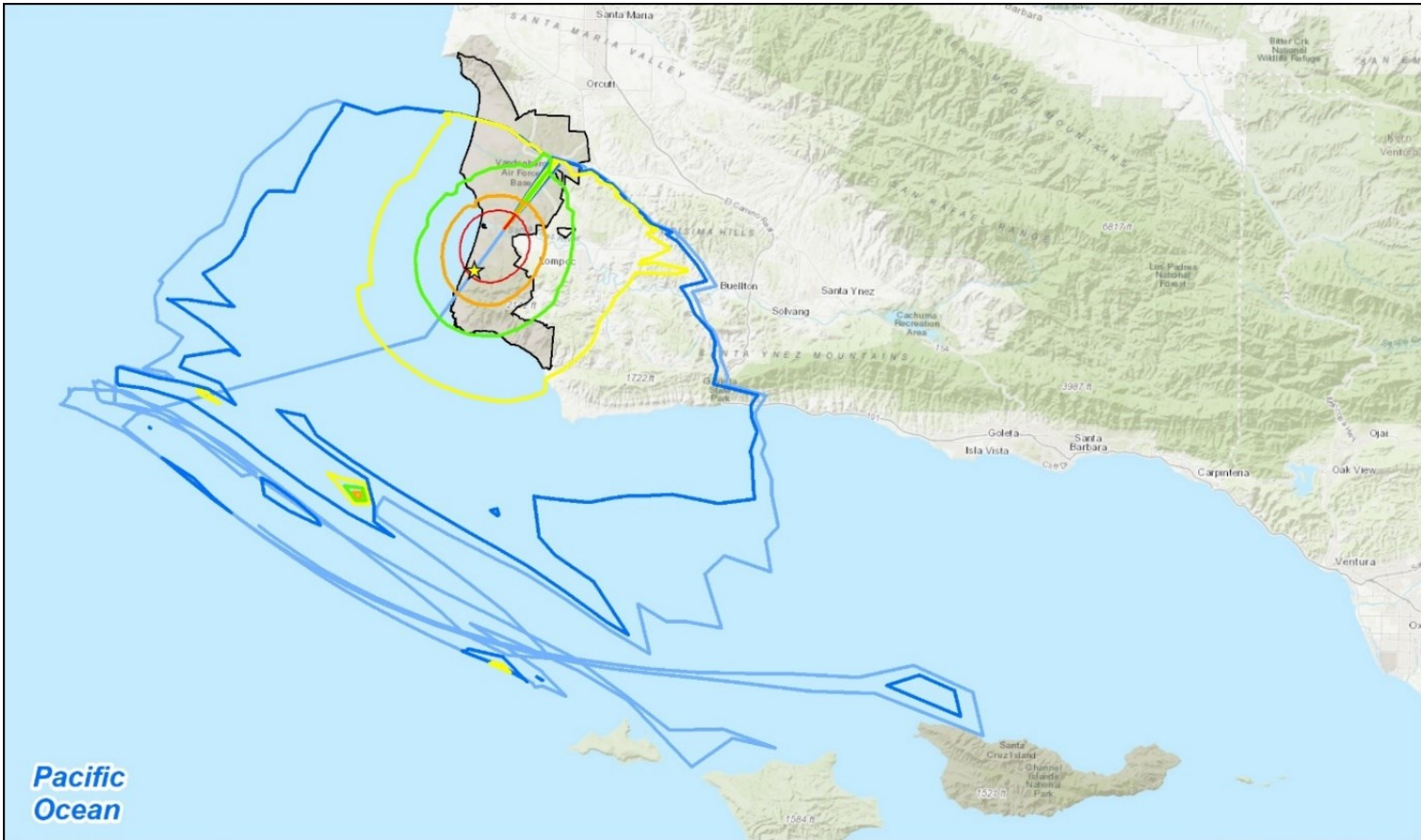
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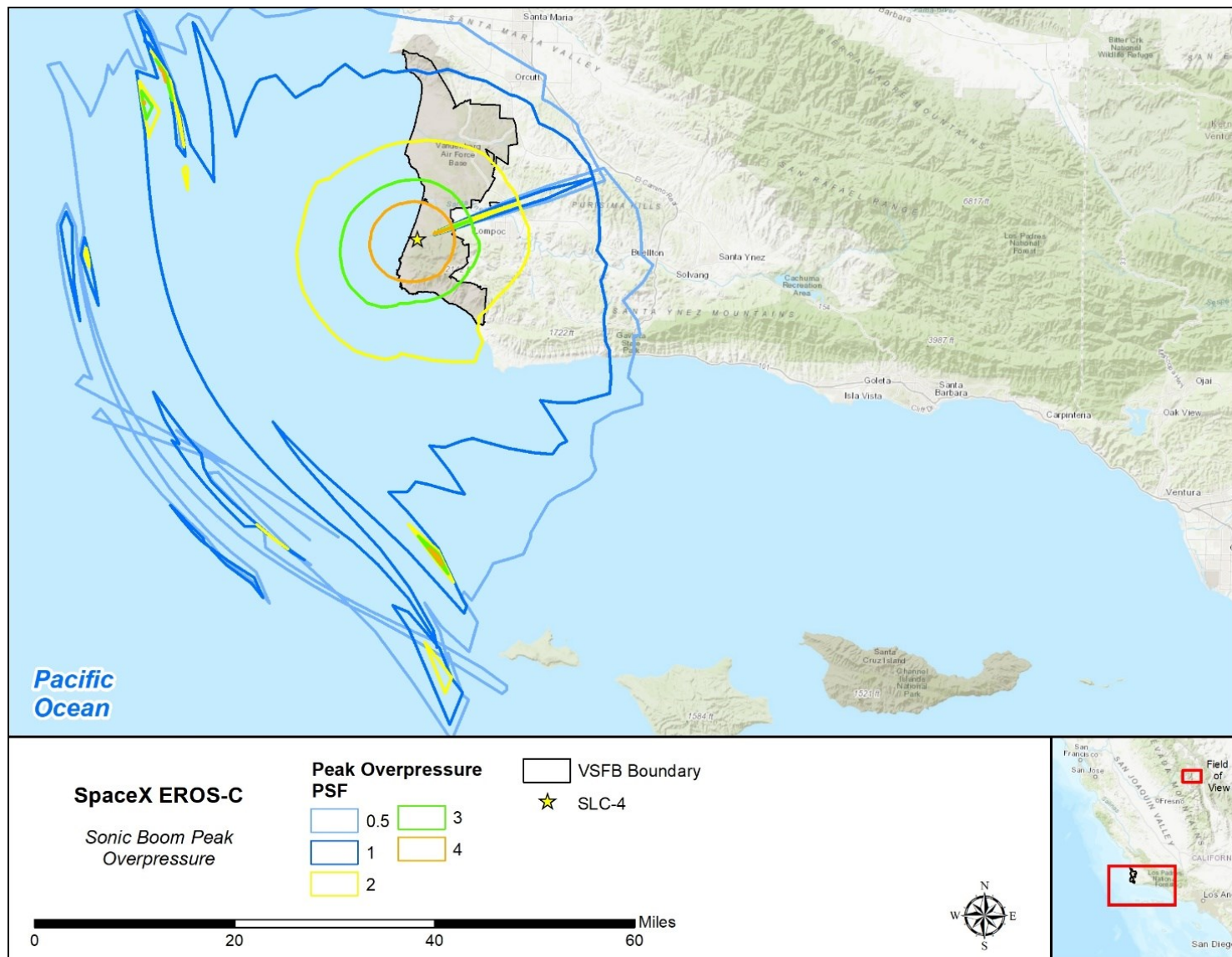
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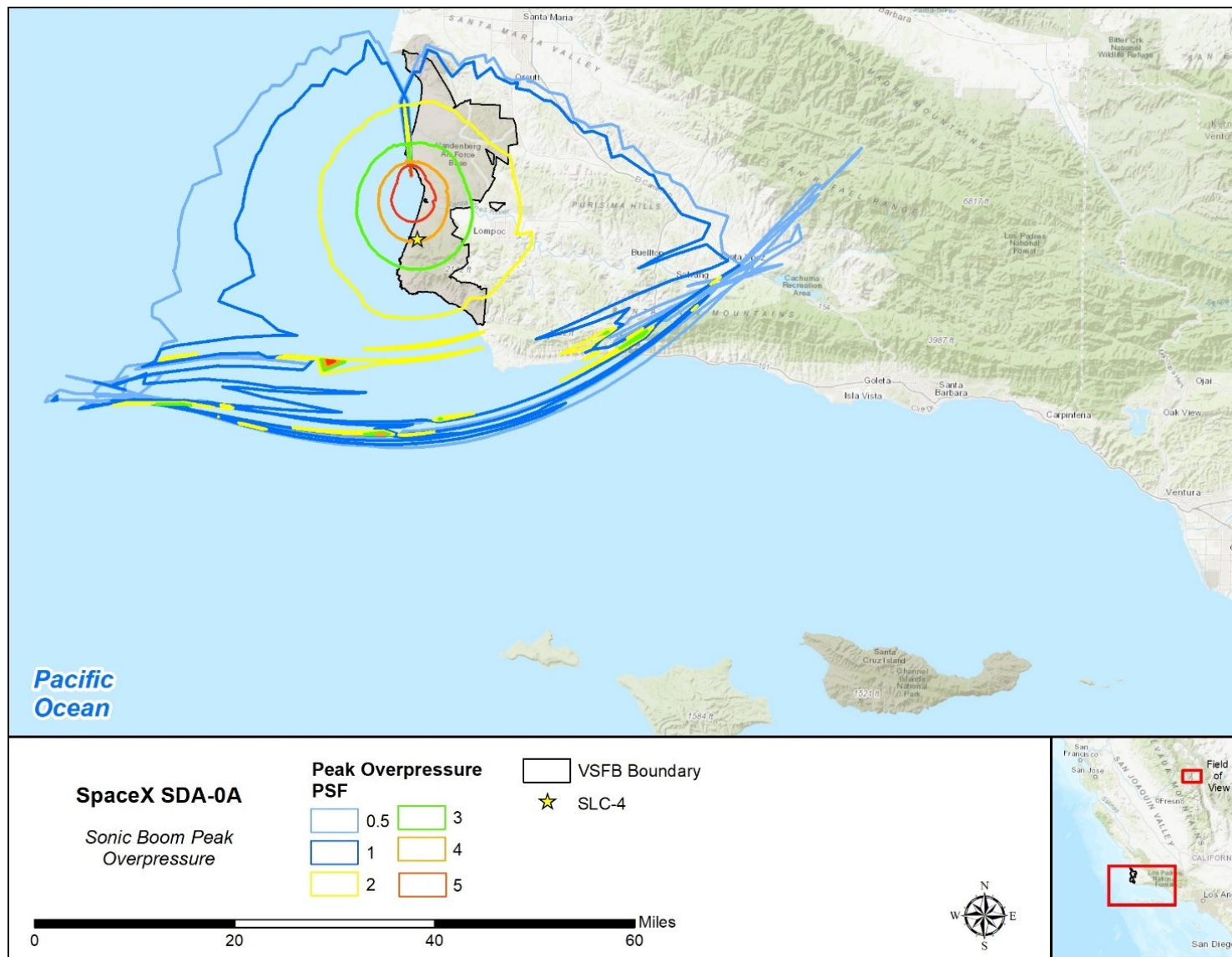
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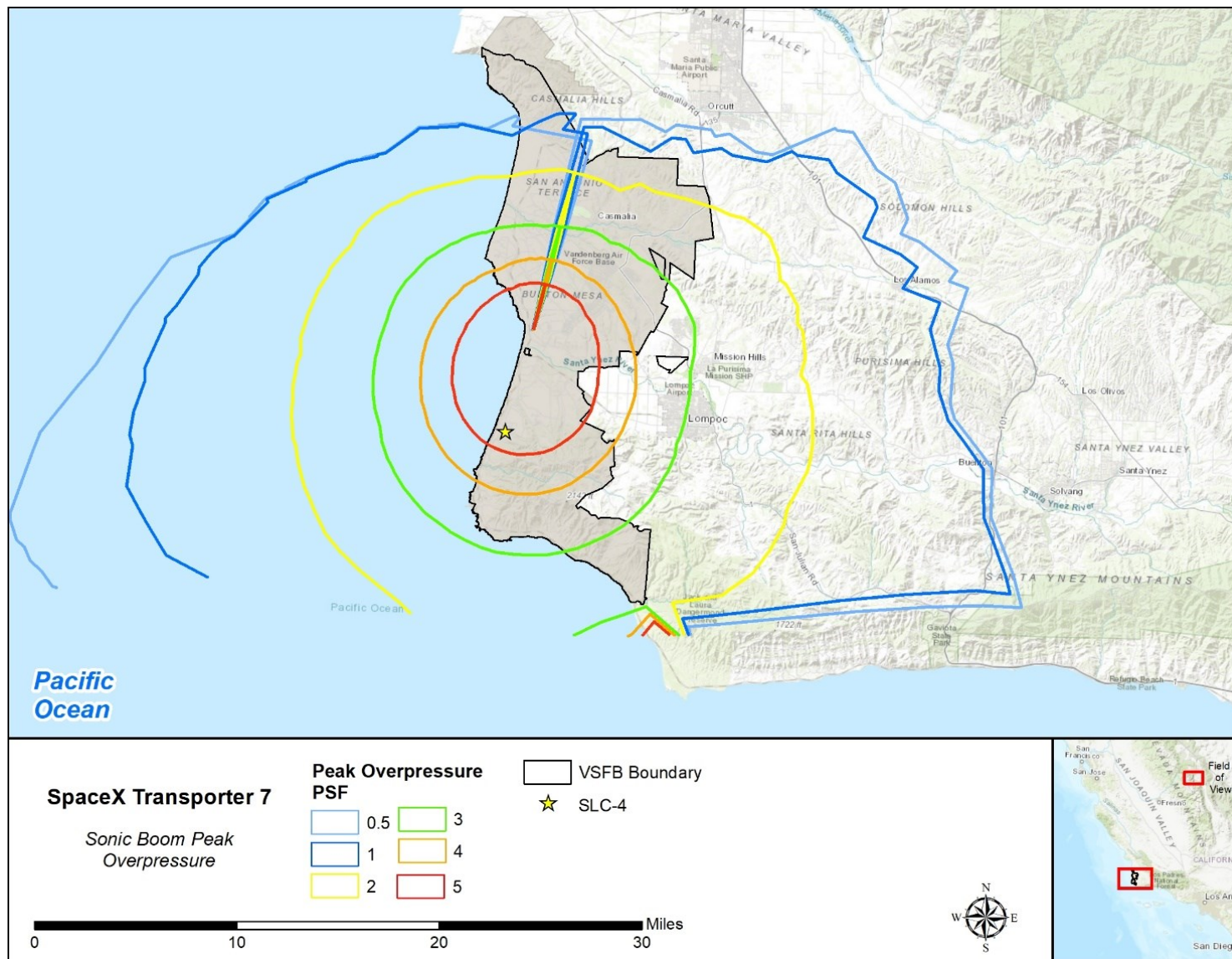
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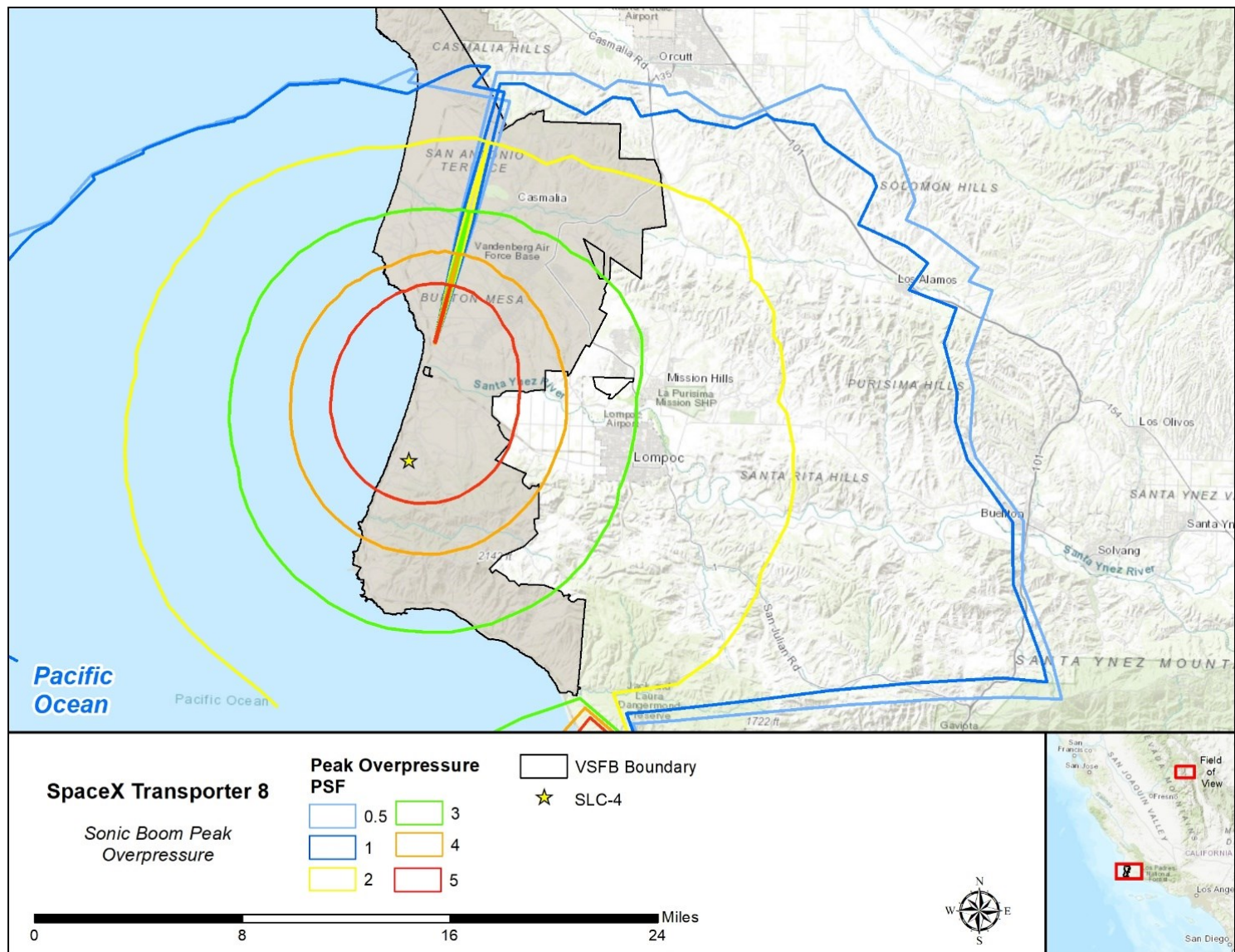


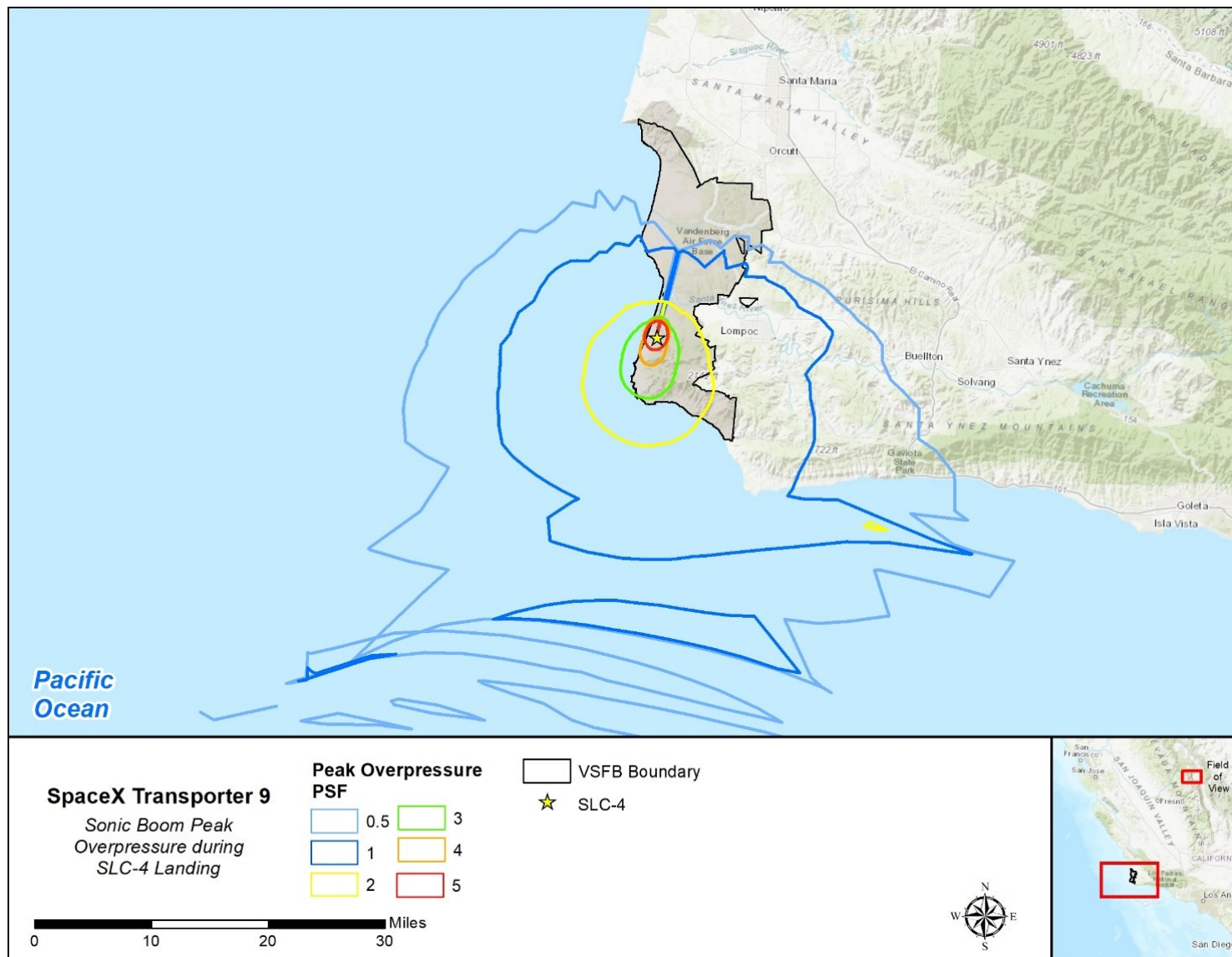


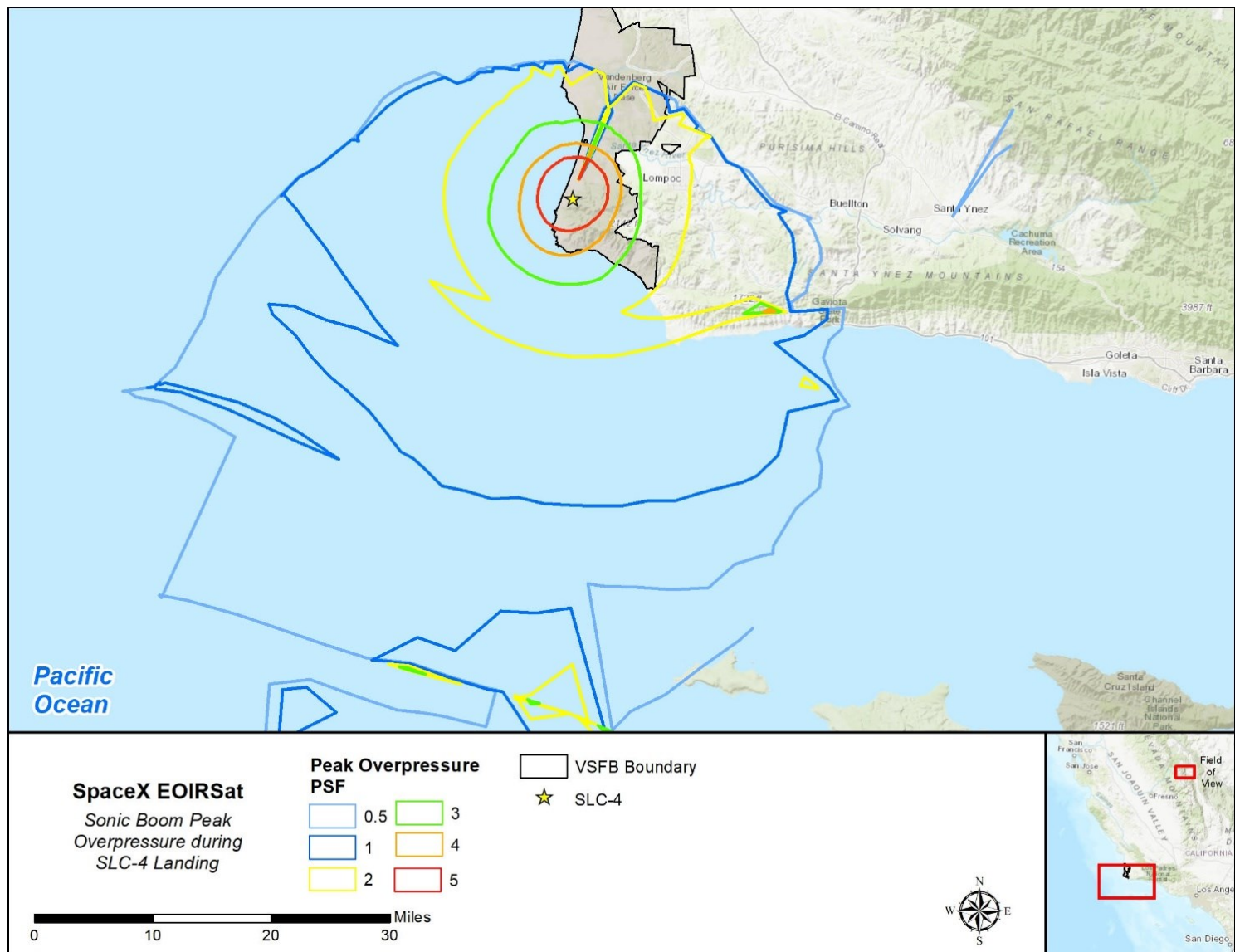


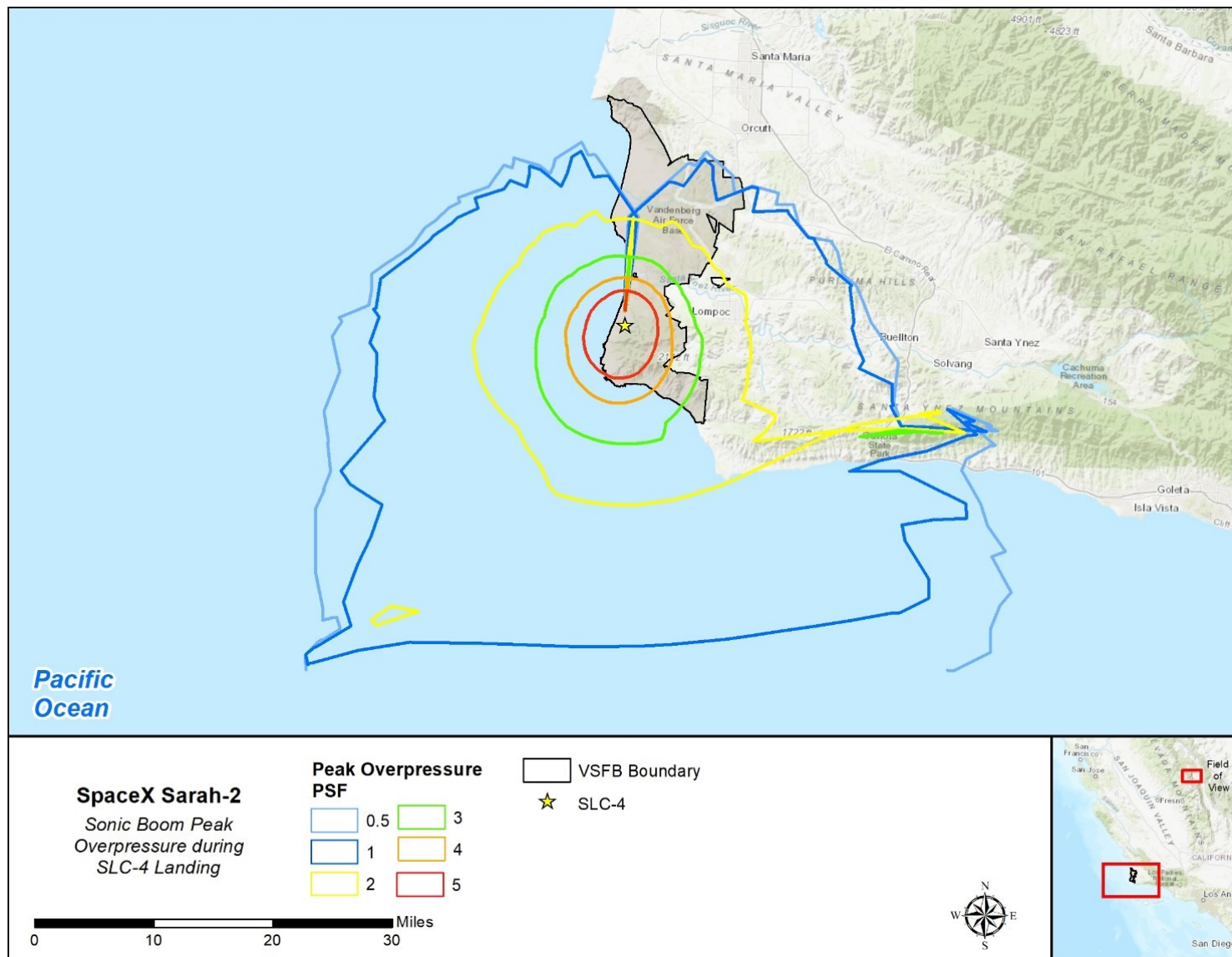


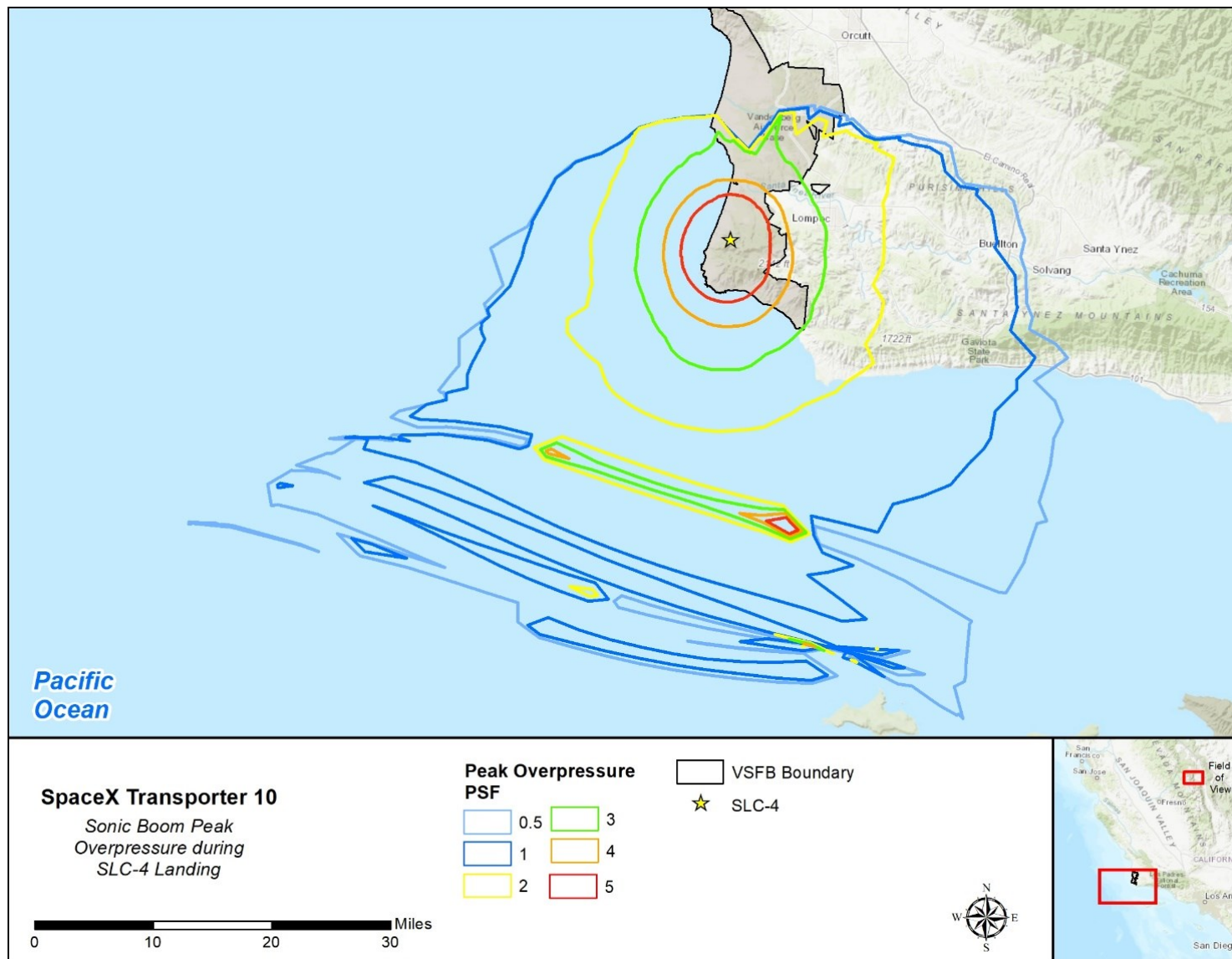


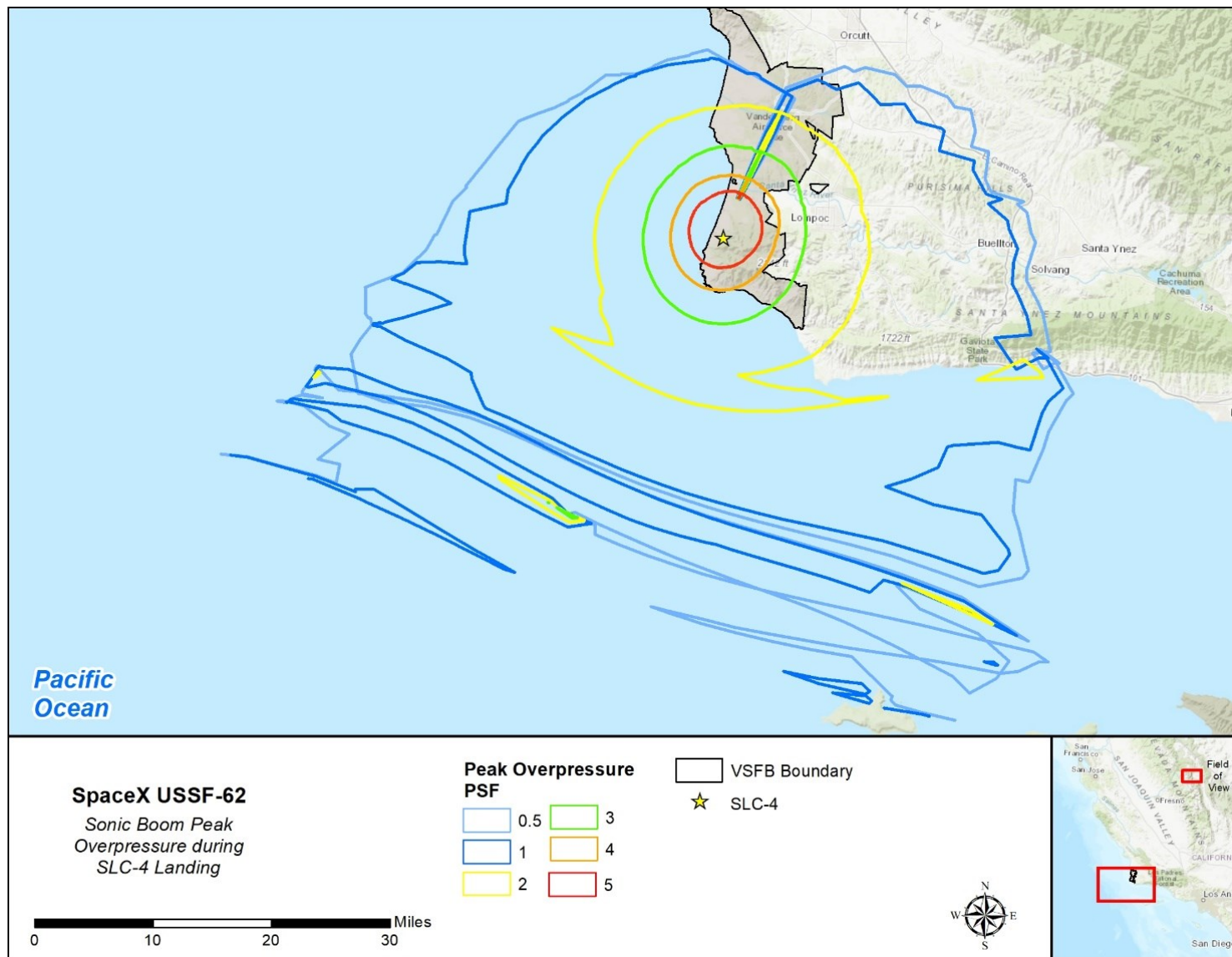


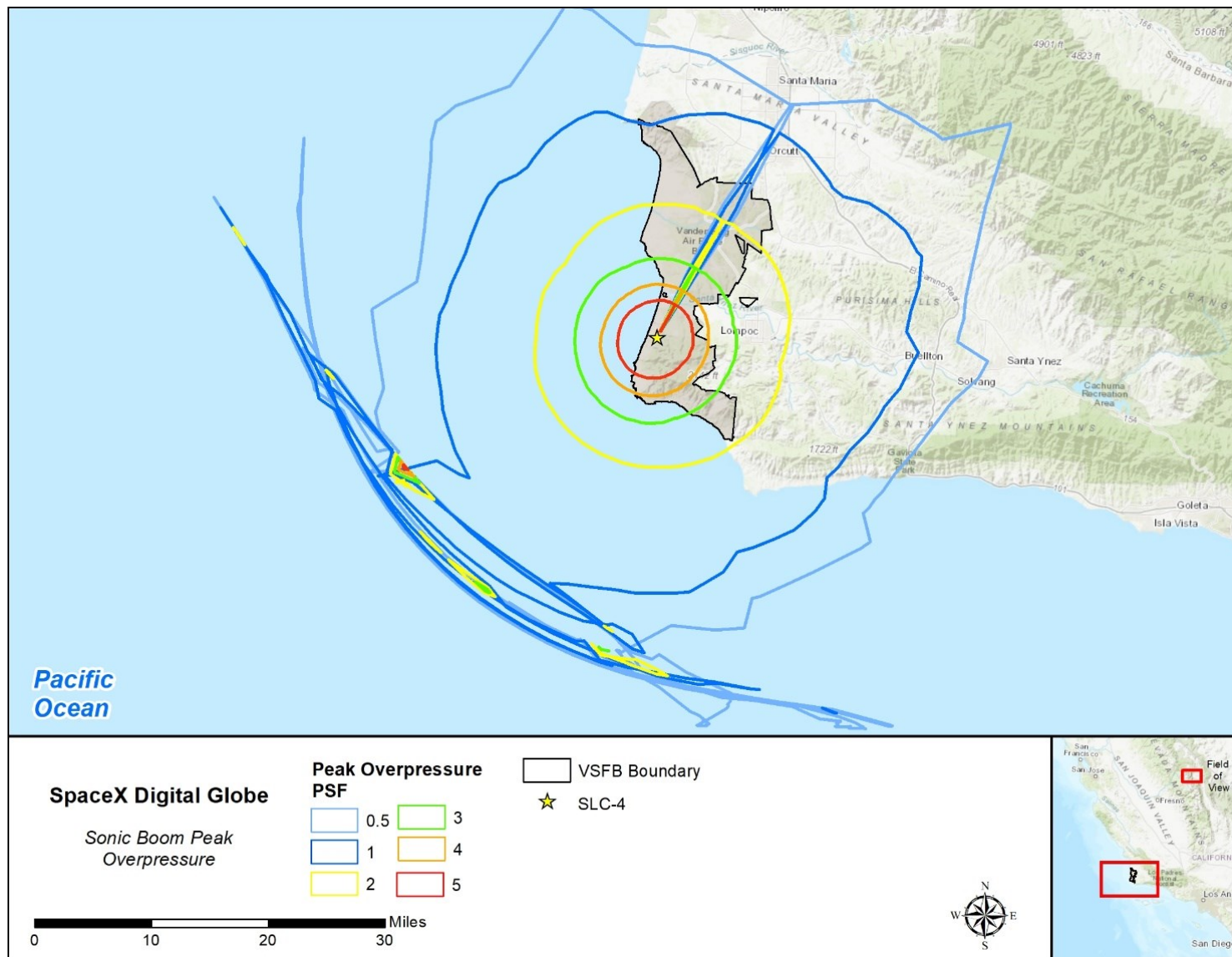


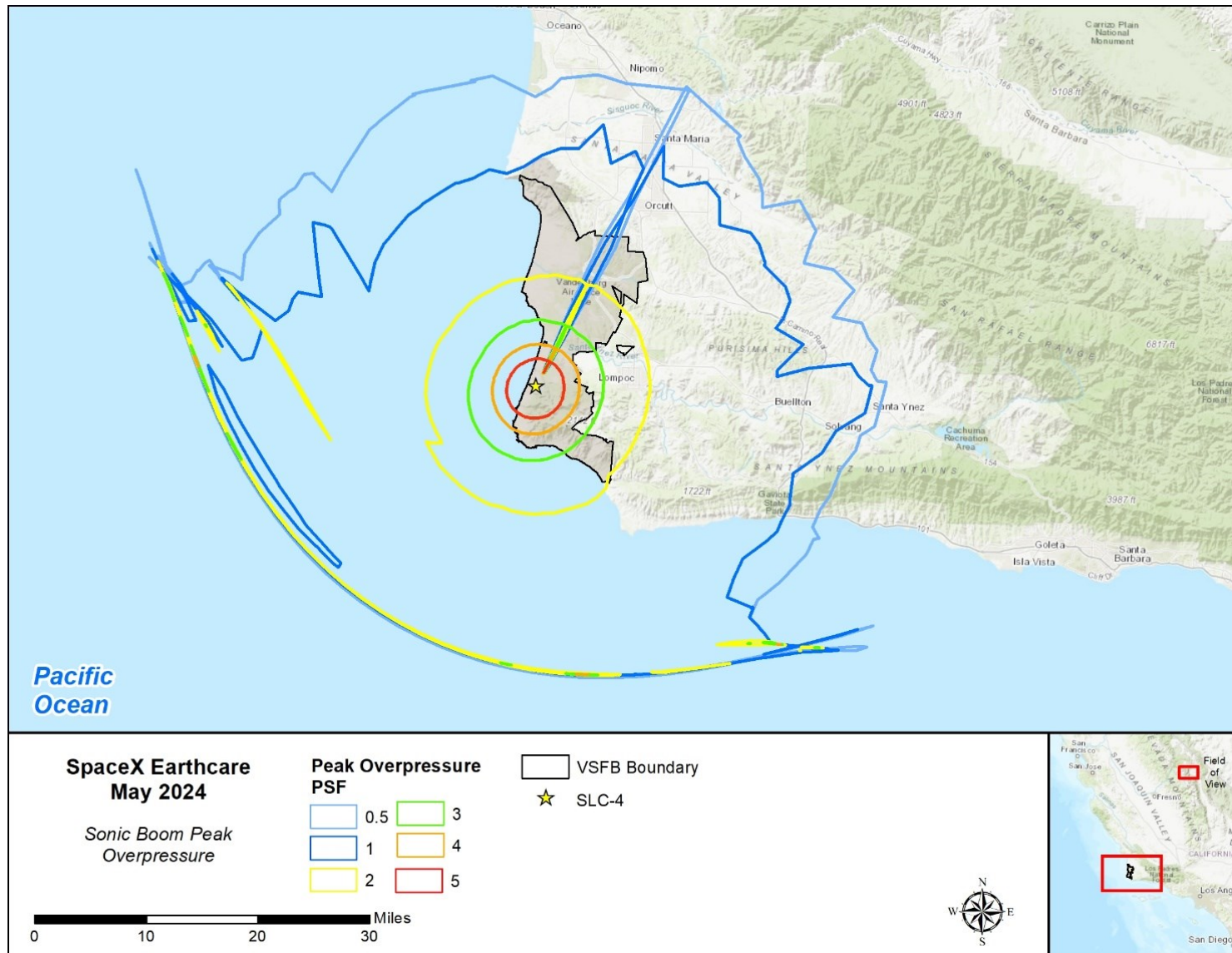


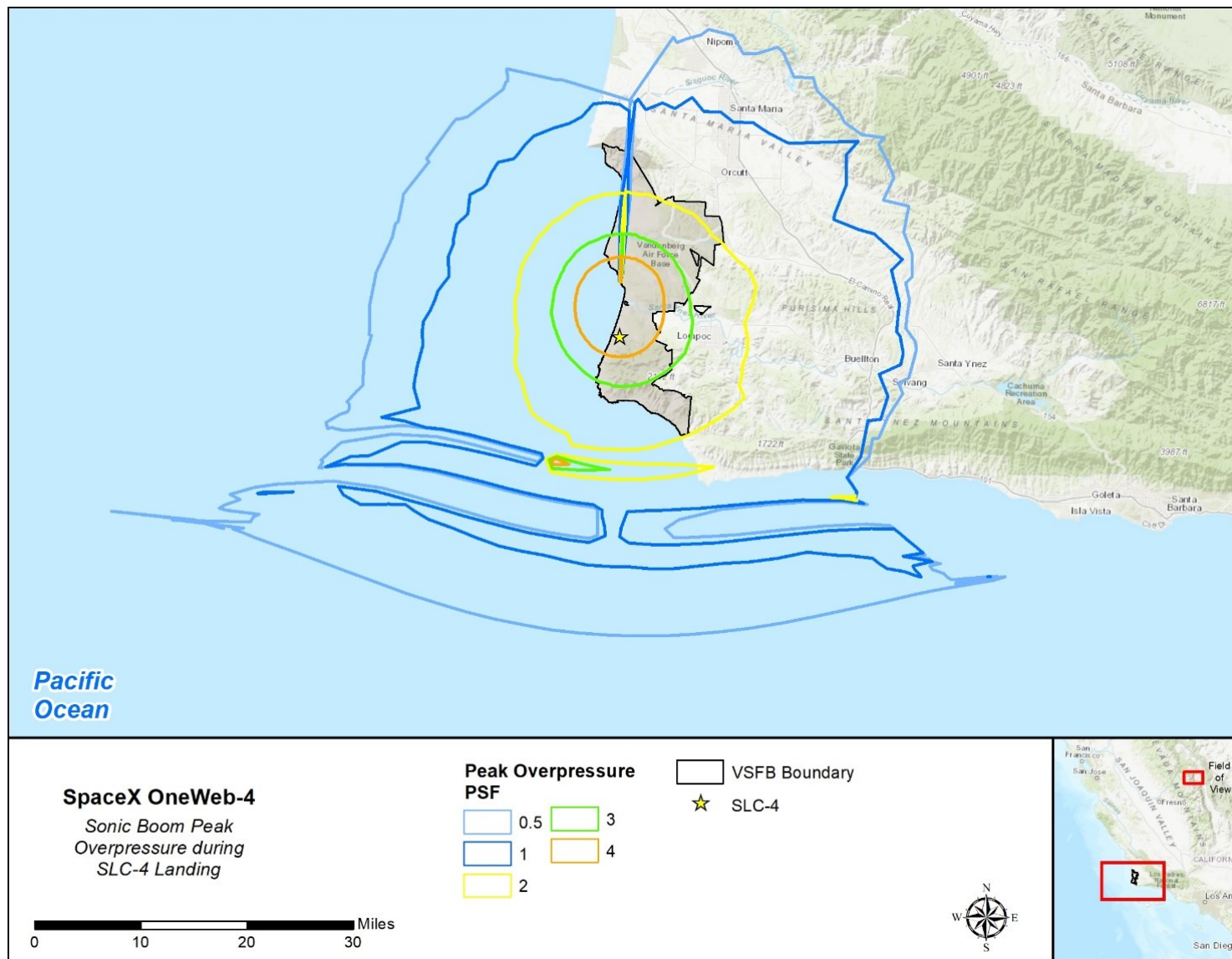


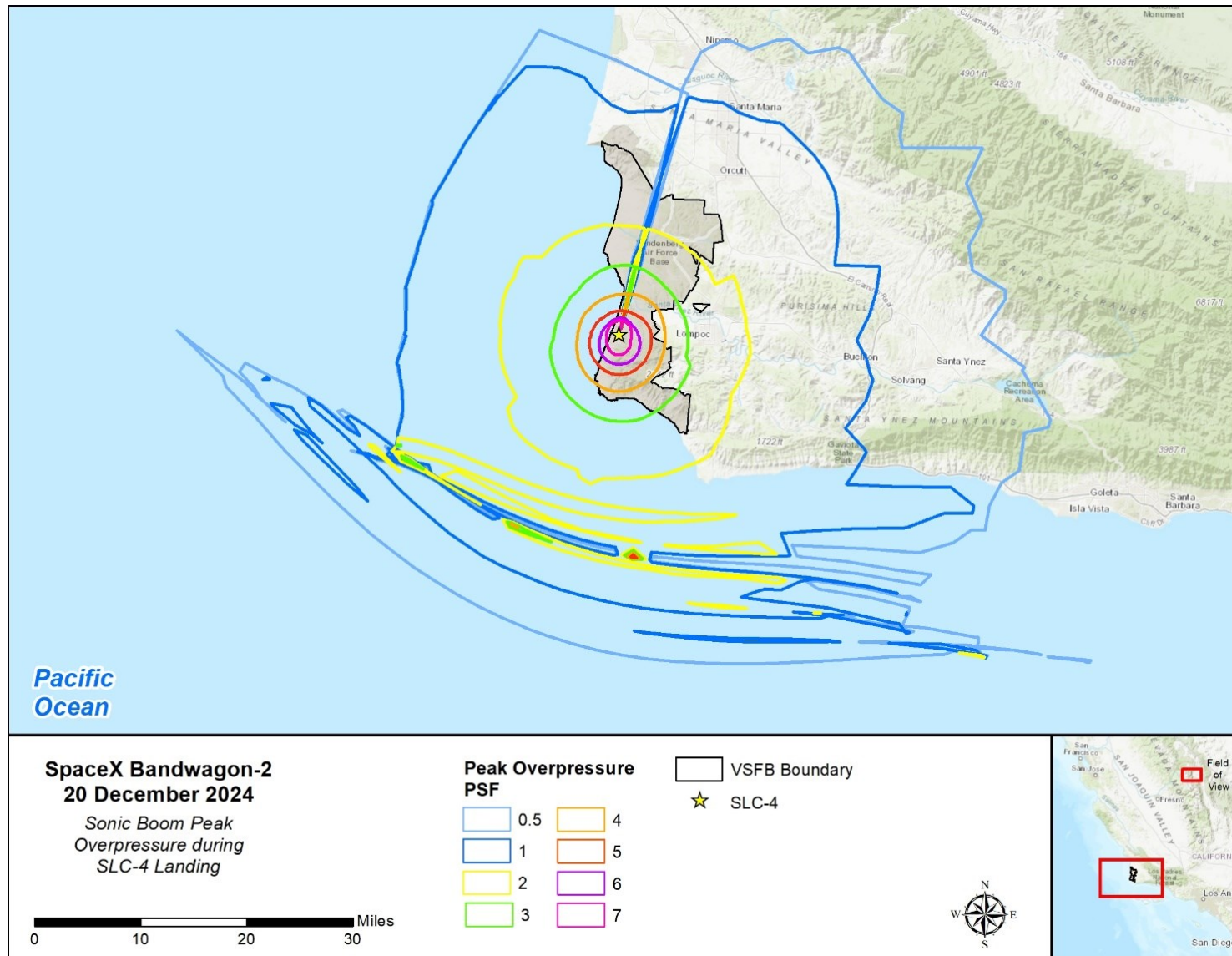


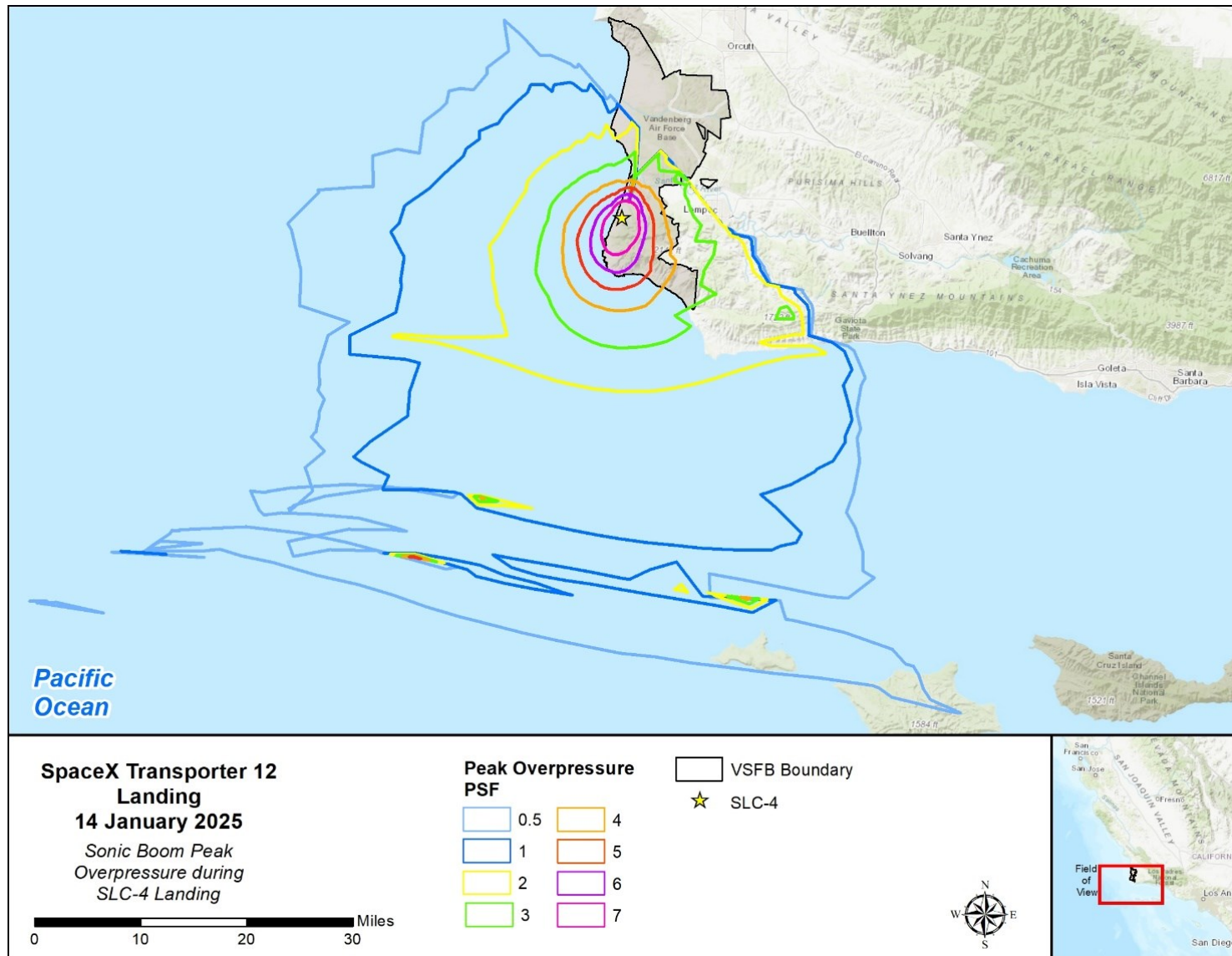












Appendix B – Falcon 9 SLC-4 Noise Measurements through 21 January 2025

Date	Mission	Landing Location	Location	Latitude	Longitude	Launch Noise (dB; Lmax)	Modeled Launch Noise (dB; Lmax; RNoise)	Measured Launch Boom (psf)	Modeled Launch Boom (psf; mission-specific model predictions)	Measured Landing Noise (dB; Lmax; RNoise)	Measured Landing Boom (psf)	Modeled Landing Boom (psf; PCBoom; mission-specific model predictions)
10/7/2018	SAOCOM	SLC-4W	Oil Well Canyon	34.556620	-120.625060					96.66	118	*
10/7/2018	SAOCOM	SLC-4W	Sudden Ranch	34.557320	-120.603600					99.5	108	*
12/3/2018	SSO-A	Droneship offshore of VSFB*	Oil Well Canyon	34.556620	-120.625060						0.0075	0.5-2
6/13/2019	Radarsat	SLC-4W	Honda Canyon	34.607531	-120.637075						2.866	1.5
6/13/2019	Radarsat	SLC-4W	Purísima Colony	34.751092	-120.626485						2.660	0.5-1
6/13/2019	Radarsat	SLC-4W	South Surf	34.666335	-120.609818						3.630	1-1.5
11/21/2020	Sentinel 6A	SLC-4W	Honda Canyon	34.607054	-120.632066						5.900	3-4
11/21/2020	Sentinel 6A	SLC-4W	Oil Well Canyon	34.556620	-120.625060						2.350	2-2.5
11/21/2020	Sentinel 6A	SLC-4W	Sudden Ranch	34.557320	-120.603600						1.760	2
9/13/2021	G2-1	Droneship	San Miguel Island: East Judith Cove	34.027127	-120.422979	ND	0	ND	4-6			
2/2/2022	NROL-87	SLC-4W	Honda Canyon	34.607054	-120.632066						2.420	3
2/2/2022	NROL-87	SLC-4W	Oil Well Canyon	34.556620	-120.625060						1.840	1.5-2
4/17/2022	NROL-85	SLC-4W	Oil Well Canyon	34.556620	-120.625060						1.290	1.5-2
4/17/2022	NROL-85	SLC-4W	South Surf	34.666335	-120.609818						1.950	2-3
5/13/2022	G4-13	Droneship	Santa Rosa Island: 1.0 mi East of Cow Canyon	34.020152	-120.115552	ND	0	1.58	0.5-5.0			
6/18/2022	Sarah-1	SLC-4W	Oil Well Canyon	34.556620	-120.625060						1.380	2
6/18/2022	Sarah-1	SLC-4W	Purísima Colony	34.751092	-120.626485						1.123	1-1.5
6/18/2022	Sarah-1	SLC-4W	South Surf	34.666335	-120.609818						2.573	3-4
12/16/2022	SWOT	SLC-4W	Honda Canyon	34.607531	-120.637075						4.700	4-5
12/16/2022	SWOT	SLC-4W	Oil Well Canyon	34.556418	-120.624948						2.540	3
12/16/2022	SWOT	SLC-4W	Sudden Ranch	34.557320	-120.603600						3.400	3
4/14/2023	Transporter 7	SLC-4W	Oil Well Canyon	34.556418	-120.624948	114.41	118			106.76	108	4.220
4/14/2023	Transporter 7	SLC-4W	South Surf	34.666335	-120.609818	118.82	122			113.77	110	4.270
4/27/2023	G3-5	Droneship	Oil Well Canyon	34.556418	-120.624948	110.47	118					
5/10/2023	G2-9	Droneship	Oil Well Canyon	34.556418	-120.624948	114.33	118					
5/10/2023	G2-9	Droneship	South Surf	34.666335	-120.609818	116.07	122					
5/20/2023	Iridium OneWeb	Droneship	Oil Well Canyon	34.556418	-120.624948	107.81	118					
5/20/2023	Iridium OneWeb	Droneship	South Surf	34.666335	-120.609818	110.58	122					
5/30/2023	G2-10	Droneship	Oil Well Canyon	34.556418	-120.624948	109.37	118					
5/30/2023	G2-10	Droneship	Purísima Colony	34.751092	-120.626485	105.57	112					
6/12/2023	Transporter 8	SLC-4W	Oil Well Canyon	34.556418	-120.624948	108.33	118				3.290	3-4
6/12/2023	Transporter 8	SLC-4W	Purísima Colony	34.751092	-120.626485	109.9	112				1.070	3-4
6/12/2023	Transporter 8	SLC-4W	Sudden Ranch	34.557320	-120.603600	108.24	116				2.700	3-4
6/22/2023	G5-7	Droneship	Oil Well Canyon	34.556418	-120.624948	110.24	118					
6/22/2023	G5-7	Droneship	Purísima Colony	34.751092	-120.626485	107.48	112					
6/22/2023	G5-7	Droneship	Santa Rosa Island: Carington Point	34.034970	-120.043351	ND	0	1.09	1.0			
6/22/2023	G5-7	Droneship	South Surf	34.666335	-120.609818	120.91	122					
7/7/2023	G5-13	Droneship	Oil Well Canyon	34.556418	-120.624948	118.16	118					
7/7/2023	G5-13	Droneship	South Surf	34.666335	-120.609818	117.65	122					
7/19/2023	G6-15	Droneship	Oil Well Canyon	34.556418	-120.624948	109.21	118					
7/19/2023	G6-15	Droneship	Purísima Colony	34.751092	-120.626485	96.95	112					
7/19/2023	G6-15	Droneship	South Surf	34.666335	-120.609818	112.83	122					
9/2/2023	sDA-08	SLC-4W	Oil Well Canyon	34.556418	-120.624948	114.78	118				3.070	5
9/2/2023	sDA-08	SLC-4W	Sudden Ranch	34.557320	-120.603600	111.88	116				2.430	2-4
11/11/2023	Transporter 9	SLC-4W	Oil Well Canyon	34.556418	-120.624948	124.2	118				3.000	3
11/11/2023	Transporter 9	SLC-4W	Sudden Ranch	34.557320	-120.603600	111.75	116				2.998	3
12/1/2023	EOIRsat	SLC-4W	Oil Well Canyon	34.556418	-120.624948	119.63	118				3.010	4
12/1/2023	EOIRsat	SLC-4W	Sudden Ranch	34.557320	-120.603600	117.91	116				2.900	4
12/24/2023	Sarah-2	SLC-4W	Oil Well Canyon	34.556418	-120.624948	113.79	118				4.170	4-5
12/24/2023	Sarah-2	SLC-4W	Sudden Ranch	34.557320	-120.603600	114.33	116				3.860	4-5
1/14/2024	G7-10	Droneship	Honda Canyon	34.606934	-120.634538	118.85	125					
1/14/2024	G7-10	Droneship	Oil Well Canyon	34.556418	-120.624948	115.11	118					
1/23/2024	G7-11	Droneship	Honda Canyon	34.606934	-120.634538	117.38	125					
1/23/2024	G7-11	Droneship	Oil Well Canyon	34.556418	-120.624948	112.4	118					
1/28/2024	G7-12	Droneship	Honda Canyon	34.606934	-120.634538	117.33	125					
1/28/2024	G7-12	Droneship	Oil Well Canyon	34.556418	-120.624948	115.14	118					
2/9/2024	G7-13	Droneship	Honda Canyon	34.606934	-120.634538	112.56	125					
2/9/2024	G7-13	Droneship	Oil Well Canyon	34.556418	-120.624948	109.89	118					
2/22/2024	G7-15	Droneship	Honda Canyon	34.606934	-120.634538	109.49	125					
2/22/2024	G7-15	Droneship	Oil Well Canyon	34.556418	-120.624948	104.47	118					
3/4/2024	Transporter 10	SLC-4W	Honda Canyon	34.606934	-120.634538	110.7	125			99.18	120	9.860
3/4/2024	Transporter 10	SLC-4W	Oil Well Canyon	34.556418	-120.624948	106.04	118			92.88	108	4.010
3/4/2024	Transporter 10	SLC-4W	Sudden Ranch	34.557320	-120.603600	104.93	116			94.87	108	5.570
3/10/2024	G7-17	Droneship	Honda Canyon	34.606934	-120.634538	115.14	125					
3/10/2024	G7-17	Droneship	Oil Well Canyon	34.556418	-120.624948	109.97	118					
4/1/2024	G7-18	Droneship	Honda Canyon	34.606934	-120.634538	116.76	125					
4/1/2024	G7-18	Droneship	Oil Well Canyon	34.556418	-120.624948	114.08	118					
4/6/2024	G8-1	Droneship	Honda Canyon	34.606934	-120.634538	127.940	125					
4/6/2024	G8-1	Droneship	Oil Well Canyon	34.556418	-120.624948	111.36	118					
4/6/2024	G8-1	Droneship	South Surf	34.666335	-120.609818	120.18	122					
4/11/2024	USSF-62	SLC-4W	Oil Well Canyon	34.556418	-120.624948	109.19	118				3.800	4
4/11/2024	USSF-62	SLC-4W	South Surf	34.666335	-120.609818	117.82	122				4.140	>5
4/11/2024	USSF-62	SLC-4W	Sudden Ranch	34.557320	-120.603600	106.08	116				0.920	4
5/2/2024	Digital Globe	SLC-4W	Honda Canyon	34.606934	-120.634538	113.57	125			106.11	120	4.250
5/2/2024	Digital Globe	SLC-4W	Oil Well Canyon	34.556418	-120.624948	110.27	118			95.85	108	2.020
5/2/2024	Digital Globe	SLC-4W	South Surf	34.666335	-120.609818	117.83	122			106.74	110	3.210
5/2/2024	Digital Globe	SLC-4W	Sudden Ranch	34.557320	-120.603600	101.83	116			96.95	108	1.790
5/9/2024	G8-2	Droneship	Honda Canyon	34.606934	-120.634538	114.61	125					3-4
5/9/2024	G8-2	Droneship	South Surf	34.666335	-120.609818	119.6	122					
5/14/2024	G8-7	Droneship	Ventura County: Beverly Drive	34.206605	-119.191071	ND		ND	0-0.09			
5/14/2024	G8-7	Droneship	Ventura County: Emma Wood	34.309159	-119.355214	ND		0.334	0-0.99			
5/14/2024	G8-7	Droneship	Ventura County: NBVC Point Mugu	34.110103	-119.092295	ND		ND	0-0.24			
5/14/2024	G8-7	Droneship	Ventura County: Say Road	34.369222	-119.058719	ND		ND	0-0.49			
5/14/2024	G8-7	Droneship	Ventura County: Ventura Harbor	34.245665	-119.267678	ND		0.218	0-1.99			
5/28/2024	EarthCARE	SLC-4W	Honda Canyon	34.606934	-120.634538	114.5	125			107.52	120	5.320
5/28/2024	EarthCARE	SLC-4W	South Surf	34.666335	-120.609818	121.96	122			109.66	110	3.920
5/28/2024	EarthCARE	SLC-4W	Sudden Ranch	34.557320	-120.603600	103.31	116			98.42	108	2.760
6/8/2024	G8-8	Droneship	Ventura County: Beverly Drive	34.206605	-119.191071	ND					ND	0-0.99
6/8/2024	G8-8	Droneship	Ventura County: Emma Wood	34.309159	-119.355214	ND					ND	0-0.09
6/8/2024	G8-8	Droneship	Ventura County: NBVC Point Mugu	34.110103	-119.092295	ND					ND	0-0.24
6/8/2024	G8-8	Droneship	Ventura County: Say Road	34.369222	-119.058719	ND					ND	0-0.49
6/8/2024	G8-8	Droneship	Ventura County: Ventura Harbor	34.245665	-119.267678	ND					ND	0-1.99
6/18/2024	G9-1	Droneship	Ventura County: Beverly Drive	34.206605	-119.191071	ND					0.287	0-0.49
6/18/2024	G9-1	Droneship	Ventura County: Emma Wood	34.309159	-119.355214	ND					ND	0
6/18/2024	G9-1	Droneship	Ventura County: NBVC Point Mugu	34.110103	-119.092295	ND					ND	0-0.24
6/18/2024	G9-1	Droneship	Ventura County: Say Road	34.369222	-119.058719	ND					ND	0
6/18/2024	G9-1	Droneship	Ventura County: Ventura Harbor	34.245665	-119.267678	ND					0.289	
6/23/2024	G9-2	Droneship	Ventura County: Beverly Drive	34.206605	-119.191071	ND					0.0067	0-0.49
6/23/2024	G9-2	Droneship	Ventura County: Emma Wood	34.309159	-119.355214	ND					0.015	0
6/23/2024	G9-2	Droneship	Ventura County: NBVC Point Mugu	34.110103	-119.092295	ND					0.038	0-0.24
6/23/2024	G9-2	Droneship	Ventura County: Say Road	34.369222	-119.058719	ND					0.013	0
6/23/2024	G9-2	Droneship	Ventura County: Ventura Harbor	34.245665	-119.267678	ND					0.078	0-0.99
6/28/2024	NROL-186	Droneship	Ventura County: Beverly Drive	34.206605	-119.191071	ND					ND	0-1.99
6/28/2024	NROL-186	Droneship	Ventura County: Emma Wood	34.309159	-119.355214	ND					ND	0
6/28/2024	NROL-186	Droneship	Ventura County: NBVC Point Mugu	34.110103	-119.092295	ND					ND	0-0.99
6/28/2024	NROL-186	Droneship	Ventura County: Say Road	34.369222	-119.058719	ND					ND	0
6/28/2024	NROL-186	Droneship	Ventura County: Ventura Harbor	34.2456								

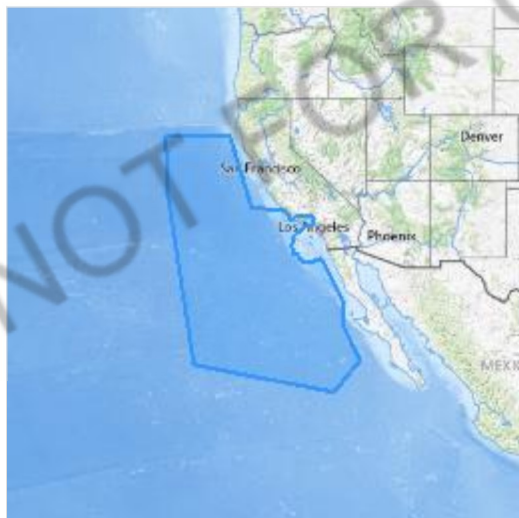
IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

California



Local offices

Arcata Fish And Wildlife Office

☎ (707) 822-7201

📅 (707) 822-8411

1655 Heindon Road
Arcata, CA 95521-4573

Carlsbad Fish And Wildlife Office

☎ (760) 431-9440

📠 (760) 431-5901

2177 Salk Avenue - Suite 250
Carlsbad, CA 92008-7385

Ventura Fish And Wildlife Office

☎ (805) 644-1766

📠 (805) 644-3958

✉ FW8VenturaSection7@FWS.Gov

2493 Portola Road, Suite B
Ventura, CA 93003-7726

Sacramento Fish And Wildlife Office

☎ (916) 414-6600

📠 (916) 414-6713

Federal Building
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species¹ and their critical habitats are managed by the [Ecological Services Program](#) of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries²).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact [NOAA Fisheries](#) for [species under their jurisdiction](#).

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1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the [listing status page](#) for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
 2. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS
Giant Kangaroo Rat <i>Dipodomys ingens</i> Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/6051	Endangered
Southern Sea Otter <i>Enhydra lutris nereis</i> Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/8560	Threatened Marine mammal

Birds

NAME	STATUS
California Condor <i>Gymnogyps californianus</i> There is final critical habitat for this species. Your location overlaps the critical habitat. https://ecos.fws.gov/ecp/species/8193	Endangered
California Least Tern <i>Sternula antillarum browni</i> Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/8104	Endangered
California Ridgway"s Rail <i>Rallus obsoletus obsoletus</i> Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/4240	Endangered
California Spotted Owl <i>Strix occidentalis occidentalis</i> No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/7266	Proposed Endangered

Coastal California Gnatcatcher <i>Poliioptila californica californica</i>	Threatened
Wherever found	
There is final critical habitat for this species. Your location overlaps the critical habitat.	
https://ecos.fws.gov/ecp/species/8178	
Hawaiian Petrel <i>Pterodroma sandwichensis</i>	Endangered
Wherever found	
No critical habitat has been designated for this species.	
https://ecos.fws.gov/ecp/species/6746	
Least Bell's Vireo <i>Vireo bellii pusillus</i>	Endangered
Wherever found	
There is final critical habitat for this species. Your location overlaps the critical habitat.	
https://ecos.fws.gov/ecp/species/5945	
Light-footed Ridgway"s Rail <i>Rallus obsoletus levipes</i>	Endangered
Wherever found	
No critical habitat has been designated for this species.	
https://ecos.fws.gov/ecp/species/6035	
Marbled Murrelet <i>Brachyramphus marmoratus</i>	Threatened
There is final critical habitat for this species. Your location does not overlap the critical habitat.	
https://ecos.fws.gov/ecp/species/4467	
Short-tailed Albatross <i>Phoebastria (=Diomedea) albatrus</i>	Endangered
Wherever found	
No critical habitat has been designated for this species.	
https://ecos.fws.gov/ecp/species/433	
Southwestern Willow Flycatcher <i>Empidonax traillii extimus</i>	Endangered
Wherever found	
There is final critical habitat for this species. Your location overlaps the critical habitat.	
https://ecos.fws.gov/ecp/species/6749	

Western Snowy Plover *Charadrius nivosus nivosus*

Threatened

There is **final** critical habitat for this species. Your location overlaps the critical habitat.

<https://ecos.fws.gov/ecp/species/8035>

Yellow-billed Cuckoo *Coccyzus americanus*

Threatened

There is **final** critical habitat for this species. Your location does not overlap the critical habitat.

<https://ecos.fws.gov/ecp/species/3911>

Reptiles

NAME

STATUS

Desert Tortoise *Gopherus agassizii*

Threatened

There is **final** critical habitat for this species. Your location does not overlap the critical habitat.

<https://ecos.fws.gov/ecp/species/4481>

Northwestern Pond Turtle *Actinemys marmorata*

Proposed Threatened

Wherever found

No critical habitat has been designated for this species.

<https://ecos.fws.gov/ecp/species/1111>

Southwestern Pond Turtle *Actinemys pallida*

Proposed Threatened

Wherever found

No critical habitat has been designated for this species.

<https://ecos.fws.gov/ecp/species/4768>

Amphibians

NAME

STATUS

Arroyo (=arroyo Southwestern) Toad *Anaxyrus californicus*

Endangered

Wherever found

There is **final** critical habitat for this species. Your location overlaps the critical habitat.

<https://ecos.fws.gov/ecp/species/3762>

California Red-legged Frog *Rana draytonii*

Threatened

Wherever found

There is **final** critical habitat for this species. Your location overlaps the critical habitat.

<https://ecos.fws.gov/ecp/species/2891>

California Tiger Salamander *Ambystoma californiense*

Endangered

There is **final** critical habitat for this species. Your location overlaps the critical habitat.

<https://ecos.fws.gov/ecp/species/2076>

Foothill Yellow-legged Frog *Rana boylei*

Endangered

There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat.

<https://ecos.fws.gov/ecp/species/5133>

Western Spadefoot *Spea hammondi*

Proposed Threatened

Wherever found

No critical habitat has been designated for this species.

<https://ecos.fws.gov/ecp/species/5425>

Fishes

NAME

STATUS

Santa Ana Speckled Dace *Rhinichthys gabrielino*

Proposed Threatened

No critical habitat has been designated for this species.

<https://ecos.fws.gov/ecp/species/4124>

Santa Ana Sucker *Catostomus santaanae*

Threatened

There is **final** critical habitat for this species. Your location overlaps the critical habitat.

<https://ecos.fws.gov/ecp/species/3785>

Tidewater Goby *Eucyclogobius newberryi*

Endangered

Wherever found

There is **final** critical habitat for this species. Your location overlaps the critical habitat.

<https://ecos.fws.gov/ecp/species/57>

Unarmored Threespine Stickleback *Gasterosteus aculeatus williamsoni*

Endangered

Wherever found

No critical habitat has been designated for this species.

<https://ecos.fws.gov/ecp/species/7002>

Insects

NAME

STATUS

Monarch Butterfly *Danaus plexippus*

Proposed Threatened

Wherever found

There is **proposed** critical habitat for this species. Your location overlaps the critical habitat.

<https://ecos.fws.gov/ecp/species/9743>

Crustaceans

NAME

STATUS

Riverside Fairy Shrimp *Streptocephalus woottoni*

Endangered

Wherever found

There is **final** critical habitat for this species. Your location overlaps the critical habitat.

<https://ecos.fws.gov/ecp/species/8148>

Vernal Pool Fairy Shrimp *Branchinecta lynchi*

Threatened

Wherever found

There is **final** critical habitat for this species. Your location overlaps the critical habitat.

<https://ecos.fws.gov/ecp/species/498>

Flowering Plants

NAME

STATUS

Beach Layia *Layia carnosa*

Threatened

Wherever found

No critical habitat has been designated for this species.

<https://ecos.fws.gov/ecp/species/6728>

Braunton's Milk-vetch *Astragalus brauntonii* Endangered

Wherever found

There is **final** critical habitat for this species. Your location overlaps the critical habitat.

<https://ecos.fws.gov/ecp/species/5674>

California Jewelflower *Caulanthus californicus* Endangered

Wherever found

No critical habitat has been designated for this species.

<https://ecos.fws.gov/ecp/species/4599>

California Orcutt Grass *Orcuttia californica* Endangered

Wherever found

No critical habitat has been designated for this species.

<https://ecos.fws.gov/ecp/species/4923>

Coastal Dunes Milk-vetch *Astragalus tener* var. *titi* Endangered

Wherever found

No critical habitat has been designated for this species.

<https://ecos.fws.gov/ecp/species/7675>

Conejo Dudleya *Dudleya abramsii* ssp. *parva* Threatened

Wherever found

No critical habitat has been designated for this species.

<https://ecos.fws.gov/ecp/species/4871>

Contra Costa Goldfields *Lasthenia conjugens* Endangered

Wherever found

There is **final** critical habitat for this species. Your location does not overlap the critical habitat.

<https://ecos.fws.gov/ecp/species/7058>

Gambel's Watercress *Rorippa gambellii* Endangered

Wherever found

No critical habitat has been designated for this species.

<https://ecos.fws.gov/ecp/species/4201>

Gaviota Tarplant *Deinandra increscens* ssp. *villosa* Endangered

Wherever found

There is **final** critical habitat for this species. Your location overlaps the critical habitat.

<https://ecos.fws.gov/ecp/species/4218>

Hoffmann's Rock-cress *Arabis hoffmannii* Endangered

Wherever found

No critical habitat has been designated for this species.

<https://ecos.fws.gov/ecp/species/5909>

Hoffmann's Slender-flowered Gilia *Gilia tenuiflora* ssp. Endangered

hoffmannii

Wherever found

No critical habitat has been designated for this species.

<https://ecos.fws.gov/ecp/species/968>

Island Barberry *Berberis pinnata* ssp. *insularis* Endangered

Wherever found

No critical habitat has been designated for this species.

<https://ecos.fws.gov/ecp/species/5197>

Island Malacothrix *Malacothrix squalida* Endangered

Wherever found

No critical habitat has been designated for this species.

<https://ecos.fws.gov/ecp/species/1211>

Island Phacelia *Phacelia insularis* ssp. *insularis* Endangered

Wherever found

No critical habitat has been designated for this species.

<https://ecos.fws.gov/ecp/species/189>

Island Rush-rose *Helianthemum greenei* Threatened

Wherever found

No critical habitat has been designated for this species.

<https://ecos.fws.gov/ecp/species/6338>

La Graciosa Thistle *Cirsium loncholepis* Endangered

Wherever found

There is **final** critical habitat for this species. Your location overlaps the critical habitat.

<https://ecos.fws.gov/ecp/species/6547>

Lompoc Yerba Santa *Eriodictyon capitatum* Endangered

Wherever found

There is **final** critical habitat for this species. Your location overlaps the critical habitat.

<https://ecos.fws.gov/ecp/species/364>

Lyon's Pentachaeta *Pentachaeta lyonii*

Endangered

Wherever found

There is **final** critical habitat for this species. Your location overlaps the critical habitat.

<https://ecos.fws.gov/ecp/species/4699>

Marcescent Dudleya *Dudleya cymosa* ssp. *marcescens*

Threatened

Wherever found

No critical habitat has been designated for this species.

<https://ecos.fws.gov/ecp/species/7145>

Marsh Sandwort *Arenaria paludicola*

Endangered

Wherever found

No critical habitat has been designated for this species.

<https://ecos.fws.gov/ecp/species/2229>

Nevin's Barberry *Berberis nevinii*

Endangered

Wherever found

There is **final** critical habitat for this species. Your location does not overlap the critical habitat.

<https://ecos.fws.gov/ecp/species/8025>

Nipomo Mesa Lupine *Lupinus nipomensis*

Endangered

Wherever found

No critical habitat has been designated for this species.

<https://ecos.fws.gov/ecp/species/5480>

Pismo Clarkia *Clarkia speciosa* ssp. *immaculata*

Endangered

Wherever found

No critical habitat has been designated for this species.

<https://ecos.fws.gov/ecp/species/5936>

Salt Marsh Bird's-beak *Cordylanthus maritimus* ssp. *maritimus*

Endangered

Wherever found

No critical habitat has been designated for this species.

<https://ecos.fws.gov/ecp/species/6447>

Santa Cruz Island Bush-mallow	<i>Malacothamnus fasciculatus</i> var. <i>nesioticus</i>	Endangered
Wherever found		
No critical habitat has been designated for this species.		
https://ecos.fws.gov/ecp/species/6152		
Santa Cruz Island Fringepod	<i>Thysanocarpus conchuliferus</i>	Endangered
Wherever found		
No critical habitat has been designated for this species.		
https://ecos.fws.gov/ecp/species/7364		
Santa Cruz Island Malacothrix	<i>Malacothrix indecora</i>	Endangered
Wherever found		
No critical habitat has been designated for this species.		
https://ecos.fws.gov/ecp/species/3210		
Santa Cruz Island Rockcress	<i>Sibara filifolia</i>	Endangered
Wherever found		
No critical habitat has been designated for this species.		
https://ecos.fws.gov/ecp/species/7424		
Santa Monica Mountains Dudleyea	<i>Dudleya cymosa</i> ssp. <i>ovatifolia</i>	Threatened
Wherever found		
No critical habitat has been designated for this species.		
https://ecos.fws.gov/ecp/species/2538		
Santa Rosa Island Manzanita	<i>Arctostaphylos confertiflora</i>	Endangered
Wherever found		
No critical habitat has been designated for this species.		
https://ecos.fws.gov/ecp/species/563		
Slender-horned Spineflower	<i>Dodecahema leptoceras</i>	Endangered
Wherever found		
No critical habitat has been designated for this species.		
https://ecos.fws.gov/ecp/species/4007		
Soft-leaved Paintbrush	<i>Castilleja mollis</i>	Endangered
Wherever found		
No critical habitat has been designated for this species.		
https://ecos.fws.gov/ecp/species/5312		

Southern Mountain Wild-buckwheat *Eriogonum kennedyi* Threatened
var. *austromontanum*
Wherever found

There is **final** critical habitat for this species. Your location does not overlap the critical habitat.

<https://ecos.fws.gov/ecp/species/7201>

Spreading Navarretia *Navarretia fossalis* Threatened
Wherever found

There is **final** critical habitat for this species. Your location overlaps the critical habitat.

<https://ecos.fws.gov/ecp/species/1334>

Ventura Marsh Milk-vetch *Astragalus pycnostachyus* var. *lanosissimus* Endangered
Wherever found

There is **final** critical habitat for this species. Your location overlaps the critical habitat.

<https://ecos.fws.gov/ecp/species/1160>

Verity's Dudleya *Dudleya verityi* Threatened
Wherever found

No critical habitat has been designated for this species.

<https://ecos.fws.gov/ecp/species/4342>

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

This location overlaps the critical habitat for the following species:

NAME	TYPE
Arroyo (=arroyo Southwestern) Toad <i>Anaxyrus californicus</i> https://ecos.fws.gov/ecp/species/3762#crithab	Final
Braunton's Milk-vetch <i>Astragalus brauntonii</i> https://ecos.fws.gov/ecp/species/5674#crithab	Final
California Condor <i>Gymnogyps californianus</i> https://ecos.fws.gov/ecp/species/8193#crithab	Final

California Red-legged Frog <i>Rana draytonii</i> https://ecos.fws.gov/ecp/species/2891#crithab	Final
California Tiger Salamander <i>Ambystoma californiense</i> https://ecos.fws.gov/ecp/species/2076#crithab	Final
Coastal California Gnatcatcher <i>Polioptila californica californica</i> https://ecos.fws.gov/ecp/species/8178#crithab	Final
Conservancy Fairy Shrimp <i>Branchinecta conservatio</i> For information on why this critical habitat appears for your project, even though Conservancy Fairy Shrimp is not on the list of potentially affected species at this location, contact the local field office. https://ecos.fws.gov/ecp/species/8246#crithab	Final
Gaviota Tarplant <i>Deinandra increscens</i> ssp. <i>villosa</i> https://ecos.fws.gov/ecp/species/4218#crithab	Final
La Graciosa Thistle <i>Cirsium loncholepis</i> https://ecos.fws.gov/ecp/species/6547#crithab	Final
Least Bell's Vireo <i>Vireo bellii pusillus</i> https://ecos.fws.gov/ecp/species/5945#crithab	Final
Lompoc Yerba Santa <i>Eriodictyon capitatum</i> https://ecos.fws.gov/ecp/species/364#crithab	Final
Lyon's Pentachaeta <i>Pentachaeta lyonii</i> https://ecos.fws.gov/ecp/species/4699#crithab	Final
Monarch Butterfly <i>Danaus plexippus</i> https://ecos.fws.gov/ecp/species/9743#crithab	Proposed
Riverside Fairy Shrimp <i>Streptocephalus woottoni</i> https://ecos.fws.gov/ecp/species/8148#crithab	Final

Santa Ana Sucker <i>Catostomus santaanae</i> https://ecos.fws.gov/ecp/species/3785#crithab	Final
Southwestern Willow Flycatcher <i>Empidonax traillii extimus</i> https://ecos.fws.gov/ecp/species/6749#crithab	Final
Spreading Navarretia <i>Navarretia fossalis</i> https://ecos.fws.gov/ecp/species/1334#crithab	Final
Tidewater Goby <i>Eucyclogobius newberryi</i> https://ecos.fws.gov/ecp/species/57#crithab	Final
Vandenberg Monkeyflower <i>Diplacus vandenbergensis</i> For information on why this critical habitat appears for your project, even though Vandenberg Monkeyflower is not on the list of potentially affected species at this location, contact the local field office. https://ecos.fws.gov/ecp/species/9079#crithab	Final
Ventura Marsh Milk-vetch <i>Astragalus pycnostachyus</i> var. <i>lanosissimus</i> https://ecos.fws.gov/ecp/species/1160#crithab	Final
Vernal Pool Fairy Shrimp <i>Branchinecta lynchi</i> https://ecos.fws.gov/ecp/species/498#crithab	Final
Western Snowy Plover <i>Charadrius nivosus nivosus</i> https://ecos.fws.gov/ecp/species/8035#crithab	Final

Bald & Golden Eagles

Bald and Golden Eagles are protected under the Bald and Golden Eagle Protection Act ² and the Migratory Bird Treaty Act (MBTA) ¹. Any person or organization who plans or conducts activities that may result in impacts to Bald or Golden Eagles, or their nests, should follow appropriate regulations and implement required avoidance and minimization measures, as described in the various links on this page.

The [data](#) in this location indicates that no eagles have been observed in this area. This does not mean eagles are not present in your project area, especially if the area is difficult to survey.

Please review the 'Steps to Take When No Results Are Returned' section of the [Supplemental Information on Migratory Birds and Eagles document](#) to determine if your project is in a poorly surveyed area. If it is, you may need to rely on other resources to determine if eagles may be present (e.g. your local FWS field office, state surveys, your own surveys).

Additional information can be found using the following links:

- Eagle Management <https://www.fws.gov/program/eagle-management>
- Measures for avoiding and minimizing impacts to birds <https://www.fws.gov/library/collections/avoiding-and-minimizing-incident-take-migratory-birds>
- Nationwide avoidance and minimization measures for birds <https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf>
- Supplemental Information for Migratory Birds and Eagles in IPaC <https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action>

Bald and Golden Eagle information is not available at this time

Bald & Golden Eagles FAQs

What does IPaC use to generate the potential presence of bald and golden eagles in my specified location?

The potential for eagle presence is derived from data provided by the [Avian Knowledge Network \(AKN\)](#). The AKN data is based on a growing collection of [survey, banding, and citizen science datasets](#) and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are an eagle ([Bald and Golden Eagle Protection Act](#) requirements may apply).

Proper interpretation and use of your eagle report

On the graphs provided, please look carefully at the survey effort (indicated by the black vertical line) and for the existence of the "no data" indicator (a red horizontal line). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort line or no data line (red horizontal) means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list and associated information help you know what to look for to confirm presence and helps guide you in knowing when to implement avoidance and minimization measures to eliminate or reduce potential impacts from your project activities or get the appropriate permits should presence be confirmed.

How do I know if eagles are breeding, wintering, or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating,

or resident), you may query your location using the [RAIL Tool](#) and view the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If an eagle on your IPaC migratory bird species list has a breeding season associated with it (indicated by yellow vertical bars on the phenology graph in your "IPaC PROBABILITY OF PRESENCE SUMMARY" at the top of your results list), there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

Interpreting the Probability of Presence Graphs

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. A taller bar indicates a higher probability of species presence. The survey effort can be used to establish a level of confidence in the presence score.

How is the probability of presence score calculated? The calculation is done in three steps:

The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.

To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is $0.25/0.25 = 1$; at week 20 it is $0.05/0.25 = 0.2$.

The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

Breeding Season ()

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort ()

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data ()

A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

Migratory birds

The Migratory Bird Treaty Act (MBTA) ¹ prohibits the take (including killing, capturing, selling, trading, and transport) of protected migratory bird species without prior [authorization](#) by the Department of Interior U.S. Fish and Wildlife Service (FWS). The incidental take of migratory

birds is the injury or death of birds that results from, but is not the purpose, of an activity. The FWS interprets the MBTA to prohibit incidental take.

1. The [Migratory Birds Treaty Act](#) of 1918.
2. The [Bald and Golden Eagle Protection Act](#) of 1940.

Additional information can be found using the following links:

- Eagle Management <https://www.fws.gov/program/eagle-management>
- Measures for avoiding and minimizing impacts to birds <https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds>
- Nationwide avoidance and minimization measures for birds
- Supplemental Information for Migratory Birds and Eagles in IPaC <https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action>

Migratory bird information is not available at this time

Migratory Bird FAQs

Tell me more about avoidance and minimization measures I can implement to avoid or minimize impacts to migratory birds.

[Nationwide Avoidance & Minimization Measures for Birds](#) describes measures that can help avoid and minimize impacts to all birds at any location year-round. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is one of the most effective ways to minimize impacts. To see when birds are most likely to occur and breed in your project area, view the Probability of Presence Summary. [Additional measures](#) or [permits](#) may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of [Birds of Conservation Concern \(BCC\)](#) and other species that may warrant special attention in your project location, such as those listed under the Endangered Species Act or the [Bald and Golden Eagle Protection Act](#) and those species marked as “Vulnerable”. See the FAQ “What are the levels of concern for migratory birds?” for more information on the levels of concern covered in the IPaC migratory bird species list.

The migratory bird list generated for your project is derived from data provided by the [Avian Knowledge Network \(AKN\)](#). The AKN data is based on a growing collection of [survey, banding, and citizen science datasets](#) and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) with which your project intersects. These species have been identified as warranting special attention because they are BCC species in that area, an eagle ([Bald and Golden Eagle Protection Act](#) requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, and to verify survey effort when no results present, please visit the [Rapid Avian Information Locator \(RAIL\) Tool](#).

Why are subspecies showing up on my list?

Subspecies profiles are included on the list of species present in your project area because observations in the AKN for **the species** are being detected. If the species are present, that means that the subspecies may also be present. If a subspecies shows up on your list, you may need to rely on other resources to determine if that subspecies may be present (e.g. your local FWS field office, state surveys, your own surveys).

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the [Avian Knowledge Network \(AKN\)](#). This data is derived from a growing collection of [survey, banding, and citizen science datasets](#).

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go to the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating, or resident), you may query your location using the [RAIL Tool](#) and view the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your IPaC migratory bird species list has a breeding season associated with it (indicated by yellow vertical bars on the phenology graph in your "IPaC PROBABILITY OF PRESENCE SUMMARY" at the top of your results list), there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are [Birds of Conservation Concern](#) (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the [Bald and Golden Eagle Protection Act](#) requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially BCC species. For more information on

avoidance and minimization measures you can implement to help avoid and minimize migratory bird impacts, please see the FAQ "Tell me more about avoidance and minimization measures I can implement to avoid or minimize impacts to migratory birds".

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the [Northeast Ocean Data Portal](#). The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the [NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf](#) project webpage.

Proper interpretation and use of your migratory bird report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please look carefully at the survey effort (indicated by the black vertical line) and for the existence of the "no data" indicator (a red horizontal line). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list does not represent all birds present in your project area. It is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list and associated information help you know what to look for to confirm presence and helps guide implementation of avoidance and minimization measures to eliminate or reduce potential impacts from your project activities, should presence be confirmed. To learn more about avoidance and minimization measures, visit the FAQ "Tell me about avoidance and minimization measures I can implement to avoid or minimize impacts to migratory birds".

Interpreting the Probability of Presence Graphs

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. A taller bar indicates a higher probability of species presence. The survey effort can be used to establish a level of confidence in the presence score.

How is the probability of presence score calculated? The calculation is done in three steps:

The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.

To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is $0.25/0.25 = 1$; at week 20 it is $0.05/0.25 = 0.2$.

The relative probability of presence calculated in the previous step undergoes a statistical conversion so that

all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

Breeding Season ()

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort ()

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data ()

A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

NOT FOR CONSULTATION

Marine mammals

Marine mammals are protected under the [Marine Mammal Protection Act](#). Some are also protected under the Endangered Species Act¹ and the Convention on International Trade in Endangered Species of Wild Fauna and Flora².

The responsibilities for the protection, conservation, and management of marine mammals are shared by the U.S. Fish and Wildlife Service [responsible for otters, walruses, polar bears, manatees, and dugongs] and NOAA Fisheries³ [responsible for seals, sea lions, whales, dolphins, and porpoises]. Marine mammals under the responsibility of NOAA Fisheries are **not** shown on this list; for additional information on those species please visit the [Marine Mammals](#) page of the NOAA Fisheries website.

The Marine Mammal Protection Act prohibits the take of marine mammals and further coordination may be necessary for project evaluation. Please contact the U.S. Fish and Wildlife Service Field Office shown.

1. The [Endangered Species Act](#) (ESA) of 1973.
2. The [Convention on International Trade in Endangered Species of Wild Fauna and Flora](#) (CITES) is a treaty to ensure that international trade in plants and animals does not threaten their survival in the wild.
3. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following marine mammals under the responsibility of the U.S. Fish and Wildlife Service are potentially affected by activities in this location:

NAME

Southern Sea Otter *Enhydra lutris nereis*

<https://ecos.fws.gov/ecp/species/8560>

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the [National Wildlife Refuge](#) system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

This location overlaps the following National Wildlife Refuge lands:

LAND	ACRES
GUADALUPE-NIPOMO DUNES NATIONAL WILDLIFE REFUGE	2,501.42 acres
HOPPER MOUNTAIN NATIONAL WILDLIFE REFUGE	2,337.32 acres

Fish hatcheries

There are no fish hatcheries at this location.

Wetlands in the National Wetlands Inventory (NWI)

Impacts to [NWI wetlands](#) and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local [U.S. Army Corps of Engineers District](#).

Wetland information is not available at this time

This can happen when the National Wetlands Inventory (NWI) map service is unavailable, or for very large projects that intersect many wetland areas. Try again, or visit the [NWI map](#) to view wetlands at this location.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work

conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tubefield worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

APPENDIX C

National Marine Fisheries Service Consultations



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802-4213

January 20, 2023

Refer to NMFS No: WCRO-2023-00002

Beatrice L. Kephart
Chief, Installation Management Flight
30 CES/CEI
1028 Iceland Avenue
Vandenberg AFC, California 93437

Re: Endangered Species Act Section 7(a)(2) Concurrence Letter for increasing number of launches at the Vandenberg Space Force Base

Dear Mr. Kephart:

This letter responds to your December 19, 2022, request for concurrence from the National Marine Fisheries Service (NMFS) pursuant to Section 7 of the Endangered Species Act (ESA) for the subject action. Your request qualified for our expedited review and concurrence because it contained all required information on your proposed action and its potential effects to listed species and designated critical habitat.

We reviewed United States Space Force's consultation request document and related materials. Based on our knowledge, expertise, and your action agency's materials, we concur with the action agency's conclusions that the proposed action is not likely to adversely affect the NMFS ESA-listed species and/or designated critical habitat.

This letter underwent pre-dissemination review using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). The concurrence letter will be available through NMFS' Environmental Consultation Organizer [<https://appscloud.fisheries.noaa.gov>]. A complete record of this consultation is on file at the NMFS Long Beach office.

Reinitiation of consultation is required and shall be requested by the United States Space Force or by NMFS, where discretionary Federal involvement or control over the action has been retained or is authorized by law and (1) the proposed action causes take; (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the written concurrence; or (4) a new species is listed or critical habitat designated that may be affected by the identified action (50 CFR 402.16).

This concludes the ESA consultation.

Please direct questions regarding this letter to Chiharu Mori at Chiharu.Mori@noaa.gov.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Dan Lawson', is positioned above the printed name.

Dan Lawson
Long Beach Branch Chief
Protected Resource Division

cc: Rhys Evans, VAFB, rhys.evans@spaceforce.mil

Administrative Record Number: 151422WCR2023PR00013



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802-4213

April 17, 2024

Refer to NMFS No: WCRO-2024-00812

Beatrice L. Kephart
Chief, Installation Management Flight
30 CES/CEI
1028 Iceland Avenue
Vandenberg AFC, California 93437

Re: Endangered Species Act Section 7(a)(2) Concurrence Letter for the Increase Cadence of Space Launch Vehicle First Stage Recovery Actions and Expanded Landing Areas in the Pacific Ocean

Dear Ms. Kephart,

This letter responds to your March 21, 2024, request for concurrence from the National Marine Fisheries Service (NMFS) pursuant to Section 7 of the Endangered Species Act (ESA) for the subject action. Your request qualified for our expedited review and concurrence because it contained all required information on your proposed action and its potential effects to listed species and designated critical habitat.

This response to your request was prepared by NMFS pursuant to section 7(a)(2) of the ESA and implementing regulations at 50 CFR 402. On July 5, 2022, the U.S. District Court for the Northern District of California issued an order vacating the 2019 regulations that were revised or added to 50 CFR part 402 in 2019 ("2019 Regulations," see 84 FR 44976, August 27, 2019) without making a finding on the merits. On September 21, 2022, the U.S. Court of Appeals for the Ninth Circuit granted a temporary stay of the district court's July 5 order. On November 14, 2022, the Northern District of California issued an order granting the government's request for voluntary remand without vacating the 2019 regulations. The District Court issued a slightly amended order two days later on November 16, 2022. As a result, the 2019 regulations remain in effect, and we are applying the 2019 regulations here. For purposes of this consultation and in an abundance of caution, we considered whether the substantive analysis and conclusions articulated in the letter of concurrence would be any different under the pre-2019 regulations. We have determined that our analysis and conclusions would not be any different.

We reviewed the Department of Air Force's (DAF) consultation request document and related materials. After a brief exchange in clarification regarding the proposed action and effects determination, and reference to their most recent 2023 consultation, we believe there was adequate consideration and mitigation measures to address the, minimal but present, threat of entanglement, ingestion of debris, strike by falling object, vessel strike, exposure to sonic boom, and other indirect effects. Based on our knowledge, expertise, and your action agency's materials, we concur with the action agency's conclusions that the proposed action is not likely to adversely affect the NMFS ESA-listed species and/or proposed critical habitat.

This letter underwent pre-dissemination review using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). The concurrence letter will be available through NMFS' Environmental Consultation Organizer (<https://www.fisheries.noaa.gov/resource/tool-app/environmental-consultation-organizer-eco>) A complete record of this consultation is on file at NMFS Long Beach, CA office.

Reinitiation of consultation is required and shall be requested by DAF or by NMFS, where discretionary Federal involvement or control over the action has been retained or is authorized by law and (1) the proposed action causes take; (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the written concurrence; or (4) a new species is listed or critical habitat designated that may be affected by the identified action (50 CFR 402.16). This concludes the ESA consultation.

Please direct questions regarding this letter to Dan Lawson, NMFS Long Beach, CA office at Dan.Lawson@noaa.gov.

Sincerely,



Dan Lawson
Long Beach Office Branch Chief
Protected Resources Division

bcc: Administrative File: 151422WCR2024PR00078



DEPARTMENT OF COMMERCE

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

NATIONAL MARINE FISHERIES SERVICE

Letter of Authorization

The U.S. Space Force (USSF), is hereby authorized to take marine mammals incidental to those activities at Vandenberg Space Force Base (VSFB), California, in accordance with 50 CFR 217, Subpart G--Taking Marine Mammals Incidental to U.S. Space Force Launches and Operations at Vandenberg Space Force Base (VSFB), California subject to the provisions of the Marine Mammal Protection Act (16 U.S.C. 1361 *et seq.*; MMPA) and the following conditions:

1. This Letter of Authorization (LOA) is valid April 10, 2024, through April 9, 2029.
2. This Authorization is valid only for the unintentional taking of the species and stocks of marine mammals identified in Condition 4 incidental to rocket and missile launches and supporting operations originating at VSFB.
3. This Authorization is valid only if USSF or any person(s) operating under its authority implements the mitigation, monitoring, and reporting required pursuant to 50 CFR §§ 217.64 and 217.65 and implements the Terms and Conditions of this Authorization.
4. General Conditions
 - (a) A copy of this LOA must be in the possession of USSF, its designees, and personnel operating under the authority of this LOA.
 - (b) The incidental take of marine mammals under the activities identified in Condition 2 and 50 CFR § 217.60 of the regulations, by Level B harassment only, is limited to the species and stocks and number of takes shown in Table 1.

Species	Stock	Annual Take by Level B harassment	5-Year Total Take by Level B harassment
Harbor seal	California	11,135	38,591
California sea lion	United States	84,870	281,021
Northern elephant seal	California Breeding	9,438	29,590
Steller sea lion	Eastern	550	1,900
Northern fur seal	California	5,909	18,383
Guadalupe fur seal	Mexico	23	71



- (c) The taking by injury (Level A harassment), serious injury, or death of any of the species listed in condition 3(b) of the Authorization or any taking of any other species of marine mammal is prohibited and may result in the modification, suspension, or revocation of this LOA.

5. Mitigation

USSF, and any persons operating under its authority, must implement the following mitigation measures when conducting the activities identified in Condition 2 of this Authorization.

- (a) USSF must provide pupping information to launch proponents at the earliest possible stage in the launch planning process and direct launch proponents to, if practicable, avoid scheduling launches during pupping seasons on VSFB from 1 March to 30 April and on the Northern Channel Islands from 1 June- 31 July. If practicable, rocket launches predicted to produce a sonic boom on the Northern Channel Islands >3 pounds per square foot (psf) from 1 June – 31 July will be scheduled to coincide with tides in excess of +1.0 ft (0.3 m), with an objective to do so at least 50 percent of the time.
- (b) For manned flight operations, aircraft must use approved routes for testing and evaluation. Manned aircraft must also remain outside of a 1,000-ft (305 m) buffer around pinniped rookeries and haul-out sites (except in emergencies such as law enforcement response or Search and Rescue operations, and with a reduced, 500-ft (152 m) buffer at Small Haul-out 1).
- (c) UAS classes 0-2 must maintain a minimum altitude of 300 ft (91 m) over all known marine mammal haulouts when marine mammals are present, except at take-off and landing. Class 3 must maintain a minimum altitude of 500 ft (152 m), except at take-off and landing. UAS classes 4 and 5 only operate from the VSFB airfield and must maintain a minimum altitude of 1,000 ft (305 m) over marine mammal haulouts except at take-off and landing. USSF must not fly class 4 or 5 UAS below 1,000 ft (305 m) over haulouts.

6. Monitoring

USSF is required to conduct marine mammal and acoustic monitoring as described below:

- (a) Monitoring at VSFB and NCI must be conducted by at least one NMFS-approved Protected Species Observer (PSO) trained in marine mammal science. PSOs must have demonstrated proficiency in the identification of all age and sex classes of all marine mammal species that occur at VSFB and on NCI. They must be knowledgeable of approved count methodology and have experience in observing pinniped behavior, especially that due to human disturbances.

- (b) In the event that the PSO requirements described in paragraph (a) of this section cannot be met (*e.g.*, access is prohibited due to safety concerns), daylight or nighttime video monitoring must be used in lieu of PSO monitoring. In certain circumstances where the daylight or nighttime video monitoring is also not possible (*e.g.*, USSF is unable to access a monitoring site due to road conditions or human safety concerns), USSF must notify NMFS.
- (c) At VSFB, USSF must conduct marine mammal monitoring and take acoustic measurements for all new rockets, for rockets (existing and new) launched from new facilities, and for larger or louder rockets (including those with new launch proponents) than those that have been previously launched from VSFB during their first three launches and for the first three launches from any new facilities during March through July.
 - i. For launches that occur during the harbor seal pupping season (March 1 through June 30) or when higher numbers of California sea lions are present (June 1 through July 31), monitoring must be conducted. At least one NMFS-approved PSO trained in marine mammal science must conduct the monitoring.
 - ii. When launch monitoring is required, monitoring must begin at least 72 hours prior to the launch and continue through at least 48 hours after the launch. Monitoring must include multiple surveys each day, with a minimum of four surveys per day.
 - iii. For launches within the harbor seal pupping season, USSF must conduct a follow-up survey of pups.
 - iv. For launches that occur during daylight, USSF must make time-lapse video recordings to capture the reactions of pinnipeds to each launch. For launches that occur at night, USSF must employ night video monitoring, when feasible.
 - v. When possible, PSOs must record: species, number, general behavior, presence and number of pups, age class, gender, and reaction to launch noise, or to natural or other human-caused disturbances. PSOs must also record environmental conditions, including visibility, air temperature, clouds, wind speed and direction, tides, and swell height and direction.
- (d) USSF must conduct sonic boom modeling prior to the first three small or medium rocket launches from new launch proponents or at new launch facilities, and all heavy or super-heavy rocket launches.
- (e) USSF must conduct marine mammal monitoring and take acoustic measurements at the NCI if the sonic boom model indicates that pressures from a boom will reach or exceed 7 psf from 1 January through 28 February, 5 psf from 1 March through 31

July, or 7 psf from 1 August through 30 September. No monitoring is required on NCI from 1 October through 31 December.

- i. The monitoring site must be selected based upon the model results, prioritizing a significant haulout site on one of the islands where the maximum sound pressures are expected to occur.
 - ii. USSF must estimate the number of animals on the monitored beach and record their reactions to the launch noise and conduct more focused monitoring on a smaller subset or focal group.
 - iii. Monitoring must commence at least 72 hours prior to the launch, during the launch and at least 48 hours after the launch, unless no sonic boom is detected by the monitors and/or by the acoustic recording equipment, at which time monitoring may be stopped.
 - iv. For launches that occur in darkness, USSF must use night vision equipment.
 - v. Monitoring for each launch must include multiple surveys each day that record, when possible: species, number, general behavior, presence of pups, age class, gender, and reaction to sonic booms or natural or human-caused disturbances.
 - vi. USSF must collect photo and/or video recordings for daylight launches when feasible, and if the launch occurs in darkness night vision equipment will be used.
 - vii. USSF must record environmental conditions, including visibility, air temperature, clouds, wind speed and direction, tides, and swell height and direction.
- (f) USSF must continue to test equipment and emerging technologies, including but not limited to night vision cameras, newer models of remote video cameras and other means of remote monitoring at both VSFB and on the NCI.
- (g) USSF must evaluate UAS based or space-based technologies that become available for suitability, practicability, and for any advantage that remote sensing may provide to existing monitoring approaches.
- (h) USSF must monitor marine mammals during the first three launches of the missiles for the new Ground Based Strategic Defense program during the months of March through July across the 5-year duration of this LOA.
- i. When launch monitoring is required, monitoring must include multiple surveys each day, with a minimum of four surveys per day.

- ii. When possible, PSOs must record: species, number, general behavior, presence and number of pups, age class, gender, and reaction to launch noise, or to natural or other human-caused disturbances. PSOs must also record environmental conditions, including visibility, air temperature, clouds, wind speed and direction, tides, and swell height and direction.
- (i) USSF must conduct semi-monthly surveys (two surveys per month) to monitor the abundance, distribution, and status of pinnipeds at VSFB. Whenever possible, these surveys will be timed to coincide with the lowest afternoon tides of each month when the greatest numbers of animals are usually hauled out. If a VSFB or area closure precludes monitoring on a given day, USSF must monitor on the next best day.
 - i. PSOs must gather the following data at each site: species, number, general behavior, presence and number of pups, age class, gender, and any reactions to natural or human-caused disturbances. PSOs must also record environmental conditions, including visibility, air temperature, clouds, wind speed and direction, tides, and swell height and direction.

7. Reporting

- (a) USSF must submit an annual report each year to NMFS Office of Protected Resources and West Coast Region on March 1st of each year that describes all activities and monitoring for the specified activities during that year. This includes launch monitoring information in Condition 7(a)(i) through (iii) for each launch where monitoring is required or conducted. The annual reports must also include a summary of the documented numbers of instances of harassment incidental to the specified activities, including non-launch activities (*e.g.*, takes incidental to aircraft or helicopter operations observed during the semi-monthly surveys). Annual reports must also include the results of the semi-monthly sentinel marine mammal monitoring described in Condition 6(i), results of tests of equipment and emerging technologies described in condition 6(f), and results of evaluation of UAS based or space-based technologies described in condition 6(g).
 - i. Launch information, including:
 - 1) Date(s) and time(s) of the launch (and sonic boom, if applicable);
 - 2) Number(s), type(s), and location(s) of rockets or missiles launched;
 - ii. Monitoring program design; and
 - iii. Results of the launch-specific monitoring program, including:
 - 1) Date(s) and location(s) of marine mammal monitoring;

- 2) Number of animals observed, by species, on the haulout prior to commencement of the launch or recovery;
 - 3) General behavior and, if possible, age (including presence and number of pups) and sex class of pinnipeds hauled out prior to the launch or recovery;
 - 4) Number of animals, by species, age, and sex class that responded at a level indicative of harassment. Harassment is characterized by:
 - A. Movements in response to the source of disturbance, ranging from short withdrawals at least twice the animal's body length to longer retreats over the beach, or if already moving a change of direction of greater than 90 degrees; or
 - B. All retreats (flushes) to the water.
 - 5) Number of animals, by species, age, and sex class that entered the water, the length of time the animal(s) remained off the haulout, and any behavioral responses by pinnipeds that were likely in response to the specified activities, including in response to launch noise or a sonic boom;
 - 6) Environmental conditions including visibility, air temperature, clouds, wind speed and direction, tides, and swell height and direction; and
 - 7) Results of acoustic monitoring, including the following:
 - A. Recorded sound levels associated with the launch (in SEL, SPL_{peak} , and SPL_{rms});
 - B. Recorded sound levels associated with the sonic boom (if applicable), in psf; and
 - C. The estimated distance of the recorder to the launch site and the distance of the closest animals to the launch site.
- iv. Results of the semi-monthly sentinel marine mammal monitoring described in Condition 6(i), including:
- 1) Number of animals observed, by species;
 - 2) General behavior and, if possible, age (including presence and number of pups) and sex class of pinnipeds hauled out;

- 3) Any reactions to natural or human-caused disturbances;
 - 4) Environmental conditions including visibility, air temperature, clouds, wind speed and direction, tides, and swell height and direction.
- (b) USSF must submit a final, comprehensive 5-year report to NMFS Office of Protected Resources within 90 days of the expiration of this LOA. This report must:
- i. Summarize the activities undertaken and the results reported in all annual reports;
 - ii. Assess the impacts at each of the major rookeries; and
 - iii. Assess the cumulative impacts on pinnipeds and other marine mammals from the activities specified in Condition 2.
- (c) If the activity identified in Condition 2 likely resulted in the take of marine mammals not identified in Condition 4(b), then the USSF must notify the NMFS Office of Protected Resources and the NMFS West Coast Region stranding coordinator within 24 hours of the discovery of the take.
- (d) In the event that personnel involved in the activities discover an injured or dead marine mammal, USSF must report the incident to the Office of Protected Resources (OPR), NMFS (PR.ITP.MonitoringReports@noaa.gov and itp.davis@noaa.gov) and to the West Coast regional stranding network (866-767-6114) as soon as feasible.

The report must include the following information:

- i. Time, date, and location (latitude/longitude) of the first discovery (and updated location information if known and applicable);
 - ii. Species identification (if known) or description of the animal(s) involved;
 - iii. Condition of the animal(s) (including carcass condition if the animal is dead);
 - iv. Observed behaviors of the animal(s), if alive;
 - v. If available, photographs or video footage of the animal(s); and
 - vi. General circumstances under which the animal was discovered.
- (e) If real-time monitoring during a launch shows that the activity identified in Condition 2 is reasonably likely to have resulted in the mortality or injury of any marine mammal, USSF must notify NMFS within 24 hours (or next business day). NMFS and USSF must then jointly review the launch procedure and the mitigation

requirements and make appropriate changes through the adaptive management process, as necessary and before any subsequent launches of rockets and missiles with similar or greater sound fields and/or sonic boom pressure levels.

8. This Authorization may be modified, suspended or withdrawn if USSF fails to abide by the conditions prescribed herein or if the authorized taking is having more than a negligible impact on the species or stock of affected marine mammals.

9. Renewals and Modifications of Letter of Authorization

- (a) A LOA issued under 50 CFR §§ 216.106 and § 217.66 for the activity identified in Condition 2 of this Authorization and 50 CFR § 217.60(a) and (b) shall be modified upon request by USSF, provided that:
 - i. The specified activity and mitigation, monitoring, and reporting measures, as well as the anticipated impacts, are the same as those described and analyzed for this subpart (excluding changes made pursuant to the adaptive management provision in paragraph (c) of this section); and
 - ii. NMFS determines that the mitigation, monitoring, and reporting measures required by the previous LOA under these regulations were implemented.
- (b) For LOA modification or renewal requests by the applicant that include changes to the activity or the mitigation, monitoring, or reporting measures (excluding changes made pursuant to the adaptive management provision in paragraph (c) of this section) that do not change the findings made for the regulations or that result in no more than a minor change in the total estimated number of takes (or distribution by species or stock or years), NMFS may publish a notice of proposed changes to the LOA in the *Federal Register*, including the associated analysis of the change, and solicit public comment before issuing the LOA.
- (c) An LOA issued under 50 CFR §§ 216.106 and 217.66 for the activity identified in Condition 2 of this Authorization and 50 CFR § 217.60(a) and (b) may be modified by NMFS under the following circumstances:
 - i. After consulting with the USSF regarding the practicability of the modifications, NMFS, through adaptive management, may modify (including adding or removing measures) the existing mitigation, monitoring, or reporting measures if doing so creates a reasonable likelihood of more effectively accomplishing the goals of the mitigation and monitoring.
 - ii. Possible sources of data that could contribute to the decision to modify the mitigation, monitoring, or reporting measures in an LOA include:
 - 1) Results from the USSF's monitoring from the previous year(s);

- 2) Results from other marine mammal and/or sound research or studies; or
 - 3) Any information that reveals marine mammals may have been taken in a manner, extent or number not authorized by these regulations or a subsequent LOA.
- iii. If, through adaptive management, the modifications to the mitigation, monitoring, or reporting measures are more than minor, NMFS will publish a notice of the proposed changes to the LOA in the *Federal Register* and solicit public comment.
- (d) If NMFS determines that an emergency exists that poses a significant risk to the well-being of the species or stocks of marine mammals specified in the regulations and this Authorization, an LOA may be modified without prior notice or opportunity for public comment. Notice would be published in the *Federal Register* within 30 days of the action.

For Kimberly Damon-Randall, Director
Office of Protected Resources

Assessment to Determine Applicability of Vandenberg Space Force Base National Marine Fisheries Service Letter of Authorization for Falcon 9 Mainland Booms

2 August 2024

Background

The Department of the Air Force (DAF) contacted the National Marine Fisheries Service (NMFS) regarding mainland acoustic impacts in the Ventura County area as a result of recent SpaceX Falcon missions with easterly trajectories. Since the region of acoustic impact has increased from what was considered in the DAF's application for a Letter of Authorization (LOA; NMFS 2024), the DAF has reassessed acoustic impacts to marine mammals to analyze if the increased impact is covered by the estimated take totals in the LOA or if an amendment is needed. There are two harbor seal haulouts identified on the mainland in the new geographic noise footprint, shown in Figure 1, the Carpinteria Harbor Seal Rookery and the Point Mugu Lagoon haulout.

Our LOA assumes 110 rocket launches from Vandenberg Space Force Base annually. We have assumed 100 Falcon 9 rocket launches in our calculations below to ensure we are account for maximum future potential impact from the easterly trajectories of this rocket.

Potential Noise Impacts

Falcon launches with easterly trajectories may result in sonic booms that impact eastern Santa Barbara, Ventura, and northwestern Los Angeles Counties (Figure 1). Even with identical trajectories, atmospheric conditions create considerable variation in where sonic booms impact and the level at which they impact. To account for this variation, PCBoom can utilize meteorological parameters in the model that affect where and at what level a sonic boom may impact the surface of the earth. In the late 1990's, SRS Technologies, Inc. assembled a series of daily meteorological profiles across 10 years (1984-1994, one per day for 10 years) from radiosonde data for weather balloons released by the VSFB weather squadron. The data include pressure, temperature, wind speed, and wind direction along an elevational profile from ground, every 1,000 feet (ft), to 110,000 ft. Figure 1 depicts the overlaid output from sonic boom modeling software (PCBoom) for four actual SpaceX easterly trajectories, each trajectory run between 29 and 34 times, each run representing 1 of between 29 and 34 randomly selected meteorological profiles that capture potential weather conditions throughout the year (125 model outputs total) overlaid in the image.

We have collected sonic boom overpressure levels in the field for 6 easterly trajectories to determine to what extent the modeled vs actual overpressure levels align (Table 1). Thus far, we have seen that the model predicts higher potential boom levels than actual and thus we are confident that our calculations below are an overestimation.

Table 1. Sonic Boom Data Collection to Date.

Mission	Date	Azimuth	# of Collection Stations	Predicted Boom Level	Actual Boom Level
Starlink 8-7	14 May 2024 18:39Z	144	5	< 0.5 – 2.1 psf	< 0.5 psf
Starlink 8-8	8 June 2024 12:58Z	144	5	< 0.5 – 2.1 psf	0 psf
Starlink 9-1	19 June 2024, 03:40Z	144	15	< 0.5-1.0 psf	< 1.0 psf
Starlink 9-2	24 June 2024, 03:47Z	144	20	< 0.5-1.0 psf	< 0.5 psf
NROL-186	29 June 2024, 03:14Z	155	20	< 1.0-1.99 psf	< 0.1 psf
Starlink 9-3	12 July 2024, 02:39Z	144	15	< 1.0-1.99 psf	<0.5 psf

In addition to sonic boom, rocket engine noise is expected in these areas, but at very low levels. RNOISE was used to model engine noise during Falcon 9 launch from SLC-4. The modeled 90 decibel (dB) unweighted peak sound pressure level (SPL) extends to approximately 7.4 miles southeast of SLC-4 (Figure 2). Santa Barbara is estimated to receive 60 dB unweighted SPL due to rocket engine noise (Figure 2). Additionally, acoustic monitoring in Ventura County for five SpaceX missions with easterly trajectories, engine noise has been below ambient noise levels and thus could not be measured.

NMFS In-Air Acoustic Thresholds

Pinnipeds are categorized into two functional hearing groups based on their generalized hearing sensitivities: (1) otariids and (2) phocids. Within these hearing groups, there is one phocid, the Pacific harbor seal, that hauls out in the area that may experience noise as a result of Falcon launches in Ventura County. NMFS has established thresholds for in-air impulsive noise for Level B harassment (i.e., behavioral disruption and temporary threshold shift [TTS] in hearing sensitivity) and for Level A harassment (permanent threshold shifts [PTS] in hearing sensitivity) based on species' audiograms and the results of studies measuring threshold shifts and behavioral responses (Table 2; NMFS 2021). For all pinnipeds the Level B harassment threshold for behavioral disruption is a sound exposure level (SEL) of 100 decibels (dB).

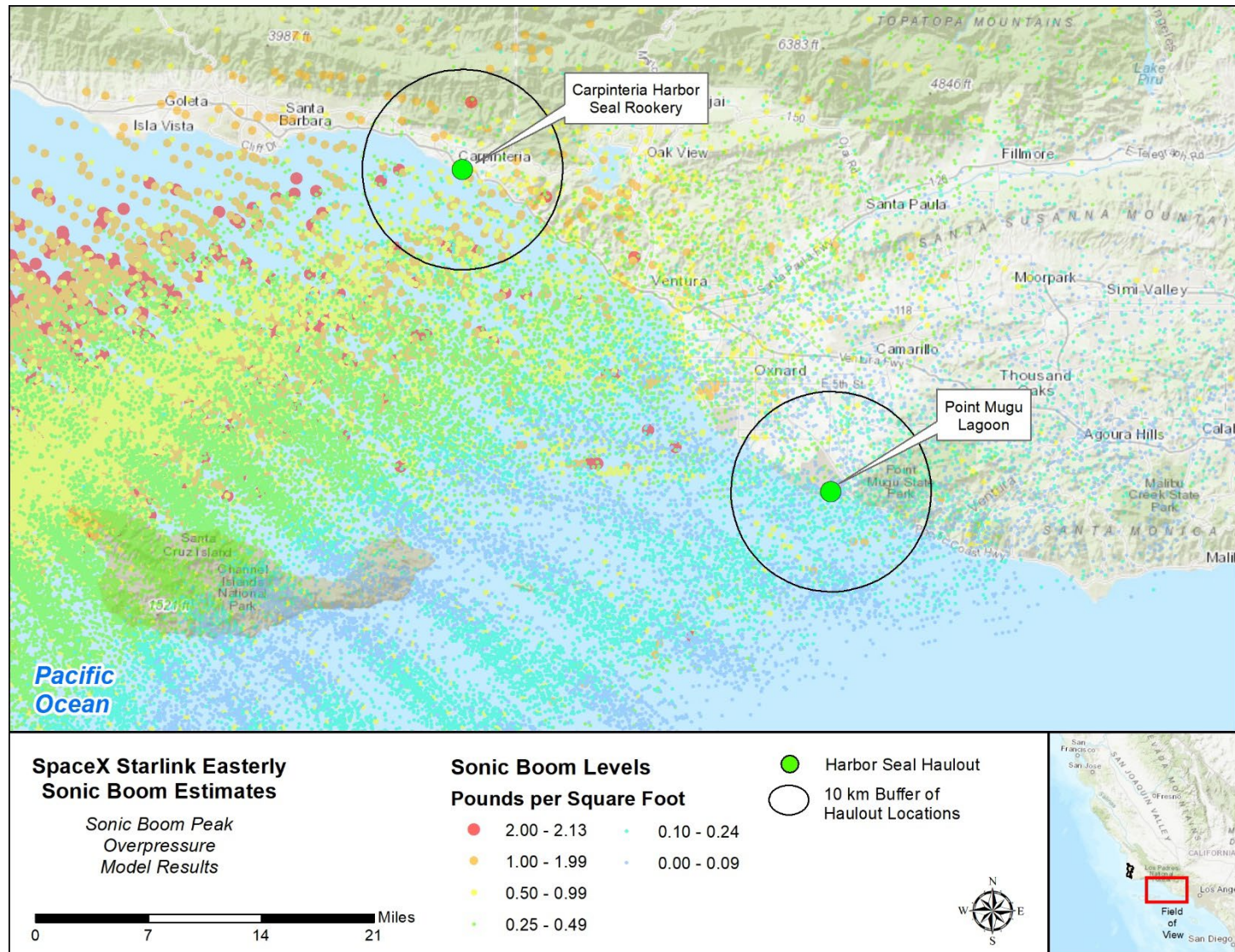


Figure 1. Sonic boom model results for easterly SpaceX Starlink trajectories showing range of possible boom impact areas and levels, depending on meteorological conditions, and mainland harbor seal haulouts (Note: the image is intended to show the array of potential sonic booms; no single launch would result in impacts across the entire areas depicted nor at the specific levels depicted).

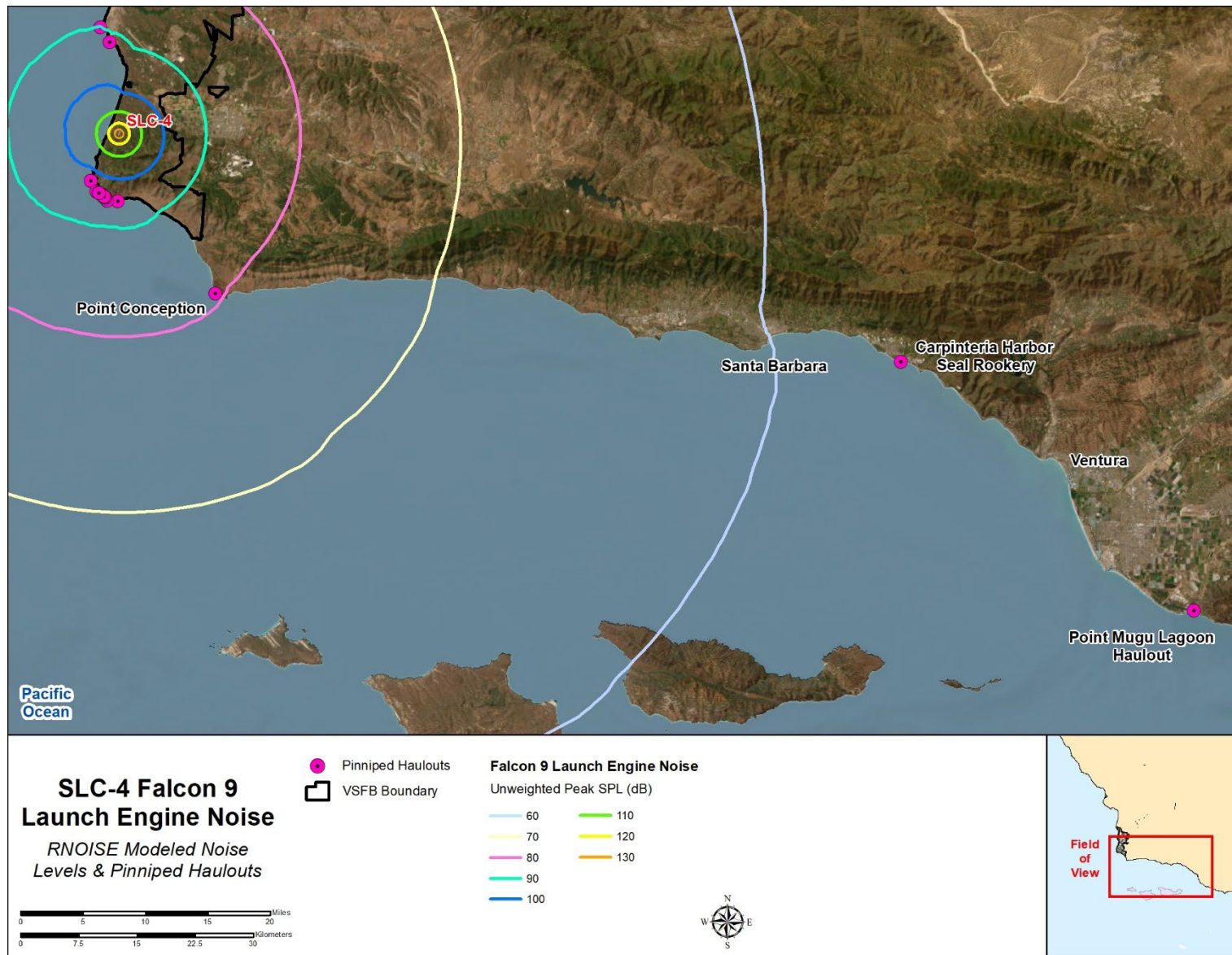


Figure 2. Modeled rocket engine noise for Falcon 9 launch from SLC-4 using RNOISE.

NMFS has also established thresholds for in-air non-impulsive noise for Level B harassment (behavioral disruption) for pinnipeds Table 3 (NMFS 2021). For harbor seals, the Level B harassment threshold (behavioral disruption) for non-impulsive noise is 90 dB root mean square (dB_{rms}). The dB_{rms} is the average dB of a noise over a period of time; therefore, substituting dB peak SPL is a conservative approach to applying the threshold for Level B harassment. NMFS has not established thresholds for Level A harassment resulting from PTS or Level B harassment resulting from TTS. However, according to Southall et al. (2019), the most recent study available, the lower limit for TTS as a result of in-air non-impulsive noise for phocids is 134 dB SEL, and the lower limit for PTS is 154 dB SEL (Table 4).

Table 2. Thresholds for in-air impulsive sound effects on pinnipeds.

Hearing Group	MMPA Level B Exposure		MMPA Level A Exposure
	Behavioral - SEL (unweighted)	TTS - Peak SPL (unweighted; re 20 µPa)	PTS - Peak SPL (unweighted; re 20 µPa)
Otariids	100 dB re 20 µPa ² sec	170 dB (132.1 psf)	176 dB (263.6 psf)
Phocids		155 dB (23.5 psf)	161 dB (46.9 psf)

Source: NMFS 2021

SEL = sound exposure level; SPL = sound pressure level; dB = decibels; dB re 20 µPa = decibels related to 20 micropascals; dB re 20 µPa²sec = decibels related to 20 micropascals squared seconds

Table 3. National Marine Fisheries Service current in-air acoustic thresholds for pinnipeds for non-impulsive noise.

Criterion	Criterion Definition	NMFS Threshold
Level A	PTS (injury)	None established
Level B	TTS	None established
Level B	Behavioral disruption for harbor seals	90 dB _{rms}
Level B	Behavioral disruption for non-harbor seal pinnipeds	100 dB _{rms}

Source: NMFS 2021

Table 4. In-air acoustic thresholds for TTS and PTS for pinnipeds and non-impulsive noise.

Group	Criterion Definition	Threshold
Otariids	PTS in hearing sensitivity (physical injury)	177 dB SEL
	TTS in hearing sensitivity	157 dB SEL
Phocids	PTS in hearing sensitivity (physical injury)	154 dB SEL
	TTS in hearing sensitivity	134 dB SEL

Source: Southall et al. 2019

Analysis of Noise Impacts in the Ventura County Area

The DAF applied the NMFS thresholds as the best available science to estimate level of take resulting from in-air impulsive and non-impulsive noise for harbor seals in Ventura County. During missions with easterly trajectories, the received engine noise levels (non-impulsive noise) would be substantially less than 90 dB_{rms}, the NMFS threshold for behavioral disturbance for harbor seals (Table 3). As discussed above, the modeled 90 dB peak SPL extends to approximately 7.4 miles southeast of SLC-4 (Figure 2). Additionally, acoustic monitoring in Ventura County for five SpaceX missions with easterly trajectories, engine noise has been below ambient noise levels and thus could not be measured. Therefore, engine noise is substantially below NMFS thresholds for behavioral disruption of harbor seals and thus no takes are anticipated at either the Carpinteria Harbor Seal Rookery or the Point Mugu Lagoon haulout.

To analyze the potential for take due to sonic boom (impulsive noise), the sonic boom model outputs were compared to harbor seal haulout locations, depicted in Figure 1. Approximately 39% of missions with easterly trajectories are predicted to impact the Carpinteria Harbor Seal Rookery. To estimate the potential levels of these sonic booms, a frequency distribution of potential sonic boom levels was constructed by overlaying a 10-km buffer of the rookery onto the PCBoom model output described above and as depicted in Figure 1. Of the sonic booms predicted to impact within 10 km of the rookery, 88% of the boom levels were predicted to be less than 1.0 psf, and 98% were predicted to be less than 2.0 psf (Figure 2). The highest predicted level was 3.7 psf.

For the Point Mugu Lagoon haulout, approximately 93% of missions with easterly trajectories are predicted to impact the site. However, 99.8% of the boom levels were predicted to be less than 1.0 psf, and 100% were predicted to be less than 1.5 psf (Figure 3). The highest predicted level was 1.6 psf.

Since PCBoom does not generate estimates of noise levels in SEL, recordings of sonic booms from VSFB were used to compare sonic boom psf levels to corresponding SEL values. During the SpaceX Sarah-1 mission, a 2.57 psf sonic boom was recorded on VSFB which corresponded to a measured level of 113.5 dB SEL. For the SpaceX Transporter 8 mission, a 1.07 psf sonic boom was recorded on VSFB which had a measured level of 102.3 dB SEL. Therefore, sonic booms of approximately 1 psf are expected to generally correspond to the NMFS threshold of 100 dB SEL for behavioral disruption for harbor seals (Table 2). This is supported by over two decades of pinniped monitoring by the DAF on the Northern Channel Islands and Vandenberg Space Force Base (VSFB) during sonic booms caused by numerous launches. The DAF has observed that there are generally no significant behavioral disruptions caused to pinnipeds by sonic booms less than 1 psf.

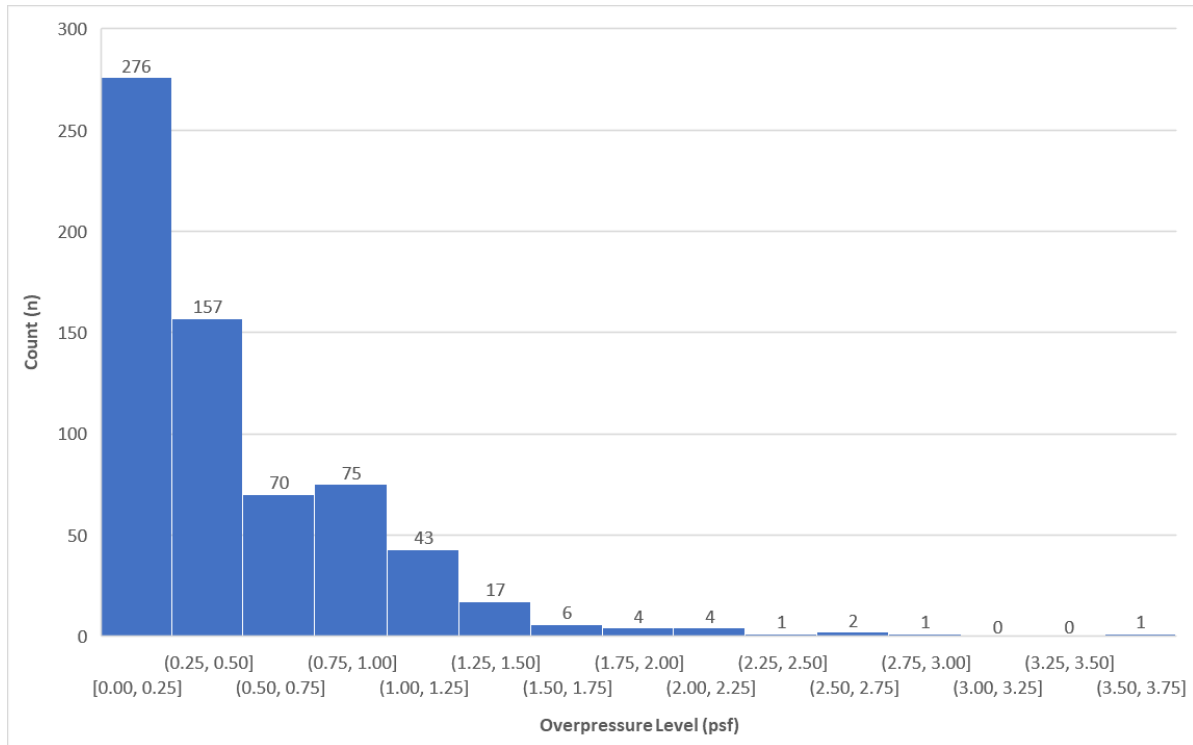


Figure 3. Distribution of PCBoom sonic boom modeling results within 10 km of the Carpinteria Harbor Seal Rookery, as shown in Figure 1.

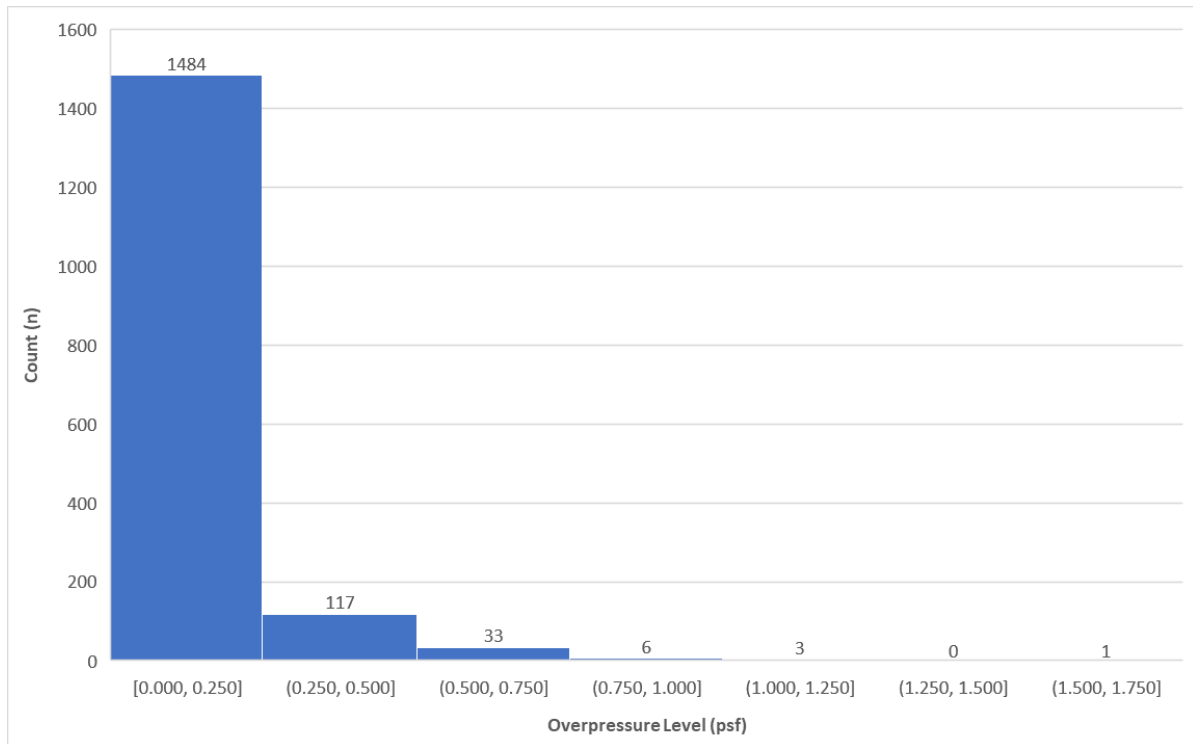


Figure 4. Distribution of PCBoom sonic boom modeling results within 10 km of the Point Mugu Lagoon haulout, as shown in Figure 1.

Therefore, applying NMFS thresholds for behavioral disruption caused by impulsive noise and VSFB pinniped monitoring results, we expect launches with easterly trajectories to result in sonic booms that would be at or above 1 psf for 22% of these missions at the Carpinteria Harbor Seal Rookery and less than 1% of missions at the Point Mugu Lagoon haulout. From 2019 through 2023 (excluding 2020 when counts did not occur due to Covid 19), the average number of adults present at the Carpinteria Harbor Seal Rookery from January through May was 132, with a high of 230 in May 2019 (Carpinteria Seal Watch 2024). The average highest number of pups recorded during this time period was 60 per year, with a high of 68 in 2019 (Carpinteria Seal Watch 2024). We estimate that approximately 80% of future Falcon 9 missions would have easterly trajectories and that 22% of these missions would create a sonic boom greater than 1 psf. Therefore, conservatively, an estimated 2,323 adult Pacific harbor seal takes would occur annually at this location. Based on 100 launches per year: $100 \text{ missions/year} \times 80\% \text{ of missions with easterly trajectories} \times 22\% \times 132 \text{ (average number recorded over a 5-year period)} = 2,323 \text{ takes}$.

For pups, present from January through May, conservatively an estimated 440 takes would occur each year. Based on 100 missions per year $\times$ 80% of missions with easterly trajectories, divided by 12 to get monthly average $\times$ 5 for the five-month pup season (Jan-May) $\times$ 22% $\times$ 60 (average highest number of pups recorded each year) = 440 takes. We used the average highest number of pups (vice average number) because of the short duration they are considered pups prior to weaning.

At the Point Mugu Lagoon haulout, we conservatively assume 1% of missions with easterly trajectories would cause a sonic boom of 1 psf or greater to impact this location. From 2019 through 2023, the average number of adults present at the Point Mugu Lagoon haulout was 104, with a high of 372 in December 2022 (NBVC Point Mugu 2024). The average highest number of pups recorded during this time period was 65 per year, with a high of 72 in 2021 (NBVC Point Mugu 2024). An estimated 83 adult Pacific harbor seals would be taken annually at this location. Based on 100 launches per year: $100 \text{ missions/year} \times 80\% \text{ of missions with easterly trajectories} \times 1\% \times 104 \text{ (average number recorded over a 5-year period)} = 83 \text{ takes}$.

For pups, present from January through May, an estimated 22 would be taken each year. Based on 100 missions per year $\times$ 80% of missions with easterly trajectories, divided by 12 to get monthly average $\times$ 5 for the five-month pup season (Jan-May) $\times$ 1% $\times$ 65 (average highest number of pups recorded each year) = 22 takes. We used the average highest number of pups (vice average number) because of the short duration they are considered pups prior to weaning.

Based on decades of monitoring harbor seal reactions to launch noise, we would expect all or some proportion of the seals to react to sonic booms of 1 psf or greater by moving off the haulout into the water. However, monitoring data shows that these responses are short-lived and animals begin to return to the haulout within minutes, typically returning to pre-launch numbers usually

within 10 to 20 minutes and show no signs of lasting behavioral impacts in the days following the launch.

Permitted Annual Take by Level B harassment

VSFB's LOA permits a total of 11,135 Pacific harbor seals to be incidentally taken by Level B harassment annually due to launch activities (NMFS 2024). Although this total did not include estimates of take at haulouts on the south coast of eastern Santa Barbara, Ventura, and northwestern Los Angeles Counties, any increase in annual take by Level B harassment of Pacific harbor seals (estimated to be 2,868 per year total) would be offset by a reduction in take on San Miguel Island. This is because as the trajectory of the Falcon 9 and resultant sonic boom moves more to the east and approaches 140 to 145 degrees the sonic boom no longer overlaps San Miguel Island, where there are large numbers of Pacific harbor seals and other pinnipeds. This is illustrated in Figures 5 and 6 below. It is therefore unnecessary to increase the number of permitted takes by Level B harassment of Pacific harbor seals under the LOA, despite the change in geographic area of potential impacts.

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Carpinteria Seal Watch. 2024. Carpinteria Seal Watch Numbers. Available at: <https://carpinteriasealwatch.org/about/>. Accessed on 2 July 2024.

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National Marine Fisheries Service. 2024. Letter of Authorization. 9 April 2024.

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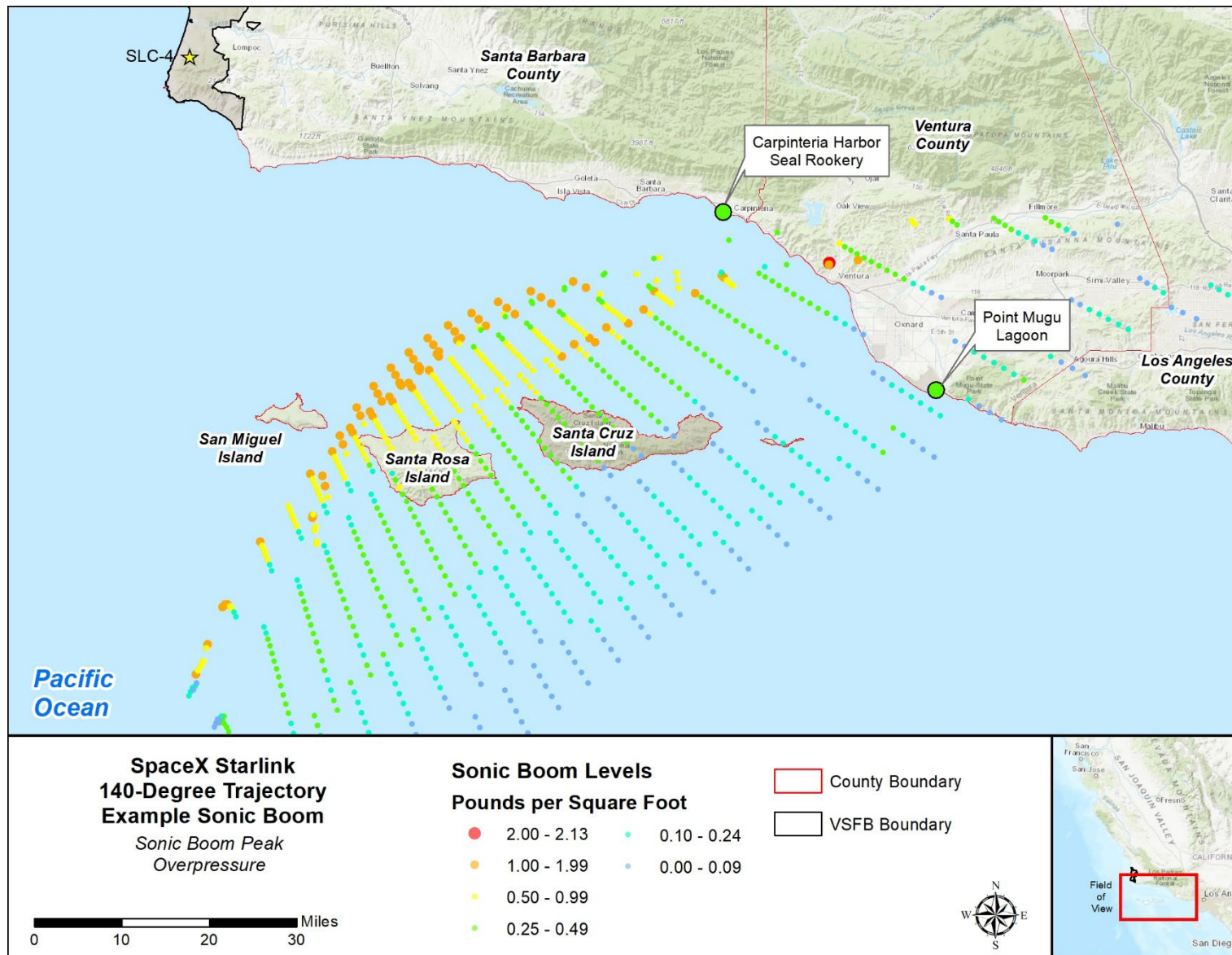


Figure 5. Falcon 9 sonic boom footprint during 140-degree trajectory overlapping mainland California, but not overlapping San Miguel Island.

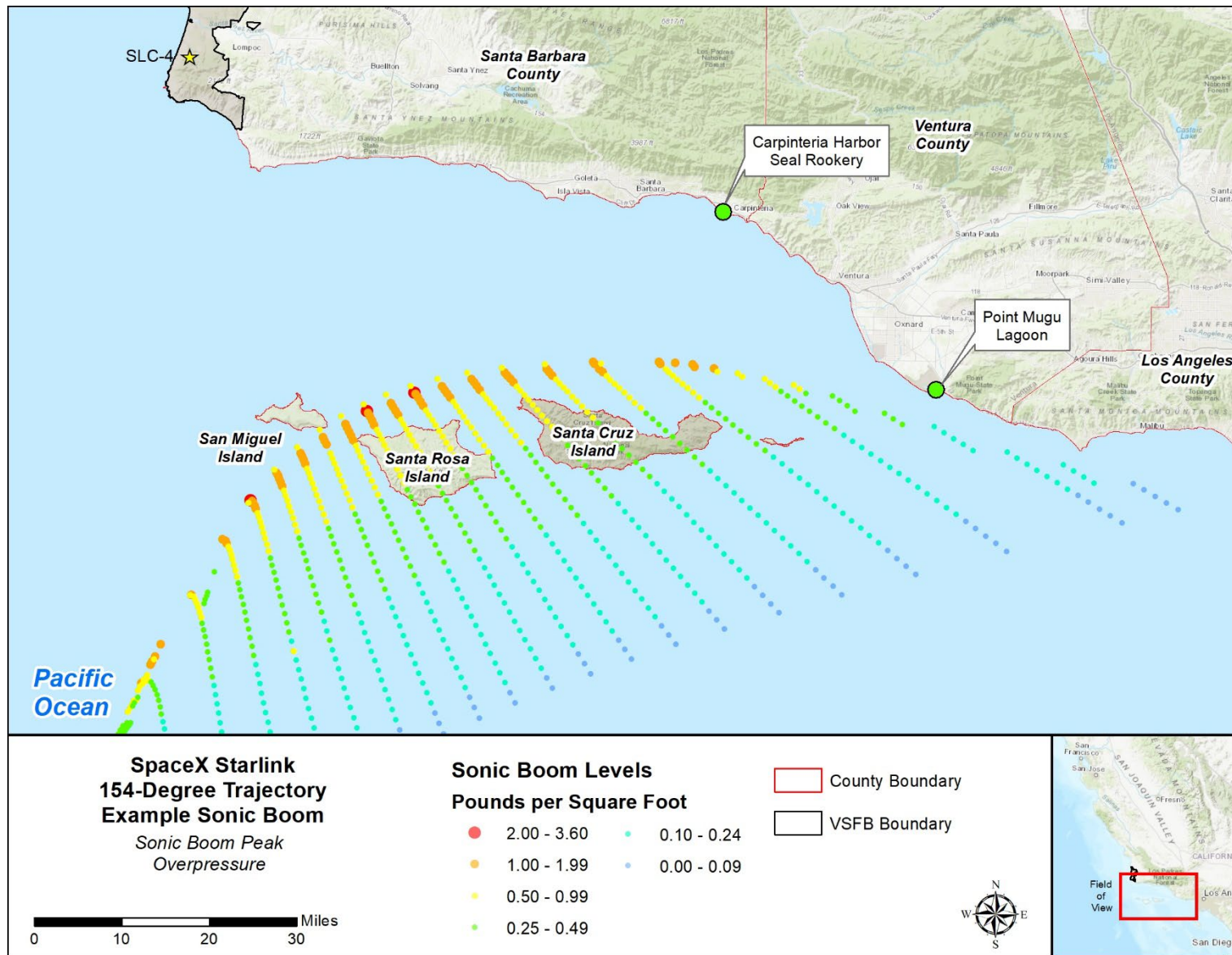


Figure 6. Falcon 9 sonic boom footprint during 154-degree trajectory not overlapping mainland California, some overlap with San Miguel Island.

From: [Leah Davis - NOAA Federal](#)
To: [WHITSITT-ODELL, TIFFANY A CIV USSF SSC 30 CES/CEIEA](#)
Cc: [KAISERSATT, SAMANTHA O CIV USSF SSC 30 CES/CEIEA](#)
Subject: Re: [Non-DoD Source] Re: Southeasterly Trajectories Maps and Information
Date: Tuesday, January 7, 2025 8:35:56 AM

Hi Tiffany,

Following NMFS' review and resolution of NMFS' questions on the Ventura Marine Mammal LOA Analysis, NMFS concurs with VSFB's conclusion that any marine mammal take from these activities is not likely to exceed the number of authorized takes in the April 2024 LOA. Therefore, we agree that modifying the LOA is not warranted at this time. In the event of incidental take of marine mammals that exceeds that analyzed in the analysis referenced above, VSFB should contact our office immediately to provide notification and to work through the necessary steps to ensure MMPA compliance moving forward, which could include submitting a request for a modified ITA. It is our practice to support the continuation of ongoing activities, contingent upon implementation of agreed-upon avoidance measures, while we act on any such request.

Kindly,
Leah

On Fri, Aug 2, 2024 at 3:40 PM WHITSITT-ODELL, TIFFANY A CIV USSF SSC 30 CES/CEIEA <tiffany.whitsitt-odell@spaceforce.mil> wrote:

Good Afternoon Leah –

Please find attached our analysis depicting impacts to harbor seals due to some of our easterly launch trajectories creating sonic booms on the mainland of Santa Barbara/Ventura/Los Angeles Counties. Based on the decades of launch specific monitoring we have completed, and past coordination with your agency, we are assuming the impacts to these individuals will be commensurate with what we have seen at other haul outs.

We welcome any questions you may have and a determination if you agree that the shift in noise impacts and potential take is covered under the existing 2024 LOA.

v/r,

Tiffany

Tiffany Whitsitt-Odell

Natural Resources, NH-3, 30 CES/CEIEA

1028 Iceland Ave B#11146
COMM: 805-606-4198/276-4198

Tiffany.Whitsitt-Odell@spaceforce.mil

(she, her, hers)

From: Leah Davis - NOAA Federal <leah.davis@noaa.gov>
Sent: Wednesday, June 26, 2024 5:16 AM
To: EVANS, RHYS M CIV USSF SSC 30 CES/CEIA <rhys.evans@spaceforce.mil>
Cc: KAISERSATT, SAMANTHA O CIV USSF SSC 30 CES/CEIA
<samantha.kaisersatt@spaceforce.mil>; WHITSITT-ODELL, TIFFANY A CIV USSF SSC 30 CES/CEIA
<tiffany.whitsitt-odell@spaceforce.mil>
Subject: Re: [Non-DoD Source] Re: Southeasterly Trajectories Maps and Information

Thanks, Rhys. I will keep an eye out for more from Tiffany and/or Samantha. Enjoy your retirement if we don't email again before then!

On Tue, Jun 25, 2024 at 7:17 PM EVANS, RHYS M CIV USSF SSC 30 CES/CEIA
<rhys.evans@spaceforce.mil> wrote:

Thank you! We are working on a response, which you will likely receive from Tiffany and/or Samantha...

I'll tell you INFORMALLY that our acoustics expert from Brigham Young University told me this morning that while they recorded booms in many locations last week, he unofficially categorized them as "minor" but it will take longer to ascertain actual PSF levels and variability between locations (but they had something like 26 recorders deployed). Yes, we acknowledge that even "minor" booms may impact pinnipeds... But more to follow!

Rhys

From: Leah Davis - NOAA Federal <leah.davis@noaa.gov>
Sent: Tuesday, June 25, 2024 1:45 PM
To: EVANS, RHYS M CIV USSF SSC 30 CES/CEIA <rhys.evans@spaceforce.mil>
Cc: KAISERSATT, SAMANTHA O CIV USSF SSC 30 CES/CEIA

<samantha.kaisersatt@spaceforce.mil>; WHITSITT-ODELL, TIFFANY A CIV USSF SSC 30 CES/CEIEA <tiffany.whitsitt-odell@spaceforce.mil>

Subject: [Non-DoD Source] Re: Southeasterly Trajectories Maps and Information

Hi Rhys,

Thanks again for providing this information. Following up from my conversation with Jolie, it is up to Vandenberg personnel to assess whether Vandenberg may be at risk of violating their authorization and needs additional MMPA coverage. If you would like to write an assessment with a determination for us to review, we would be happy to do so. (Of note, a relative comparison of impacts from the launches to impacts from other stressors (e.g., dogs) should not be included as part of an assessment.)

While additional monitoring is not a requirement, I think if I were you, I would conduct some pinniped monitoring on the mainland (perhaps at the site you reference above, for example) to observe whether responses that were not anticipated in the analysis may be occurring, in order to help support your determination.

I hope that helps!

Leah

On Fri, Jun 21, 2024 at 2:46 PM Leah Davis - NOAA Federal <leah.davis@noaa.gov> wrote:

Thanks, Rhys, received. I will review, check in with Jolie, and then follow up.

Have a great weekend,

Leah

On Thu, Jun 20, 2024 at 4:58 PM EVANS, RHYS M CIV USSF SSC 30 CES/CEIEA <rhys.evans@spaceforce.mil> wrote:

Hello again, Leah.

I've attached a brief, preliminary analysis (well, it's 8 pages, but 6 pages of figures) of sonic booms on the mainland. There will be more to come, specifically when we receive analysis of the 21 (I wrote 18 in the last e-mail) recorders that were deployed for the 18 June launch and are planned to be deployed again for a launch scheduled 28 June.

I would like to ask if there are any specific sites that concern you? We're of course "quite" aware of many comments on Facebook (etc.) over noise impacts to pinnipeds hauled-out at Carpinteria State Beach, but I would "argue" that those seals – and sometimes sea lions – are harassed by unleashed dogs about 18 times more than rockets...

The next part of this discussion should be about if we need to amend our LOA to include potential effects of mainland booms or if NMFS can consider including the mainland without a formal amendment?

Thanks! rhys

--

Leah Davis (she/her)

Biologist, Permits and Conservation Division

Office of Protected Resources | NOAA Fisheries
(301) 427- 8431
www.fisheries.noaa.gov

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Leah Davis (she/her)

Biologist, Permits and Conservation Division

Office of Protected Resources | NOAA Fisheries
(301) 427- 8431
www.fisheries.noaa.gov

--

Leah Davis (she/her)

Biologist, Permits and Conservation Division

Office of Protected Resources | NOAA Fisheries
(301) 427- 8431
www.fisheries.noaa.gov

--

Leah Davis (she/her)

Biologist, Permits and Conservation Division
Office of Protected Resources | NOAA Fisheries
(301) 427- 8431
www.fisheries.noaa.gov



**Biological Assessment for
Increase Cadence of Space Launch Vehicle First Stage Recovery
Actions and Expanded Landing Areas in the Pacific Ocean at
Vandenberg Space Force Base, California**

21 March 2024

Prepared for

Space Launch Delta 30, Installation Management Flight Environmental Assets
1028 Iceland Avenue, Bldg. 11146
Vandenberg Space Force Base, California 93437

Prepared by

ManTech SRS Technologies, Inc.
300 North G Street
Lompoc, CA 93436

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ACRONYMS AND ABBREVIATIONS

BA	Biological Assessment
C.F.R.	Code of Federal Regulations
DAF	Department of the Air Force
DPS	Distinct Population Segment
EPM	Environmental Protection Measure
ESA	Endangered Species Act
ESU	Evolutionary Significant Unit
°F	degrees Fahrenheit
FE	federally endangered
ft	foot or feet
FT	federally threatened
LOC	Letter of Concurrence
mi	mile(s)
NCI	Northern Channel Islands
NLAA	not likely to adversely affect
nm	nautical mile(s)
NMFS	National Marine Fisheries Service
psf	pounds per square foot
SLC	Space Launch Complex
USFWS	United States Fish and Wildlife Service
VSFB	Vandenberg Space Force Base

1 Introduction

1.1 Background & Consultation History

The purpose of this Biological Assessment (BA) is to address the effects of the addition of Falcon Heavy at Vandenberg Space Force Base (VSFB), increasing Falcon 9 and Falcon Heavy launch, and first stage and booster recoveries to 100 times per year, and expanding the first stage/booster and fairing recovery area in the Pacific Ocean on species listed under the Endangered Species Act (ESA) and designated critical habitat under the jurisdiction of the National Marine Fisheries Service (NMFS). Although the current action also includes the modification and future use of existing Space Launch Complex 6 (SLC-6), there is no impact from that portion of the action on NMFS' resources.

Only those species and designated critical habitat that may be affected by the Proposed Action are discussed in this BA. Consistent with the NMFS requirements for ESA Section 7 analyses, the spatial and temporal overlap of activities with the presence of listed species is assessed in this BA. The definitions used by the Department of the Air Force (DAF) in making the determination of effect under Section 7 of the ESA are based on the United States Fish and Wildlife Service (USFWS) and NMFS Endangered Species Consultation Handbook (USFWS & NMFS 1998). The DAF is the lead agency for the purposes of this BA. The DAF and the project proponents have utilized the best available scientific and commercial data in the preparation of this BA.

The DAF previously completed informal Section 7 consultation with NMFS, which concurred potential impacts were *not likely to adversely affect* the ESA-listed species managed by NMFS, detailed in Table 1.1-1, through a Letter of Concurrence (LOC), issued on 20 January 2023 (hereafter "2023 LOC"; NMFS 2023). The Proposed Change has not modified the action in a manner that would result in different types of stressors or levels of stressors that were not considered in the 2023 LOC; nor would the Proposed Change affect the ESA-listed species previously consulted on or critical habitat in a manner or to an extent not previously considered. The addition of Falcon Heavy to VSFB would not result in new stressors that were not considered in the 2023 LOC. The DAF would not increase the number of first stage/booster landings at VSFB; however, would increase the number of downrange first stage/booster landings on dronships in the Pacific Ocean. This increase would not change the types or levels of stressors to ESA-listed species in the Pacific Ocean (discussed in Section 4). The proposed recovery area is larger than analyzed in the 2023 LOC and overlaps the range of the federally threatened Central North Pacific Distinct Population Segment (DPS) of the green sea turtle (*Chelonia mydas*), which was not included in the NMFS 2023 LOC. All other species, DPSs, and Evolutionary Significant Units (ESUs) considered in the prior BA (30th Space Wing 2022) and 2023 LOC remain the same.

Table 1.1-1. NMFS concurrence on effect determinations for species, DPSs, and ESUs covered under LOC 20 January 2023.

Common Name	Distinct Population Segment or Evolutionarily Significant Units	ESA Status	Effect Determination
Steelhead	Southern California Coast	FE	NLAA
Chinook salmon	4 ESUs ¹	FT	NLAA
Coho salmon	2 ESUs ^{2,3}	FT	NLAA
Green sturgeon	Southern	FT	NLAA
Oceanic whitetip shark	-	FT	NLAA
Scalloped hammerhead shark	Eastern Pacific	FE	NLAA
Green sea turtle	East Pacific	FT	NLAA
Leatherback sea turtle	-	FE	NLAA
Olive ridley sea turtle	Mexico Pacific coast	FE	NLAA
Hawksbill sea turtle	-	FE	NLAA
Loggerhead turtle	North Pacific	FE	NLAA
Blue whale	-	FE	NLAA
Fin whale	-	FE	NLAA
Gray whale	Western North Pacific	FE	NLAA
Humpback whale	Mexico	FT	NLAA
	Central America	FE	
Humpback whale critical habitat	Mexico/Central America DPS	-	NLAA
Killer whale	Southern Resident	FE	NLAA
Sei whale	-	FE	NLAA
Sperm whale	-	FE	NLAA
Guadalupe fur seal	-	FT	NLAA

¹ Chinook salmon ESUs include California Coastal (FT), Central Valley Spring-Run (FT), Lower Columbia River (FT), and Sacramento River Winter-Run (FT)

² Coho salmon ESUs include Central California Coast (FT) and Southern Oregon and Northern California Coasts (FT).
FE = federally endangered; FT = federally threatened; NLAA = not likely to adversely affect.

2 Description of the Action and the Action Area

2.1 Action Area

The action area is defined in 50 Code of Federal Regulations (C.F.R.) § 402.02 as “all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action.” In general, the action area includes the portions of the Pacific Ocean where launch, reentry, and recovery activities are anticipated (Figure 2.1-1). These activities occur in the marine environment in deep waters between approximately 46-400 nautical miles (nm) off Rockport, California at the northern limit, 575 nm off of southern Mexico at the southern limit, and 490 nm east of Hawaii at the western limit (Figure 1.1-1). No recovery activities would occur within 12 nm of islands. The only component of the Proposed Action that occurs less than 12 nm from the U.S. are marine vessels transiting to and from a port in support of first stage and fairing recovery activities. These nearshore vessel transit areas in the action area include marine waters that lead to the Port of Long Beach and the VSFB Harbor.

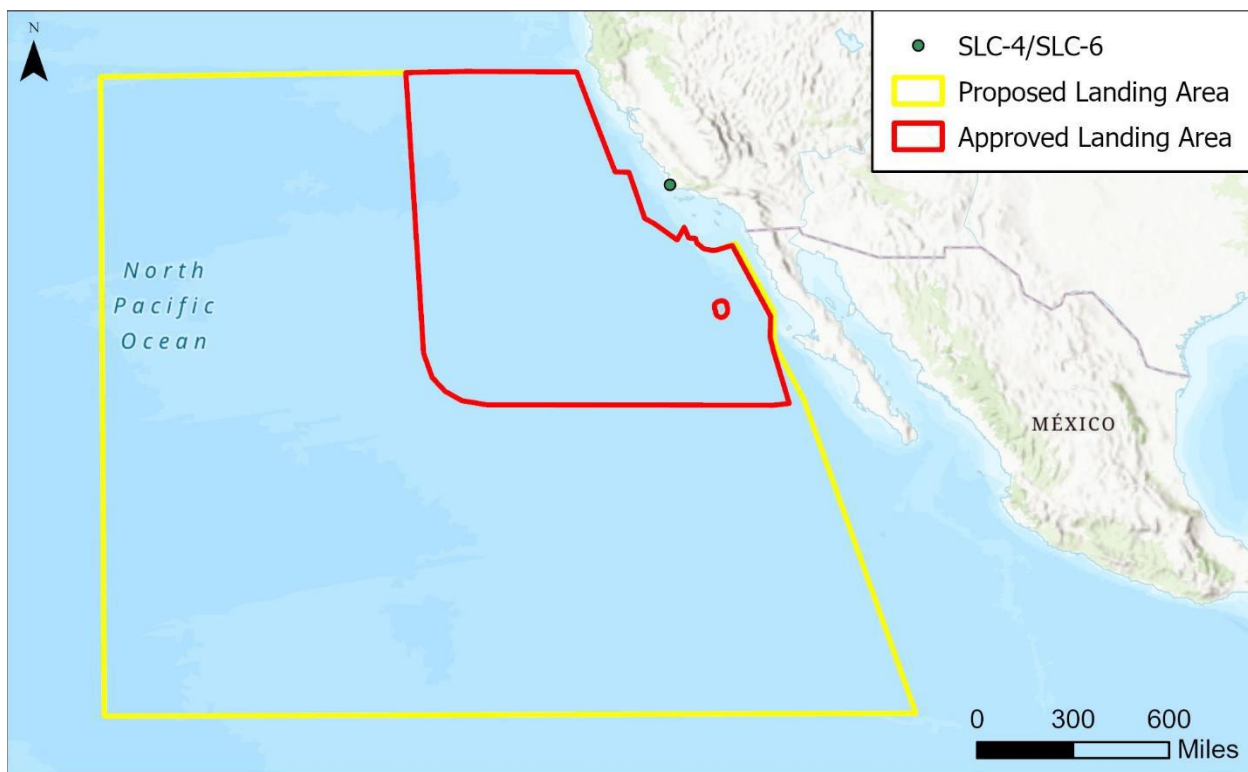


Figure 2.1-1. Proposed landing area. (Note: at this scale, SLC-4 and SLC-6 are in practically the same location)

2.2 Proposed Action

The Proposed Action will maintain the annual number of space launch activities from VSFB at 110 launches per year, as analyzed in the 2023 LOC. The DAF also proposes to increase the annual number of first stage recoveries from 36 per year, as approved in the 2023 LOC, to 100 either downrange on a dronship or at landing zones at VSFB, but not more than 36 per year at landing zones at VSFB, and expand potential downrange dronship landing and fairing recovery locations

in the Pacific Ocean to accommodate new trajectories and the addition of Falcon Heavy (Figure 2.1-2). Launches and recovery operations would continue to occur day or night, at any time during the year.

2.2.1 Launch Operations

Launch operations would be performed in the same manner as analyzed in the 2023 LOC. Space launch vehicles (commonly termed rockets) at VSFB place a payload into space by vertical launch. For expendable launch vehicles, the first stage and fairing would fall into the Pacific Ocean after stage separation and sink to the ocean floor. The fairing consists of two halves which separate, allowing the deployment of the payload at the desired orbit. First stage boosters and fairings are composed of heavy-duty metal components but may also include some carbon composite components that may float for several days (10 days maximum) before becoming waterlogged and sinking. Both expendable and reusable rockets at VSFB use liquid oxygen and either kerosene or alcohol as propellants. Current and reasonably foreseeable launch vehicles at VSFB are listed in Table 2.2-1.

Table 2.2-1. Launch Vehicles that May Affect the Marine Environment.

Launch Vehicle	Operator	Type	Launch Site
Alpha	Firefly	Expendable	SLC-2
Daytona-E	Phantom	Expendable	SLC-5/SLC-8
Falcon 9	SpaceX	Reusable/Expendable	SLC-4/SLC-6
Falcon Heavy	SpaceX	Reusable/Expendable	SLC-6
Laguna-E	Phantom	Expendable	SLC-5
Minotaur IV/Peacekeeper	Northrop Grumman	Expendable	SLC-8
New Glenn	Blue Origin	Expendable	SLC-9
RSL	ABL	Expendable	LF-576E
Terran 1	Relativity	Expendable	SLC-11
Vulcan	ULA	Expendable	SLC-3

As analyzed previously, launches may occur from any launch facility on VSFB. Engine noise produced during launches would primarily impact VSFB and the surrounding area. During ascent, a sonic boom (overpressure of impulsive sound) with a peak generated over a relatively small area, typically between 3.0 to 5.0 pounds per square foot (psf), but potentially as high as 8.0 psf, would be generated. Depending on the launch trajectory, the sonic boom may or may not impact the surface of the earth. When sonic booms do impact the earth's surface, they primarily impact the Pacific Ocean, but may overlap the Northern Channel Islands (NCI). The levels and anticipated impact locations of sonic booms would not change from those previously analyzed in the 2023 LOC.

2.2.2 First Stage/Booster Recovery Operations

The Proposed Action would continue to conduct boost-back and landing of first stage/boosters downrange in the Pacific Ocean on a dronship within the proposed landing area (Figure 2.1-1) or at a landing complex on VSFB. Currently the only active landing complex on VSFB is at Space Launch Complex (SLC) 4; however, SpaceX will develop a second landing zone near SLC-6. The annual number of first stage/booster recoveries would increase from 36 (as analyzed in the 2023

LOC) to 100; however, the annual number of first stage/booster landings at landing complexes on VSFB would not increase from 36, which was analyzed in the 2023 LOC.

After the first stage engine cutoff and separation from the second stage, a subset of the first stage engines restart to conduct a reentry burn. Once the first stage is in position and approaching its landing target, the engines are cut off. A final burn is performed to slow the first stage to a velocity of zero for landing on the droneship or at VSFB. During descent, the first stage will produce engine noise and sonic booms. Engine noise during downrange droneship landing operations would only impact open ocean and would not impact mainland or islands. As analyzed in the 2023 LOC, engine noise produced during landing operations at VSFB would primarily impact areas on VSFB. Landing engine noise follows launch and associated launch engine noise by approximately 5 to 7 minutes and typically occurs slightly before the sonic boom impacts land. During descent, when a first stage/booster is supersonic, a sonic boom (overpressure of high-energy impulsive sound) would be generated, as analyzed in the 2023 LOC. Overpressure levels for the Falcon Heavy booster landings at SLC-6 would be similar to those for Falcon 9 first stage landings, except higher overpressure levels are expected centered on the landing pad, due to the vehicle transitioning from supersonic to subsonic at a lower altitude (Figure 2.2-1). While Figure 2.2-1 shows two sonic boom footprints, each for one Falcon Heavy booster landing, each recovery operation may involve two nearly simultaneous booster landings at SLC-6, such that multiple booms are expected to occur at nearly the same time from both vehicles. (Figure 2.2-3). During landing events at VSFB or in offshore areas near VSFB, sonic booms may continue to impact the NCI at the same levels and geographic locations as analyzed in the 2023 LOC.

The Proposed Action includes expanding the potential landing area in the Pacific Ocean to accommodate new trajectories; first stage/booster landing locations would be no closer than 12 nm from either mainland or islands anywhere within the Proposed Landing Area (Figure 1.1-2). The proposed landing area is also no closer than 26 nm to the Davidson Seamount and no closer than 12 nm to Guadalupe Island (Figure 1.1-2).

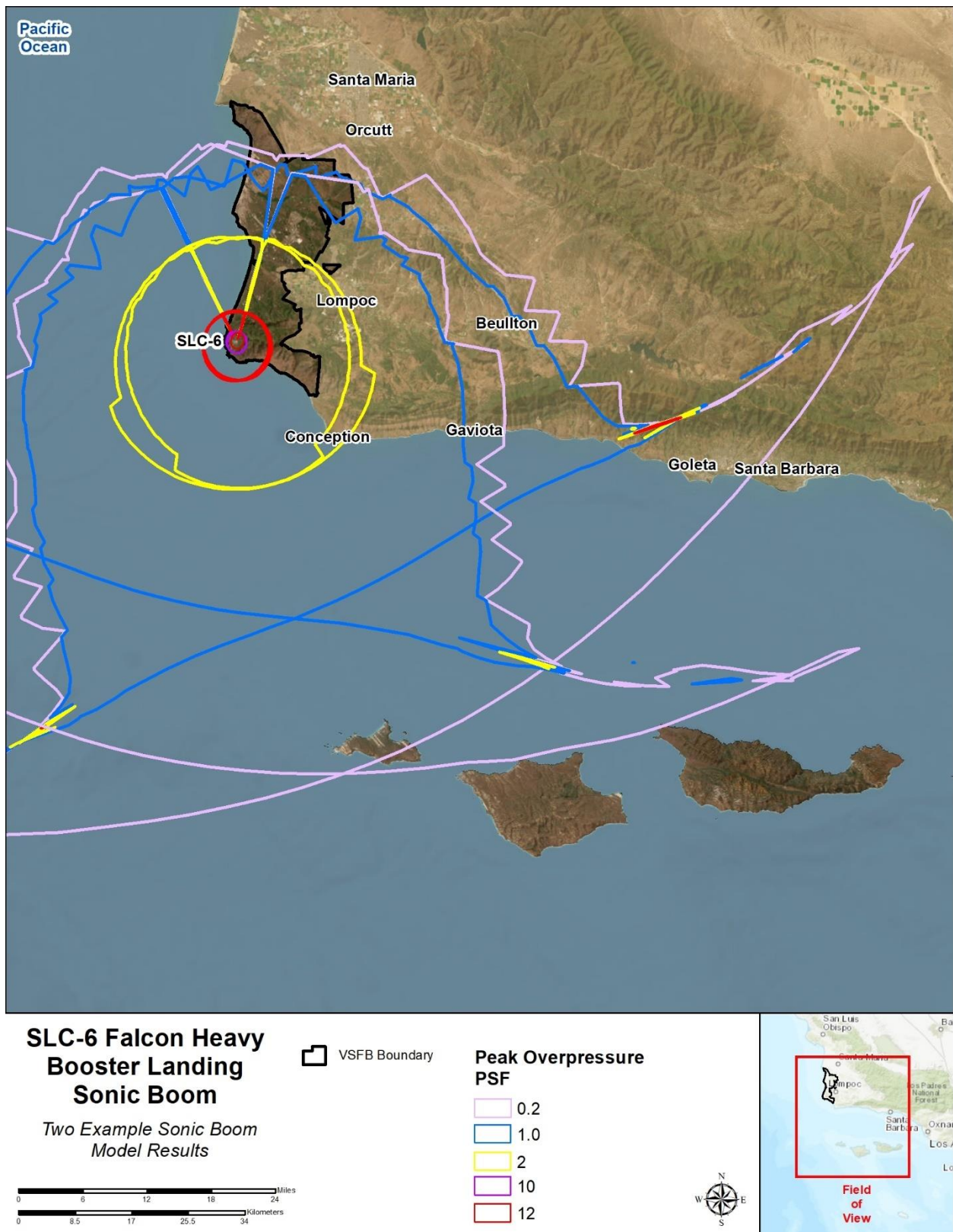


Figure 2.2-1. Examples of two sonic boom model results for Falcon Heavy boost landing at SLC-6.

2.2.3 Fairing Recovery Operations

Fairing recovery operations would increase from 36 to up to 100 per year. Up to 200 parachutes and 200 parafoils would land in the ocean annually. All parachutes and parafoils are meant to be recovered and they have been recovered during the majority of operations, but it is possible that some of the parafoils would not be recovered due to sea or weather conditions at the time of recovery. Parafoils are made of nylon and are expected to sink at a rate of approximately 1,000 feet (ft) in 145.5 minutes (NMFS 2022). Recovery of the parachute assembly would be attempted if the recovery team can get a visual fix on the splashdown location. Because the parachute assembly is deployed at a high altitude, it is difficult to locate. In addition, based on the size of the assembly and the density of the material, the parachute assembly would saturate and begin to sink upon impact. This would make recovering the parachute assembly difficult and unlikely. Parachutes are made of nylon and Kevlar and are expected to sink at a rate of approximately 1,000 ft in 46 minutes (NMFS 2022).

The fairing and parafoil would be recovered by a salvage ship stationed in the Proposed Landing Area near the anticipated splashdown site, but no closer than 12 nm offshore (Figure 2.1-1). The salvage ship would be able to locate the fairing using GPS data from mission control and strobe lights on the fairing data recorders. Upon locating the fairing, a rigid hulled inflatable boat would be launched. Crew members would hook rig lines to the fairing and connect a buoy to the parafoil. Then the crew would release the parafoil riser lines and secure the canopy by placing it into a storage drum. If sea or weather conditions are poor, recovery of the fairing and parafoil may be unsuccessful.

2.2.4 Environmental Protection Measures

The DAF will continue to ensure the following Environmental Protection Measures (EPMs) are implemented to reduce the risk of injury or mortality of ESA-listed species:

- The DAF will ensure that all personnel associated with vessel support operations are instructed about marine species and any critical habitat protected under the ESA that could be present in the proposed landing area. Personnel will be advised of the civil and criminal penalties for harming, harassing, or killing ESA-listed species.
- Support vessels will maintain a minimum distance of 150 ft from sea turtles and a minimum distance of 300 ft from all other ESA-listed species. If the distance ever becomes less, the vessel will reduce speed and shift the engine to neutral. Engines would not be re-engaged until the animal(s) are clear of the area.
- Support vessels will maintain an average speed of 10 knots or less.
- Support vessels will attempt to remain parallel to an ESA-listed species' course when sighted while the watercraft is underway (e.g., bow-riding) and avoid excessive speed or abrupt changes in direction until the animal(s) has left the area.
- The DAF will immediately report any collision(s), injuries, or mortalities to ESA-listed species to the appropriate NMFS contact.

3 Description of the Species

The list of ESA-listed endangered and threatened species that may be affected by the Proposed Change were obtained from the NMFS endangered species web sites, species experts, and a review of available literature. Table 1.1-1 lists the ESA-listed species under NMFS jurisdiction that may be affected by the Proposed Change that were previously analyzed in the 2023 LOC. The Proposed Change has not modified the action in a manner that would result in different types of stressors or levels of stressors that were not considered in the 2023 LOC; nor would the Proposed Change affect ESA-listed species or critical habitat in a manner or to an extent not previously considered. The proposed recovery area is larger than analyzed in the 2023 LOC and overlaps the range of the federally threatened Central North Pacific DPS of the green sea turtle which was not included in the 2023 LOC. All other species, DPSs, and ESUs considered in the prior BA and 2023 LOC remain the same. As a result, a description is only provided for the Central North Pacific DPS of the green sea turtle.

3.1 Green Sea Turtle (*Chelonia mydas*)

3.1.1 Distribution

The green sea turtle is found in tropical and subtropical coastal and open ocean waters, between 30° North and 30° South. Green sea turtles are widely distributed in the subtropical coastal waters of southern Baja California, Mexico, and Central America (Cliffton et al. 1995; NMFS and USFWS 1998). The range of the Central North Pacific DPS includes the Hawaiian Archipelago and Johnston Atoll, bound by 41° North 169° East in the northwest corner, 41° North 143° West in the northeast, 9° North 125° West in southeast, and 9° North 175° West in the southwest. Balazs et al. (2015) estimated the total nester abundance at 4,000 females, with 96 percent of nesting occurring at one atoll at the French Frigate Shoals.

3.1.2 Critical Habitat

Critical habitat has not been designated in the Action Area.

4 Analysis of Effects of the Proposed Action

As discussed in the prior BA and analyzed in the 2023 LOC, acoustic impacts as a result of the Proposed Action are limited to in-air noise as a result of sonic boom or rocket engine noise. Exceptionally little sound is transmitted between the air-water interface; thus, in-air sound would not have a significant effect on submerged animals (Godin 2008). Therefore, increasing the number of downrange dronship recoveries to 100, and thus the number of noise events on the open ocean, would have no effect on ESA-listed fish species.

In addition, cetaceans and sea turtles spend most of their time (>90% for most species) entirely submerged below the surface. When at the surface, their bodies are almost entirely below the water's surface, with only the blowhole or turtle's head exposed briefly to allow breathing. This minimizes in-air noise exposure, both natural and anthropogenic, essentially 100 percent of the time because their ears are nearly always below the water's surface. As a result, increasing the number of downrange dronship recoveries to 100 per year, and thus the number of noise events on the open ocean, will not have an effect on ESA-listed sea turtles or cetacean species.

Similarly, when at-sea, pinnipeds spend varying amounts of time underwater and the potential for disruption from in-air noise within the limited area of potential exposure during the brief moment of the sonic boom or engine noise is extremely unlikely for animals that are at sea. As a result, increasing the number of downrange dronship recoveries to 100 per year, and thus the number of noise events on the open ocean, would have no effect on ESA-listed Guadalupe fur seals that are at-sea.

The proposed increase in the number of weather balloons and fairing recovery operations would not change the effects analysis in the prior BA and 2023 LOC. Unrecovered parafoils, parachutes, and weather balloons could potentially become entangled with ESA-listed species, causing injury or death. While these materials may pose a risk of entanglement, the likelihood of entanglement is extremely small because: (1) the encounter rate for these expended materials is low, (2) there is restricted overlap with susceptible species, and (3) the physical characteristics of the expended materials reduce entanglement risk to ESA-listed species compared to abandoned fishing gear. For example, latex weather balloons burst after reaching its elastic limit at an altitude of 12 to 19 miles (mi). The temperature at this altitude range can reach negative 40 Fahrenheit (°F) and even colder. Under these conditions of extreme elongation and low temperature, the balloon undergoes "brittle fracture" where the rubber shatters along grain boundaries of crystallized segments. The resultant pieces of rubber are small strands comparable to the size of a quarter (Burchette 1989). The balloon fragments would be positively buoyant, float on the surface, and begin to photo-oxidize due to UV light exposure. In addition, unrecovered parafoils and parachutes would sink quickly through the water column, at 7 ft and 22 ft per minute, respectively, and settle (NMFS 2022). These activities would typically occur far offshore in deep waters where they are not expected to be encountered by ESA-listed species potentially affected by the Proposed Action. Entanglement with parachutes, unrecovered parafoils, or weather balloons therefore remains extremely unlikely and therefore the risk of entanglement is very low, as analyzed in the prior BA and 2023 LOC.

Similarly, the risk of ingestion of expended materials remains very low and discountable, as analyzed in the prior BA and 2023 LOC. Pieces of weather balloons, parachutes, or parafoils may pose an ingestion stressor to ESA-listed species. Parachutes and parafoils would sink rapidly (discussed above) and settle on the ocean floor, typically far from shore at depths greater than the ESA-listed species are expected to occur and where ultraviolet light would not penetrate. Because the degradation of these materials would be very slow and the presence of the ESA-listed species at these depths is unlikely the risk of ingestion of parachute or parafoil materials by ESA-listed species would remain very low and discountable. As discussed above, weather balloons would undergo "brittle fracture", and shatter into pieces approximately the size of a quarter (Burchette 1989). These pieces would become dispersed over a broad area as they fall to the surface of the ocean. The balloon fragments would be positively buoyant, float on the surface, and degrade over approximately 6 weeks as they photo-oxidize due to UV light exposure (Burchette 1989). After several weeks, the pieces of latex would be smaller and become neutrally buoyant (Ye and Andrady 1991; Lobelle and Cunliffe 2011). Because of the small amount of latex material expended, the dispersion of fragments as they descend to the ocean, and their limited amount of time on the surface, and low densities of ESA-listed species in the action area, the risk

of ingestion of weather balloon material remains very low and discountable, as analyzed in the prior BA and 2023 LOC.

The proposed recovery area is larger than analyzed in the 2023 LOC and overlaps the range of the federally threatened Central North Pacific DPS of the green sea turtle, which was not included in the NMFS 2023 LOC and is therefore analyzed below. The potential effects to all other species, DPSs, and ESUs considered in the prior BA and 2023 LOC remain the same.

4.1 Direct and Indirect Effects on the Central North Pacific Green Sea Turtle DPS

This section evaluates how, and to what degree, the activities described in Chapter 2 potentially impact the ESA-listed Central North Pacific DPS of the green sea turtle. The stressors and effects are the same as were determined in the prior BA and 2023 LOC since green sea turtles of the Central North Pacific DPS are physically, behaviorally, and functionally essentially the same as the green sea turtle DPSs analyzed in the prior BA. The stressors considered are:

- Physical disturbance and impacts by fallen objects
- Entanglement
- Ingestion
- Ship Strike
- Indirect Effects
- Cumulative Effects

The DAF has identified no interrelated or interdependent projects that would impact the Central North Pacific DPS of the green sea turtle within the Action Area.

4.1.1 Physical Disturbance and Impacts by Fallen Objects

If a fairing or radiosonde struck a green sea turtle, it could result in injury or death. Once within the water column, disturbance or strike from an item falling through the water is possible, but its velocity would be greatly reduced (reducing the potential for serious injury) and the falling object could potentially be avoided by marine species once detected. A low possibility exists that a green sea turtle would be at or just under the surface in the impact area at the time of splashdown, but population-level impacts would not occur. In addition, green sea turtles occur in very low densities throughout the proposed landing area (U.S. Department of the Navy 2017), therefore, the probability of a strike would be very unlikely and discountable.

Therefore, the DAF has determined physical disturbance and potential strike as a result of the Proposed Change would be discountable and may affect, but is not likely to adversely affect the Central North Pacific DPS of the green sea turtle.

4.1.1 Entanglement

Unrecovered parafoils, parachutes, and weather balloons can potentially become entangled with green sea turtles, causing injury or death. While individual turtles could encounter expended materials that may pose a risk of entanglement, the likelihood of entanglement is extremely small

because: (1) the encounter rate for these expended materials is low, (2) there is restricted overlap with susceptible turtles, and (3) the physical characteristics of the expended materials reduce entanglement risk to green sea turtles compared to abandoned fishing gear. For example, latex weather balloons burst after reaching its elastic limit at an altitude of 12 to 19 mi. The temperature at this altitude range can reach negative 40 °F and even colder. Under these conditions of extreme elongation and low temperature, the balloon undergoes "brittle fracture" where the rubber shatters along grain boundaries of crystallized segments. The resultant pieces of rubber are small strands comparable to the size of a quarter (Burchette 1989). The balloon fragments would be positively buoyant, float on the surface, and begin to photo-oxidize due to UV light exposure. In addition, unrecovered parafoils and parachutes would sink quickly through the water column, at 7 ft and 22 ft per minute, respectively, and settle (NMFS 2022). These activities will typically occur far offshore in deep waters where they are not expected to be encountered by green sea turtles potentially affected by the Proposed Action. Entanglement with parachutes, unrecovered parafoils, or weather balloons is therefore extremely unlikely and therefore the risk of entanglement is very low.

As a result, the DAF has determined that entanglement stressors introduced into the marine environment as a result of the Proposed Action may affect, but is not likely to adversely affect the Central North Pacific DPS of the green sea turtle species because the potential impacts are discountable.

4.1.2 Ingestion Stressors

Pieces of weather balloons, parachutes, or parafoils may pose an ingestion stressor to green sea turtles. Ingestion of expended materials by turtles could occur at or just below the surface, in the water column, or at the seafloor depending on the size and buoyancy of the expended object and the feeding behavior of the turtle. Floating material is more likely to be eaten by a turtle that is feeding at or just under the water's surface.

Parachutes and parafoils are made of nylon and Kevlar and thus do not degrade quickly. Photooxidation would break down nylon, however, the parachutes and parafoils would sink rapidly (discussed above) and settle on the ocean floor, typically far from shore at depths greater than the green sea turtles discussed herein are expected to occur and where ultraviolet light would not penetrate. Because the degradation of these materials would be very slow and the presence of the green sea turtle species at these depths is unlikely the risk of ingestion of parachute or parafoil materials by green sea turtle would be very low and discountable.

Weather balloons would burst at an altitude of 12 to 19 mi where temperatures can reach negative 40 °F and even colder. As discussed above, the balloon would undergo "brittle fracture", and shatter into pieces approximately the size of a quarter (Burchette 1989). These pieces would become dispersed over a broad area as they fall to the surface of the ocean. The balloon fragments would be positively buoyant, float on the surface, and degrade over approximately 6 weeks as they photo-oxidize due to UV light exposure (Burchette 1989). After several weeks, the pieces of latex would be smaller and become neutrally buoyant (Ye and Andrady 1991; Lobelle and Cunliffe 2011). Because of the small amount of latex material expended, the dispersion of fragments as they descend to the ocean, and their limited amount of time on the surface, and

low densities of green sea turtle in the action area, the risk of ingestion of weather balloon material is very low and discountable.

Therefore, the DAF has determined that ingestion stressors introduced into the marine environment as a result of the Proposed Action may affect, but is not likely to adversely affect the Central North Pacific DPS of the green sea turtle because the potential impacts are discountable.

4.1.3 Ship Strike

Support vessels which would be used during first stage and fairing recover activities have the potential to strike green sea turtles that are at or near the surface of the water. Any of the sea turtles found in the action area can occur at or near the surface in open ocean, whether feeding or periodically surfacing to breathe. However, green sea turtles spend a majority of their time submerged (Hochscheid et al. 1999; Rice & Balazs 2008). Green sea turtles forage along the sea floor and are more likely to forage nearshore shallow environments (Hochscheid et al. 1999; Rice & Balazs 2008), outside of the proposed landing area. Green sea turtles occur in low densities in the action area and are widespread and scattered at sea. Therefore, ship strikes of green sea turtles would be very unlikely. Additionally, the probability of a strike would be further reduced by implementation of the EPMs, discussed in Section 2.2.4. As a result, the DAF has determined that strike stressors as a result of the Proposed Action may affect, but is not likely to adversely affect the Central North Pacific DPS of the green sea turtle because the potential impacts are discountable.

4.1.4 Indirect Effects

Indirect effects (secondary stressors) on green sea turtles would mainly be associated with the occurrence and availability of prey species and impacts on habitat. For example, the impact of expended materials on the ocean surface might cause injury or induce startle reactions and temporary dispersal of schooling fishes if they are within close proximity of the activity. The abundance of prey species could be diminished for a brief period of time before being repopulated by animals from adjacent waters. Secondary impacts such as these would be temporary, and no lasting impact on prey availability or the pelagic food web would be expected. Indirect impacts under the Proposed Action would not result in a decrease in the quantity or quality of prey species populations or sea turtle habitats in the Action Area.

Therefore, the DAF has determined that indirect effects of the Proposed Action may affect, but is not likely to adversely affect the Central North Pacific DPS of the green sea turtle because the potential impacts are insignificant.

4.2 Cumulative Effects on the Central North Pacific Green Sea Turtle DPS

Cumulative effects on green sea turtle species are those effects of future state or private activities, not involving federal activities, that are reasonably certain to occur within the Action Area (50 C.F.R. Section 402.02). For the purposes of this BA and cumulative effects analysis for the Central North Pacific DPS of the green sea turtle, the DAF identified broad categories of activities including commercial fishing and harvest, maritime traffic and vessel strikes, coastal land development, ocean pollution, ocean noise, and offshore energy development. Any impacts

that might occur could be additive to behavioral disturbance, injury and mortality associated with other actions within the Action Area. Therefore, this section evaluates risks posed by non-federal activities in the Action Area that could result in cumulative adverse effects on sea turtles.

Based on the listing status of the Central North Pacific DPS of the green sea turtle within the Action Area, there is a clear indication that the current aggregate impacts of past human activities are significant for green sea turtles. Bycatch, vessel strikes, coastal land development, and ocean pollution are the leading causes of mortality and population decline for green sea turtles. Poaching and illegal harvest of eggs within nesting areas are also impactful. Any incidence of injury and mortality that might occur under the Proposed Action, though unlikely and would affect a relatively small number of individuals, could be additive to injury and mortality associated with other actions in the region of influence.

As discussed above, the Central North Pacific DPS of the green sea turtle could be affected by physical disturbance, strike stressors, entanglement stressors, and ingestion stressors. Some stressors could also result in injury or mortality to a relatively small number of individuals but the likelihood of these effects is discountable. It is anticipated that the Proposed Action may affect, but is not likely to adversely affect the Central North Pacific DPS of the green sea turtle within the Action Area. Effects from the Proposed Action to green sea turtle food sources would be insignificant. Likewise, the stressors under the Proposed Action generally would not overlap other stressors in space and time as they occur as dispersed, infrequent, and isolated events that do not last for extended periods.

It is possible that the response of a previously stressed animal to impacts associated with the Proposed Action could be more severe than the response of an unstressed animal, or impacts from the Proposed Action could make an individual more susceptible to other stressors. Likewise, the Proposed Action could contribute incremental stressors to individuals, which would both compound effects on a given individual already experiencing stress which may further stress populations in significant decline. Although the aggregate impacts of past, present, and other reasonably foreseeable future actions continue to have significant impacts on the Central North Pacific DPS of the green sea turtle in the Action Area, the Proposed Action is not likely to incrementally contribute to declines in populations of the Central North Pacific DPS of the green sea turtle within the Action Area.

In summary, the aggregate impacts of past, present, and other reasonably foreseeable future actions continue to have significant impacts on the Central North Pacific DPS of the green sea turtle in the Action Area. The Proposed Action could contribute incremental stressors to individuals, which may further stress populations in significant decline. However, the incremental stressors anticipated from the Proposed Action would be insignificant in light of the relative contribution from the Proposed Action in comparison to other actions and because the Proposed Action generally will not overlap in space and time with other stressors. Therefore, it is anticipated that the Proposed Action may affect, but is not likely to adversely affect the Central North Pacific DPS of the green sea turtle within the Action Area.

5 Conclusion

The DAF proposes to add Falcon Heavy, increase first stage and booster recoveries to 100 times per year, and expand the first stage/booster and fairing recovery area in the Pacific Ocean. The Proposed Change would not modify the action in a manner that would result in different types of stressors or levels of stressors that were not considered in the 2023 LOC; nor would the Proposed Change affect the ESA-listed species previously consulted on or critical habitat in a manner or to an extent not previously considered. The proposed recovery area is larger than analyzed in the 2023 LOC and overlaps the range of the federally threatened Central North Pacific DPS of the green sea turtle, which was not included in the NMFS 2023 LOC. All other species, DPSs, and ESUs considered in the prior BA and 2023 LOC remain the same. After reviewing the Proposed Change, including the EPMs (Section 2.2.4), the DAF has determined that the Proposed Change *may affect, but is not likely to adversely affect* the Central North Pacific DPS of the green sea turtle.

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7 List of Preparers

Taylor Houston (ManTech SRS Technologies, Inc.), Senior Biologist
MBA Operations Management
B.A. Natural Resources Management
Years of Experience: 28

John LaBonte, Ph.D. (ManTech SRS Technologies, Inc.), Senior Biologist
Ph.D. Department of Biology, U.C. Santa Barbara, California
B.S. Ecology, Behavior, and Evolution, U.C. San Diego, California
Years of Experience: 28

Mike Zickel (ManTech SRS Technologies, Inc.), Senior Environmental Scientist
M.S., Marine Estuarine Environmental Sciences
B.S., Physics
Years of Experience: 25

APPENDIX D

California Coastal Commission Consultation

CALIFORNIA COASTAL COMMISSION

ENERGY, OCEAN RESOURCES AND FEDERAL CONSISTENCY
455 MARKET STREET, SUITE 300
SAN FRANCISCO, CA 94105-2421
VOICE (415) 904-5200
FAX (415) 904-5400



August 26, 2025

Gretchen Swinehart
Chief, Installation Management Flight
Department of the Air Force
ATTN: Tiffany Whitsitt-Odell
1028 Iceland Avenue
Vandenberg SFB, CA 93437-6010
Via e-mail to: gretchen.swinehart@spaceforce.mil

Re: Consistency Determination CD-0006-25 to increase Space Exploration Technologies' (SpaceX) Falcon 9 launch activities at Vandenberg Space Force Base (VSFB) from 50 to 95 per year, launch SpaceX Falcon Heavy up to five times per year, modify Space Launch Complex (SLC)-6 and construct two new landing zones.

Dear Chief Swinehart,

On August 14, 2025, by a unanimous decision, the California Coastal Commission (Commission) objected, based on a lack of sufficient information, to the above-referenced consistency determination. The Commission found that Department of the Air Force's (DAF) did not provide sufficient information to evaluate whether the proposed project was consistent with Sections 30230, 30231, 30240 and 30253 of the California Coastal Act (CCA), which are enforceable policies of the California Coastal Management Program (CCMP), as further detailed in Sections IV.A, IV.C, IV.D, IV.E and Appendix C of the enclosed Adopted Findings.

Notably, the Commission did not have sufficient data regarding sonic boom impacts to properly evaluate the Falcon 9 95-launch cadence and Falcon Heavy 5-launch cadence consistency analysis provided by DAF. The Commission also identified concerns about the adequacy of information included in DAF's plans to monitor areas and species of special biological significance and environmentally sensitive habitat areas (ESHA); the absence of biological monitoring data collected from the launch cadence of 36 per year conditionally concurred with by the Commission in August of 2024; the inadequacy of information provided regarding steps taken by DAF to avoid, minimize and monitor sonic booms generated during rocket launches and landings; the uncertainty about DAF's commitment to fulfill Conditions 1 through 4 from CD-003-24; and the lack of sufficient information about mitigation that would be provided for adverse impacts to coastal resources as well as the efficacy of these measures to sufficiently protect California's coastal resources.

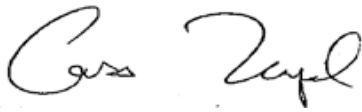
The Commission also found that DAF has not submitted adequate information to support the claim that SpaceX's launch program from the base is, in fact, a federal agency activity. The Commission's findings on this lack of information are included in Section III.B and Appendix B of the attached Adopted Findings.

If a State agency's objection is based upon a finding that the Federal agency has failed to supply sufficient information (as is the case here), Title 15 CFR Section 930.43(b) requires the State agency's response to describe the nature of the information requested and the necessity of having such information. Please see the enclosed Adopted Findings for the information requested and the necessity of having such information.

Pursuant to Title 15 CFR Section 930.43(e), if a Federal agency decides to proceed with a Federal agency activity that is objected to by a State agency, or to follow an alternative suggested by the State agency, the Federal agency shall notify the State agency of its decision to proceed before the project commences.

Please contact me at Cassidy.Teufel@coastal.ca.gov should you have any questions regarding this matter.

Sincerely,

A handwritten signature in black ink, appearing to read "Cassidy Teufel". The signature is fluid and cursive, with the first name "Cassidy" written in a larger, more prominent script than the last name "Teufel".

Cassidy Teufel
Director
Energy, Ocean Resources, Federal Consistency, and Technical Services

Enclosures: California Coastal Commission Adopted Findings for Consistency
Determination No. CD-0006-25

Cc:

Jeffrey Payne, Ph.D, National Oceanic and Atmospheric Administration, Office for Coastal
Management (jeff.payne@noaa.gov)

CALIFORNIA COASTAL COMMISSION

ENERGY, OCEAN RESOURCES AND FEDERAL CONSISTENCY
455 MARKET STREET, SUITE 300
SAN FRANCISCO, CA 94105
VOICE (415) 904-5200
WEB: WWW.COASTAL.CA.GOV



Th9b

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Staff: EORFC Staff
Staff Report: 8/1/2025
Hearing Date: 8/14/2025
Vote: 10-0

ADOPTED FINDINGS

Consistency Determination No. CD-0006-25

Applicant: Department of the Air Force – U.S. Space Force

Location: Vandenberg Space Force Base (VSFB), Santa Barbara County

Project Description: Increase Space Exploration Technologies' (SpaceX) Falcon 9 launch activities at Vandenberg Space Force Base (VSFB) from 50 to 95 per year, launch SpaceX Falcon Heavy up to five times per year, modify Space Launch Complex (SLC)-6 and construct two new landing zones.

Commission Action: Objection due to lack of sufficient information

SUMMARY OF COMMISSION ACTION

On June 13, 2025, the Department of the Air Force (DAF), United States Space Force (Space Force) submitted a consistency determination (CD) for Space Exploration Technologies Corporation (SpaceX) to increase its Falcon 9 rocket launch and landing

activities from 50 to up to 95 per year^[1], from the space launch complexes (SLC-4 and SLC-6) it leases from DAF on Vandenberg Space Force Base (VSFB). The proposed project also includes SpaceX's launch and landing of its larger Falcon Heavy rockets up to five times per year from launch complex SLC-6. This complex is proposed to be expanded and modified by SpaceX to support increased launch operations and to accommodate the launch and landing activities of the larger Falcon Heavy rocket. Modifications would include changes to the existing Horizontal Integration Facility (HIF), construction of a road with rails between the existing launch pad and the HIF, and construction of two new landing zones adjacent to SLC-6 to support landing of first stage Falcon boosters. Falcon 9 rockets would be launched from either SLC-4 or SLC-6 while the Falcon Heavy rockets would only launch from SLC-6.

In addition to doubling the number of SpaceX launches from the current level, DAF's CD proposes to double the number of landing events, with up to 24 SpaceX rocket landing events per year at VSFB, including up to 12 first stage boosters per year at SLC-4 and up to 12 landing events at SLC-6, including five Falcon Heavy missions where two boosters would land simultaneously. SpaceX would also carry out up to 76 at-sea landing events of its rocket first stage boosters offshore of Baja California, Mexico, and each time would transport that first stage by ocean barge to the Port of Long Beach, transfer it to a different ocean barge and then bring it to Vandenberg Harbor where it would be offloaded onto a land transport vehicle and returned the short distance across VSFB to SpaceX's leased launch complexes for refurbishment and reuse.

The project CD also proposes up to ten SpaceX launches per year that may include expendable first stages (five Falcon Heavy center core boosters and up to five Falcon 9 launches) that would be discarded into the Pacific Ocean. These boosters are roughly two hundred feet long with a diameter of 12 feet and comprised of a mix of materials, primarily metals.

The CD further proposes up to 12 beach and campground closure events at Jalama Beach County Park in order to maintain public safety during certain launch events. This is the same number previously considered and conditionally concurred with by the Commission in August 2024 through DAF's Consistency Determination No. CD-0003-24 for SpaceX's increase in annual launches from six to 36. The additional five launches and landings proposed for Falcon Heavy rockets would require an additional five closures of Ocean Beach and Surf Beach, for a total of up to 17 closures per year at those locations. However, public access to these beaches is currently limited to primarily daylight hours, meaning that any launches at night would not result in any additional closures of these beaches.

^[1] In August of 2024, the Commission conditionally concurred with a CD to increase SpaceX Falcon 9 launches from VSFB from six to 36 per year. In October of 2024, the Commission objected, based on a finding that DAF had failed to provide sufficient information to support its determination of consistency. As such, the Commission has found, to date, that 36 Falcon 9 launches per year are consistent with California's Coastal Management Program, with implementation of the protective measures it identified through its conditional concurrence, but that 50 launches per year are not. The current CD proposes a further increase in launch activities.

Similar to the two other DAF CDs the Commission has considered over the past 12 months for SpaceX launches from VSFb (first for an increase from six to 36 and then for an increase from 36 to 50 per year), the proposed project broadly raises two unique issues: (1) whether SpaceX launches are a “federal agency activity,” as described by DAF, and thus appropriately qualify for the limited review authority provided to the Commission under the federal Coastal Zone Management Act and reserved for federal government agencies; (2) what specific effects expanded launch activities would have on coastal resources, particularly sensitive marine and terrestrial species and habitats exposed to much more frequent elevated noise levels and more intense pressure waves from engine noise and sonic booms; and (3) would these effects be consistent with the enforceable policies of the California Coastal Management Program (CCMP) focused on the protection of marine and terrestrial biological resources (primarily Sections 30230, 30231 and 30240). Similar to the Commission’s finding in October of 2024, staff’s review of the current DAF CD indicates that it does not include sufficient information to resolve these issues and allow the Commission to adequately evaluate DAF’s determination that SpaceX’s proposed increase in launch activities would be fully consistent with the enforceable policies of the CCMP.

Based on existing information, the proposed SpaceX launch activities do not appear to be a federal agency activity. Rather, the existing available information indicates that the proposed launch cadence’s primary purpose is to further expand and support SpaceX’s commercial satellite internet and telecommunications network, Starlink. Each rocket launch can place approximately 21 Starlink satellites into Earth orbit. This network, or “satellite constellation,” is now comprised of several thousand individual satellites that provide internet across the globe through a subscription service and are now equipped to support cellular phone service as well, the revenues from which do not flow into any federal agency. With its Starlink satellite constellation, SpaceX owns significantly more satellites than the combined total owned by every country and every other company in the world. Building and maintaining this system and leadership position is the primary purpose for launches and reason for their proposed increase, all of which support a recent \$400 billion valuation recently set by private investors, as described in more detail in [Appendix B](#). SpaceX also periodically launches satellites and payloads under contract for a variety of federal government agencies and private companies as well^[2], but available information demonstrates that these federal contracted payloads are the minority and do not necessitate the proposed increase to the launch cadence.

Although the Commission staff have consistently rejected DAF’s characterization of SpaceX launch activities – including those associated with the proposed increase - as a “federal agency activity” as defined in the Coastal Zone Management Act, DAF continues to maintain this stance in the current consistency determination, stating:

The purpose of the Proposed Action is to increase the space launch mission capability of the U.S. Department of Defense (DOD) and National Aeronautics

^[2] For example, on June 23, 2025, SpaceX launched cremated remains and DNA from 166 people into space from VSFb under contract with a private company offering “space burial” services: <https://san.com/cc/space-burial-mission-ends-in-failure-after-capsule-crashes-into-pacific-ocean/>

and Space Administration (NASA), and other federal and commercial customers and to enhance the resilience and capacity of the nation's space launch infrastructure, while promoting a robust and competitive national space industry. As directed by U.S. policy (10 United States Code [U.S.C.] Section 2273, "Policy regarding assured access to space: national security payloads"; see also the White House's 2021 Space Priorities Framework^[3]), the U.S. seeks to provide greater launch and landing capabilities and infrastructure to support national security objectives, including deploying satellites and other space assets that enable intelligence, reconnaissance, and global security operations. The U.S. aims to promote a hybrid space architecture that diversifies access to space, reduces dependency on singular systems, and ensures rapid reconstitution capabilities. The DOD, NASA, and other Federal agencies obtain access to space through the procurement of commercial launch services, rather than with Government-owned or operated launch systems. As such, commercial launch capability is critical to the national defense, American's national space objectives, and the National Space Policy of the U.S. (May 2020).

The USSF's mission to "secure our Nation's interests in, from, and to space" is enabled by Space Systems Command's largest organization, the Assured Access to Space Directorate. The Assured Access to Space Directorate procures launch services from the commercial space transportation industry at VSFB, one of only two Federal Ranges from which national security space launches can occur—and the only Federal Range on the West Coast. Space launch for the USSF, other DOD organizations, and the Intelligence Community relies on commercial space launch service providers, as DOD does not operate its own space launch vehicles. SpaceX supports, and is under contract for, the full spectrum of U.S. Government space mission requirements...

...

SpaceX has developed Starlink and Starshield, satellite constellations in low-Earth orbit that require numerous launches to develop and maintain the constellation. Starlink is a critical national capability that is directly utilized by DOD and the intelligence community, which contracts directly for satellite communications services important to the national defense and in support of U.S. interests abroad. Starlink is a services provider for the DOD under numerous contracting vehicles, including the U.S. Space Force Commercial Satellite Communications Office, the U.S. Air Force's Global Lightning program^[4], and other programs designed to enhance U.S. national security capability on-orbit and on the ground. Starlink services have also been directly procured by each of the U.S. military services, and by U.S. Special Operations Command. Beyond the Intelligence Community, Starlink is under contract with the Federal Emergency Management Agency, Department of State, Department of Veterans

^[3] <https://www.state.gov/wp-content/uploads/2023/05/Space-Framework-Clean-2-May-2023-Final-Updated-Accessible-5.25.2023.pdf>

^[4] <https://www.airandspaceforces.com/global-lightning-satcom-project-expanding-to-ac-130-kc-135/>

Affairs, Department of Transportation, U.S. Coast Guard (USCG), Customs and Border Patrol, U.S. Geological Survey, U.S. Forest Service, National Oceanic and Atmospheric Administration (NOAA), and many other government organizations at the state and local level...it is in the public interest to continuously enhance Starlink network capacity, particularly in furtherance of U.S. Government purposes and objectives. SpaceX's rapid launch capability and continuous deployment of Starlink satellites in orbit directly correspond to improved network performance that scales directly with network growth to meet escalating demand. Starlink launches are not incidental; each individual Starlink launch is part of a deliberate, planned effort to meet capacity needs to support the requirements or demand of specific customers, including the U.S. Government. The capability of new satellites allows SpaceX to add capacity more quickly and interconnect the Starlink constellation, to serve critical U.S. Government needs around the globe, and to launch critical communication services for aviation and maritime in the U.S. and the rest of the world's most remote locations.

SpaceX also launches payloads for the USSF's Space Development Agency as part of the Proliferated Warfighter Space Architecture, a resilient layered network of military satellites designed to quickly deliver needed national security space capabilities to the joint warfighter. In addition to missions for the DOD, SpaceX launches payloads from VSFB for U.S. Government agencies, including NASA and NOAA, and allied foreign nations, including missions that directly benefit environmental monitoring and response.

To attempt to summarize and paraphrase DAF's position, because it is one customer of – and reliant on – SpaceX's launches and satellite network, all SpaceX launches are a federal agency activity. However, this does not align with how federal agency activities are defined in the Coastal Zone Management Act's regulations or the manner in which the Commission has historically implemented those regulations, and DAF has not submitted adequate information to support the claim that SpaceX's launches from the base are, in fact, a federal agency activity. While DAF's statements above provide no doubt as to the substantial benefit SpaceX provides to the U.S. government, the question is whether the additional launches are "on behalf of" the federal government, not whether they benefit the federal government and its policies. The simple fact remains that it is a privately owned company engaged in activities primarily for its own commercial business. It is not a public federal agency or conducting its launches on behalf of the federal government. It should therefore be regulated accordingly.

This appears to be a perspective already held by the federal government outside of the context of the Commission's review process, since SpaceX itself is required to lease its launch complexes on VSFB from DAF and to apply for and hold various licenses, permits and authorizations from a variety of state, local and federal agencies, including the Federal Aviation Administration, Central Coast Regional Water Quality Control Board and Santa Barbara County Air Pollution Control District, in order to carry out launch activities; if the launch and landing activities at VSFB were a federal agency activity, then DAF, not SpaceX, would be responsible for applying for and obtaining all

applicable licenses, permits and authorizations, or at least demonstrate that it has given authority to SpaceX to apply for these authorizations on its behalf for all of SpaceX's launch and landing activities at the base—but that's not the case. More consistent adherence to this approach therefore appears warranted, including recognition of SpaceX launches as private company activities and conducting the Commission's review process through that lens.

Following the Commission's conditional concurrence with consistency determination CD-0003-24 for up to 36 SpaceX launches per year, DAF confirmed in a letter dated September 13, 2024, that it accepted all seven of the Commission's conditions and outlined its approach to meeting their requirements and intent. Commission staff provided feedback in response to this letter and DAF replied via letter on September 17, 2024, to expand on and clarify the scope of its commitments and efforts to satisfy the Commission's conditional concurrence. DAF also provided, on September 13th, 16th and 25th, plans required through Conditions 4 through 7. These plans are discussed in detail in the revised findings report for the February 6, 2025, hearing ([Appendix A](#)) and are discussed further below in the context of this CD submittal for a further increase in launches to 100 per year, development and use of the SLC-6 launch complex, and use of Falcon Heavy rockets.

Although Conditions 1 through 7 (provided in the August 8, 2024, staff report for CD-0003-24, available by link in [Appendix A](#)) apply to DAF's consistency determination to increase SpaceX launches from six to 36 per year, further development and implementation of the protective measures and plans needed to satisfy those conditions is also essential to ensuring that any additional increase in launches proposed beyond 36 launches per year would be consistent with the relevant enforceable policies of the CCMP. While DAF did commit (in its September 17, 2024, letter) to implementing the protective measures and plans of Conditions 1 through 7 as part of the recent project to increase the frequency of launches at SLC-4 to 50 per year (CD-0007-24), and integrated the protective measures into the project description of that earlier consistency determination, the current CD submittal for a further increase in launches to 100 per year, use of SLC-6, and use of Falcon Heavy rockets, does not appear to include a commitment to implement all of the previously committed-to coastal resource protective measures.

Specifically, insufficient information is provided to conclude that DAF's prior commitments to fulfill Conditions 1 through 4 from CD-0003-24 would be maintained. Therefore, the Commission's analysis in this report cannot assume that DAF would follow through on the previous commitments it made in accepting Conditions 1 through 4 of CD-0003-24, as further described below and in Appendix D.

It should be noted, however, that DAF convened an interagency working group (further described below) in October of 2024 comprised of staff from the Commission, DAF, National Marine Fisheries Service, U.S. Fish and Wildlife Service and the Federal Aviation Administration. This working group increased coordination among the agencies and their individual requirements and allowed for discussion and further development of biological monitoring programs and analysis of results. However, despite that increased

coordination and discussion, Commission staff and DAF were unable to come to an agreement on the necessary monitoring requirements for multiple conditions, as described in more detail in Appendix C.

The Commission lacks critical information necessary to determine whether the proposed project would be consistent with the enforceable policies of the CCMP focused on the protection of sensitive marine and terrestrial species and habitats. Specifically, significant unresolved questions remain about the accuracy of descriptions provided about noise and sonic boom intensities that would be generated from launches and landings; implementation and efficacy of the biological monitoring programs; DAF's commitment and ability to implement effective sonic boom monitoring and minimization measures; and the absence of robust data demonstrating that substantially more or different adverse impacts to marine resources and environmentally sensitive habitat areas would not occur with the significant proposed increase in launches, landings and associated development activities. Therefore, multiple issues warrant substantial consideration prior to any further increase in launch and landing activities beyond the 36 launches and landings per year previously concurred with by the Commission.

In particular, the effectiveness of the working group process, once it is more fully implemented, must be demonstrated, as it is critical to DAF's ability to continue to meet the spirit and intent of the protective measures. Even assuming that the working group process for the 36-launch cadence results in adequate biological monitoring programs and an effective framework for sonic boom minimization, time is required to determine whether new impacts are occurring under the 36 launch per year frequency previously concurred with by the Commission, and whether new protective or mitigation measures are needed to avoid significant coastal effects. In the absence of this information, the Commission is unable to determine whether the proposed increase to a 100 launch per year cadence would be consistent with the enforceable policies of the California Coastal Management Program.

Given this lack of information, the Commission objects to DAF consistency determination No. CD-0006-25 and finds that DAF has not provided sufficient information to enable the Commission to determine that the proposed project is consistent with the enforceable policies of the California Coastal Management Program. The Commission therefore **objects** to the Navy's consistency determination CD-0006-25 due to lack of sufficient information.

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EXHIBITS

[Exhibit 1 – Vicinity Map](#)

[Exhibit 2 – Potential sonic boom impact areas in Santa Barbara, Ventura, and Los Angeles Counties](#)

[Exhibit 3 – Aerial Overview for SLC-4](#)

[Exhibit 4 – Aerial Overview and Site Plan for SLC-6](#)

[Exhibit 5 – Engine Noise and Sonic Boom Modeling](#)

[Exhibit 6 – Preliminary Off-Base Sonic Boom Monitoring](#)

[Exhibit 7 – Recorded Noise and Overpressure Measurements from Monitoring](#)

[Exhibit 8 – Interagency Working Group Memo, June 2025](#)

[Exhibit 9 – Other Agency Comment Letters on 2025 DEIS](#)

[Exhibit 10 – Species Maps with Modeled Noise Impacts](#)

CD-0006-25 (DAF)

[Exhibit 11 – Pinniped Monitoring Plan, March 2025](#)

[Exhibit 12 – NMFS Letter of Authorization, 2019](#)

[Exhibit 13 – NMFS Letter of Authorization, 2024](#)

[Exhibit 14 – Environmental Protection Measures in CD](#)

I. FEDERAL AGENCY'S CONSISTENCY DETERMINATION

Space Launch Delta 30 (SLD 30) of the United States Department of the Air Force (DAF), United States Space Force (Space Force), has determined the project is consistent to the maximum extent practicable with the enforceable policies of the California Coastal Management Program (CCMP).

II. MOTION AND RESOLUTION

Motion:

I move that the Commission **concur** with consistency determination CD-0006-25 that the project described therein is consistent to the maximum extent practicable with the enforceable policies of the California Coastal Management Program.

Staff recommends a **NO** vote on the motion. Failure of this motion will result in an objection to the determination and adoption of the following resolution and findings. An affirmative vote of the majority of the Commissioners present is required to pass the motion.

Resolution:

The Commission hereby objects to consistency determination CD-0006-25 made by the Space Force for the proposed project, finding that the consistency determination does not supply sufficient information to determine if the project is consistent to the maximum extent practicable with the enforceable policies of the California Coastal Management Program.

III. APPLICABLE LEGAL AUTHORITIES

A. DECISION OPTIONS AND NEXT STEPS

As described in more detail below, the Commission objects to DAF's consistency determination based upon a finding that the Federal agency has failed to supply sufficient information to determine that SpaceX's proposed project is a federal agency activity and because there is a lack of information to determine the proposed project's consistency with the enforceable policies of the California Coastal Management Program (CCMP).

Next Steps

The Commission objects based on a lack of information. Commission staff will therefore attempt to work with DAF directly to obtain the information necessary to determine if the project is a federal agency activity and consistent with the enforceable policies of the CCMP.

However, as with all federal consistency objections, DAF has the option of concluding, despite the Commission's objection, that the SpaceX project is a federal agency activity and its consistency determination (CD) is correct in finding the activity is fully consistent with the enforceable policies of the CCMP and could proceed without providing the identified information or seeking the Commission's concurrence. In this situation, Commission staff would strive to continue to work with DAF to attempt to address the issues that resulted in the objection, including by suggesting and exploring project modifications, protective measures and mitigation that could allow the proposed activity's adverse impacts to coastal resources to be avoided, minimized and/or offset. Such efforts could be informal or include formal, voluntary mediation facilitated by the Secretary of Commerce or the National Oceanic and Atmospheric Administration's Office for Coastal Management.

B. OBJECTION BASED ON LACK OF INFORMATION

The federal consistency regulations (15 CFR § 930.43) provide for state agency objections based on lack of information, as follows:

§ 930.43 State agency objection.

...

(b) If the State agency's objection is based upon a finding that the Federal agency has failed to supply sufficient information, the State agency's response must describe the nature of the information requested and the necessity of having such information to determine the consistency of the Federal agency activity with the enforceable policies of the management program.

(c) State agencies shall send to the Director a copy of objections to Federal agency consistency determinations.

(d) In the event of an objection, Federal and State agencies should use the remaining portion of the 90-day notice period (see § 930.36(b)) to attempt to resolve their differences. If resolution has not been reached at the end of the 90-day period, Federal agencies should consider using the dispute resolution mechanisms of this part and postponing final federal action until the problems have been resolved. At the end of the 90-day period the Federal agency shall not proceed with the activity over a State agency's objection unless:

(1) the Federal agency has concluded that under the "consistent to the maximum extent practicable" standard described in section 930.32 consistency with the 'enforceable policies of the management program is prohibited by existing law applicable to the Federal agency and the Federal agency has clearly described, in writing, to the State agency the legal impediments to full consistency (See §§ 930.32(a) and 930.39(a)), or

(2) the Federal agency has concluded that its proposed action is fully consistent with the enforceable policies of the management program, though the State agency objects.

(e) If a Federal agency decides to proceed with a Federal agency activity that is objected to by a State agency, or to follow an alternative suggested by the State agency, the Federal agency shall notify the State agency of its decision to proceed before the project commences.

As described above, if the Commission's objection is based on lack of information, the Commission must identify the information necessary for it to assess the project's consistency with the CCMP. These information needs are identified below and in Sections IV.A, IV.C, and IV.D of this report.

Procedural Issues

Lack of Information Supporting DAF's Assertion that the Proposed Project is a Federal Agency Activity

It is the Commission's position, based on the information provided to it to date, that it lacks information that SpaceX's space launch activities on Vandenberg Space Force Base (VSFB) are a federal agency activity. DAF nevertheless has determined that the proposed project is a "federal agency activity," as defined in the Coastal Zone Management Act's federal consistency regulations and has therefore prepared a consistency determination for the Commission's review. While preserving its position, the Commission is also moving forward with its review of DAF's consistency determination because failure to do so before August 27, 2025 – the review period deadline established by DAF - would result in a presumption, by operation of law, of the Commission's concurrence with DAF's consistency determination.

Regarding what qualifies as a federal agency activity, the federal consistency regulations at 15 C.F.R. Section 930.31(a) state that:

The term "Federal agency activity" means any functions performed by or on behalf of a Federal agency in the exercise of its statutory responsibilities. The term "Federal agency activity" includes a range of activities where a Federal agency makes a proposal for action initiating an activity or series of activities when coastal effects are reasonably foreseeable, e.g., a Federal agency's proposal to physically alter coastal resources, a plan that is used to direct future agency actions, a proposed rulemaking that alters uses of the coastal zone. "Federal agency activity" does not include the issuance of a federal license or permit to an applicant or person (see subparts D and E of this part) or the granting of federal assistance to an applicant agency (see subpart F of this part).

Since it is undisputed that SpaceX is not part of the federal government and thus would not be performing its private, commercial launches as a federal agency, the only option for SpaceX's proposed launch cadence to qualify as a federal agency activity is if

SpaceX is performing all of its launches “on behalf of” Space Force. There is no definition of what it means to perform a function “on behalf of a Federal agency in the exercise of its statutory responsibilities” in the CZMA or its regulations. Thus, turning to the usual and ordinary meaning of the term is appropriate to interpret the provision. Black’s Law Dictionary defines “on behalf of” as “acting in the place of someone else.”¹ An agency relationship is established when someone (agent) acts on behalf of a government entity (principal), where “the principal becomes responsible for the acts of the agent, and the agent’s acts are like those of the principal.”² Thus, under agency law, a principal becomes liable for its agent’s actions. Therefore, to establish that SpaceX’s launch and landing activities are a federal agency activity, Space Force must demonstrate that SpaceX is performing all its launch activities on behalf of the Space Force and that Space Force is responsible and accepts liability for all of SpaceX’s launch activities at VSFB.

Space Force’s position that SpaceX’s increased launch cadence to 100 launches per year is a function performed on behalf of Space Force is not supported by substantial evidence. Based on Commission staff’s review, a very small fraction of SpaceX’s total of several hundred launches carried out in the U.S. over the past several years between its Falcon 9, Falcon Heavy and Dragon rockets/spacecraft have served Department of Defense (“DOD”) contracts.”³⁴⁵ This is true of launches from VSFB as well, with less than roughly 30 of the approximately 132 SpaceX launches that have occurred from 2018 through July of 2025, identified as carrying U.S. government payloads, based on launch and mission information provided by SpaceX on its website, as well as from Commission staff’s review of various online sources⁶ describing missions and payloads.

In fact, the substantial majority of SpaceX launches from VSFB are to place SpaceX’s expanding “Starlink” satellite constellation into orbit. This coordinated network of thousands of low Earth orbit satellites supports SpaceX’s subscription-based satellite internet business⁷ as well as its partnership with cellular carrier T-Mobile to provide “direct to cellular” satellite-supported phone service worldwide⁸. As of the date of this staff report, there are over 13,252 active satellites in orbit around the Earth, over 9,172 of which are owned by SpaceX and included within its Starlink system.⁹ Based on this, SpaceX currently has more active satellites in space than every other company (and country) combined and is moving at an accelerating pace to further establish its business advantage in this area. The typical SpaceX launch from VSFB is used to place

¹ <https://thelawdictionary.org/on-behalf-of/>.

²

<https://dictionary.law.com/default.aspx?selected=2370> <https://thelawdictionary.org/on-behalf-of/>.

³ <https://www.spacex.com/vehicles/falcon-9/>.

⁴ <https://www.spacex.com/vehicles/falcon-heavy/>.

⁵ <https://www.spacex.com/vehicles/dragon/>.

⁶ Including descriptions of missions and new releases from sources including: <https://go4liftoff.com/> ; <https://science.nasa.gov/> ; <https://www.nasaspacesflight.com> ; and <https://spaceflightnow.com/>

⁷ <https://www.starlink.com/>

⁸ <https://www.t-mobile.com/news/un-carrier/first-spacex-satellites-launch-for-breakthrough-direct-to-cell-service-with-t-mobile>

⁹ <https://orbit-ing-now.com/>

between 20 and 50 additional Starlink satellites into orbit with no federal payload. Because Starlink satellites operate for a limited duration and are frequently upgraded with new technology, older versions are “de-orbited” to burn up in the atmosphere while being replaced with newer versions. This means that launches are needed to both expand and maintain SpaceX’s constellation of Starlink satellites.

Further discussion and analysis of DAF’s position that the proposed project is a federal agency activity is included in [Appendix B](#) – Procedural Issues (continued), and incorporated herein as if fully set forth in the findings.

Conclusion and Summary of Information Needs

DAF can submit evidence demonstrating that SpaceX is acting on behalf of or as an agent for the DAF/DOD when it launches Falcon 9 and Falcon Heavy rockets from VSF to address the current information deficiencies to support that position. As it stands, however, based on existing public information disclosed above and in [Appendix B](#), Space Force has not demonstrated that it is a principal in an agency relationship with SpaceX to support its position that SpaceX’s proposed launch cadence is a federal agency activity. Therefore, the Commission does not currently have an adequate evidentiary basis to find that a Consistency Determination is appropriate for SpaceX’s proposed project.

The Commission must therefore object to DAF’s consistency determination based on a lack of information. Sections IV.A, IV.C and IV.D of this report, below, detail how DAF’s consistency determination also lacks the information needed for the Commission to determine whether the proposed project is fully consistent with Sections 30230, 30231, and 30240 of the Coastal Act.

C. CONSISTENT TO THE MAXIMUM EXTENT PRACTICABLE

The federal Coastal Zone Management Act (“CZMA”), 16 U.S.C. § 1451-1464, requires that federal agency activities affecting coastal resources be “carried out in a manner which is consistent to the maximum extent practicable with the enforceable policies of approved State management programs.” Id. at § 1456(c)(1)(A). The implementing regulations for the CZMA (“federal consistency regulations”), at 15 C.F.R. § 930.32(a)(1), define the phrase “consistent to the maximum extent practicable” to mean:

...fully consistent with the enforceable policies of the management programs unless full consistency is prohibited by existing law applicable to the Federal agency.

This standard allows a federal activity that is not fully consistent with California’s Coastal Management Program (“CCMP”) to proceed, if full compliance with the CCMP would be “prohibited by existing law.” In its consistency determination, the DAF did not argue that full consistency is prohibited by existing law or provide any documentation to support a “maximum extent practicable” argument. Therefore, there is no basis to conclude that existing law applicable to the Federal agency prohibits full consistency. Since the DAF has raised no issue of practicability, as so defined, the standard before

the Commission is full consistency with the enforceable policies of the CCMP, which are the policies of Chapter 3 of the Coastal Act (Cal. Pub. Res. Code §§ 30200-30265.5).

D. FEDERAL LANDS EXCLUDED FROM THE COASTAL ZONE

Under the federal CZMA, the Commission is authorized to review federal agency activities and actions that occur within or outside of California's coastal zone and that affect any land or water use or natural resource of the coastal zone. However, the Coastal Zone Management Act (CZMA) excludes from its definition of the coastal zone "lands the use of which by law is subject solely to the discretion of or which is held in trust by the Federal Government." (15 USC 1453(1)). Thus, in cases where a proposed federal agency activity that is being reviewed under the Commission's federal consistency authority is to be located on federal land under the sole control of the federal government, the Commission's CZMA review is limited to evaluating whether the activities will result in effects that extend outside of the federal property and will "spill over" into the coastal zone. For example, if the activities would adversely affect a coastal species such as western snowy plover while it is present on the federal property and put it at risk outside of that federal property within the coastal zone as well, it would be considered to have a "spill over" effect.

In addition to the Commission disagreeing with DAF that the proposed project is a federal agency activity subject solely to Commission review as a consistency determination and the Coastal Zone Management Act's limited definition of "coastal zone," the project is also unique in that it is not spatially limited in the way most projects are. While the SpaceX launch and landing complex is located on VSFB property leased to SpaceX by DAF, the rockets pass outside of the base and result in development and effects directly within the coastal zone off of VSFB as well. For example, sonic booms generated by the proposed SpaceX rocket launches can subject an extensive area of central and southern California's mainland coast and offshore islands to blast waves (also known as overpressure because they generate temporary spikes over and beyond natural atmospheric pressure) and elevated sound levels. Marine mammals and other coastal wildlife species outside of VSFB experience these sound and pressure effects from sonic booms and respond with startle responses and other behavioral changes. In addition, the public safety zones implemented during rocket launches such as those proposed in the current project would extend outside of VSFB and would result in up to 12 closures and evacuations per year of public beaches and campgrounds at Jalama Beach County Park and up to 17 closures per year at Ocean Beach and Surf Beach. This is another direct effect of the SpaceX rocket launches that would occur outside of VSFB and within the coastal zone. These closures and evacuations would adversely affect public beach access and recreation within the coastal zone. Further, the proposed at-sea rocket landings involve the barge transport of the rocket first stage from waters offshore of Baja, California, to the Port of Long Beach and then through coastal waters back to Vandenberg Harbor. As such, the project includes elements that would occur both within and outside of federal property within the coastal zone. The Commission therefore has the authority to review the proposed SpaceX launch and landing activities

because they would result in both “spillover” and direct effects and development activities within the coastal zone.

IV. FINDINGS AND DECLARATIONS

A. PROJECT DESCRIPTION

Launch Vehicle

The proposed project would include launches of two different launch vehicles, the Falcon 9 and the Falcon Heavy, both of which are designed, manufactured, and controlled entirely by SpaceX.

The Falcon 9 is a reusable, two-stage rocket approximately 229 feet long with a diameter of 12 feet. The rocket uses Rocket Propellant-1 (RP-1) and liquid oxygen (LOX) as propellants to produce approximately 1.7 million pounds of thrust at liftoff. The Falcon 9 first stage booster has four deployable legs for landings and four grid fins near the top of the first stage that are used to align the first stage booster after separating from the rest of the launch vehicle in space and to guide the first stage during reentry and landing operations.

Falcon Heavy is also a reusable, two-stage rocket approximately 229 feet long. However, instead of a single booster like the Falcon 9, the Falcon Heavy consists of a center core with two side boosters. The Falcon Heavy uses the same fuel as the Falcon 9, but with the additional boosters, total thrust at liftoff is 5.13 million pounds, which allows Falcon Heavy to deliver greater mass to orbit. All three boosters on the Falcon Heavy have deployable legs and stabilizing fins. During landing for Falcon Heavy missions, the side boosters would return to SLC-6 at VSFB while the center booster would typically be discarded each launch into the Pacific Ocean. Images of the Falcon 9 and Falcon Heavy are included in **Figure 1** below.

Launches

The proposed project would include launching the SpaceX Falcon 9 rocket from SLC-4 and SLC-6 on VSFB (**Exhibit 1**) up to 95 times per year. The cadence of Falcon 9 launches from either SLC-4 or SLC-6 would be determined by the launch manifest and Western Range operations. The project would also include launching the Falcon Heavy up to five times per year from SLC-6.

Figure 1: Images of Falcon 9 and Falcon Heavy

The project would include launch trajectories along a range of azimuths between 140 to 325 degrees, including Falcon 9 launches from SLC-6 and Falcon Heavy launches. The launches would generally follow southerly trajectories between 140 and 210 degrees (i.e., southeast to southwest) intended to deliver payloads to a specific polar and geostationary orbit. Depending on the trajectory and atmospheric conditions, the launches may result in sonic booms affecting the counties of Santa Barbara, Ventura and Los Angeles, including areas seaward of those counties in the coastal zone.

Exhibit 2¹⁰ provides a general estimate of the affected area based on predictive models used by the Department of the Air Force (DAF) and Federal Aviation Administration (FAA), but the model results are cropped to only show those over mainland California. Exhibit 4a of the revised findings report for the February 6, 2025, hearing for CD-0007-24 ([Appendix A](#)) also provided a similar figure. Exhibit 4b of the CD-0007-24 report also depicted the aggregate sonic boom footprint with overpressure levels (in pounds per square foot, psf) predicted for the areas along coastal and inland Santa Barbara, Ventura and Los Angeles Counties and Exhibit 4c showed modeled sonic boom footprints, broken into several overpressure ranges, over the Pacific Ocean and the northern Channel Islands. While the new consistency determination (CD) did not provide similar figures to Exhibits 4b and 4c of that report, they are useful to reference for depicting the potential range of impacts over the water and the islands, as well as for how model results vary by trajectory. Notably, **Exhibit 2** includes several modeled estimates of higher sonic boom levels¹¹ than those presented in figures previously provided by DAF in prior consistency determinations for SpaceX launches.

¹⁰ This is Figure 3.2-6 of the CD but it is also included as Figure 3.4-9 of the 2025 DEIS which states that the figure shows sonic boom model results for 308 runs for easterly SpaceX Falcon 9 trajectories. As described in the DEIS, data were sampled from a 10-year collection of radiosonde meteorological data from weather balloons previously released by VSFB. The model used 8 representative flight trajectories and modeled each trajectory between 29 and 40 times with randomly selected meteorological profile data.

¹¹ This includes predictions of overpressure levels above 2 and 3 psf in Ventura and Santa Barbara Counties, respectively.

After launching rockets, SpaceX would land the first stage either directly adjacent to their launch sites at SLC-4 or SLC-6, or on a drone ship stationed offshore of Baja California in the international waters of the Pacific Ocean. Each launch may be preceded by a static fire test of the engines lasting several seconds, which would be conducted one to three days before the launch. The need to conduct a static fire test is mission dependent and there would be no more than 50 static fire events per year. Launch operations are proposed to occur at any time, day or night.

Space Launch Complexes

Existing fueling, loading, launch and landing pad infrastructure at SLC-4 and all of the first stage processing protocols that SpaceX currently uses for launching rockets from SLC-4 would remain the same. However, the frequency of processing protocols would increase in order to support the increased launch frequency.

At SLC-6, four existing structures would be demolished, including the mobile service tower, mobile assembly shelter, fixed umbilical tower, and the lift and pit crown. Mechanical shears would be used to cut the building sections into smaller, more manageable sizes, and cranes would be used to assist with heavy lifts of structures. Four 50-pound explosives would be used to remove the Mobile Service Tower. Excavators and backhoes would transport materials to a dump truck for hauling the material offsite. Any staging or temporary storage of materials would occur within previously disturbed areas.

Construction at SLC-6 would include commodity storage tanks (for fuel as well as various gases used during launch and landing operations), a vehicle erector, water towers, ground support equipment, a hanger for vehicle processing, five emergency generators for standby power, and a transport road with rail system from the Horizontal Integration Facility (HIF) to the existing launch pad. The HIF at SLC-6 is currently leased to United Launch Alliance (ULA) and as part of the project DAF would authorize SpaceX to modify the HIF for SpaceX launches. The interior of the existing HIF would be modified and an annex would be constructed on the south side of the building. Existing infrastructure at SLC-6 would be modified as necessary and practicable. The existing flame trench would be converted to a unidirectional water-cooled flame diverter with a deluge/acoustic suppression system.

SpaceX is also proposing to construct two 400-foot-wide landing zones located approximately 850 feet south of SLC-6 to support the landing of first stage Falcon boosters. Each landing zone would be constructed with a concrete pad in the center surrounded by a gravel apron. Each landing pad would also have a 30-foot by 30-foot pedestal for post-flight processing of the booster. The landing zones would also include construction of access roads, improvements to an existing access road, and clearing of vegetation to create a 50-foot-wide fire break.

Demolition would require six months and would only occur during daylight hours. Construction is anticipated to require 18 months and would occur during the day and at night. Use of explosives is proposed to facilitate demolition work and the proposed demolition explosive event is estimated to result in impulsive noise levels of over 140

decibels (dB) directly adjacent to SLC-6, and up to approximately 130 dB along the coast of VSFB. The locations and configurations of the launch and landing complexes are shown in **Exhibits 3** (aerial overview of SLC-4) and **4** (aerial overview of SLC-6)¹².

Vegetation Management

A deluge of water would be flooded onto the launch pad following ignition of SpaceX Falcon 9 and Falcon Heavy rockets to absorb or deflect the high levels of acoustic energy that are released as the rocket lifts off, and to avoid damage to the vehicle and payload. The exhaust cloud would be comprised of combusted fuel and water that largely consists of steam. In order to avoid and minimize adverse impacts to nesting migratory birds within Spring Canyon from hot steam produced as a result of the deluge curtain, SpaceX has been removing vegetation within a 1.121-acre area of arroyo willow wetland habitat adjacent to the SLC-4E launch complex (the area adjacent to the launch pad on the left in which flame and steam is directed into in the before/after images in Figure 2 below¹³).

Figure 2: Liftoff Images



Some vegetation clearance has happened historically around the SLC-4E location, and Commission staff previously reviewed vegetation clearance up to 30 feet beyond the fence line (the Executive Director previously concurred that this amount of vegetation clearance would not result in new or additional adverse effects to coastal resources beyond what was included in CD-049-98 and ND-055-10). However, this vegetation management activity has expanded well beyond what was previously reviewed and concurred with. All of the first stage processing protocols that SpaceX currently uses for launching rockets from SLC-4E would remain the same. However, the frequency of processing protocols would increase in order to support the increased launch frequency.

¹² Including the conceptual site plan, estimated demolition noise levels, proposed landing zones, proposed firebreak, and alternative for a new hangar, in Figures 2.1-3, -4, -5, -6, and -7, from the CD, respectively

¹³ Images captured from video of May 2, 2024 SpaceX launch from SLC-4E, full video available at <https://twitter.com/i/broadcasts/1YqJDgypdRDGV>

At SLC-6, vegetation management activities (**Exhibit 4**) would occur within the entirety of the proposed landing zones and the fire break and would encompass areas of approximately 16 acres and 3.5 acres, respectively.

Payload Fairing Recovery Operations

The Falcon 9 and Falcon Heavy systems include a fairing to protect payloads until they can be delivered to their designated orbit. The fairings consist of two halves which separate to release the payload into space. After separating, the fairing halves would fall back to earth, and a built-in parachute system would slow the descent of each fairing and enable a soft splashdown so that the two halves can be recovered. The splashdown site would be outside of California's state waters and United States territorial waters. The parachute system consists of a drogue parachute and a parafoil which are approximately 110 sq. ft. and 3,000 sq. ft. in size, respectively.

SpaceX would attempt to recover both halves of the fairing after each launch using a salvage ship stationed in the area of the anticipated splashdown site. For safety reasons, the salvage ship cannot be within 12 nautical miles of the splashdown site. Parachutes, parafoils, and their assemblies are made of Kevlar and nylon and would quickly sink once they become waterlogged after splashdown. SpaceX would attempt to recover all parafoils, but ocean conditions or weather conditions could prevent salvage operations from recovering the foil. As described in the CD, SpaceX recovered approximately 66% of parafoils in 2024 and 80% in 2023. The lower recovery rate in 2024 was due to adverse ocean surface conditions, such as high winds or rough seas which make recovery operations more difficult. In 2024 approximately 99% of fairings were recovered and approximately 35% of parachutes were recovered.

Weather Balloons

Prior to each launch, SpaceX would need to measure windspeeds in the landing area by releasing an average of five weather balloons in order to create profiles of expected wind conditions during each landing. Each balloon unit would consist of a radiosonde, which is an instrument approximately the size of a half-gallon milk carton powered by a 9-volt battery, attached to a weather balloon. The radiosonde would transmit data to SpaceX and the operating systems aboard the Falcon 9 and Falcon Heavy rockets. The balloon is comprised of latex and would ascend to an altitude of 12 to 19 miles before the atmospheric pressures cause the balloon to burst. The balloon fragments and radiosonde would then fall back to earth and are assumed to land in the ocean. The radiosonde does not have a parachute and would not be recovered.

Landing

The SpaceX Falcon 9 and Falcon Heavy rockets have a reusable first stage section that would undergo a controlled descent and landing. Each landing of the first stage would occur either in the ocean atop the drone ship offshore of Mexico or back at VSFB at SLC-4 or SLC-6, where it would produce a sonic boom that would affect VSFB and surrounding areas (as described below in more detail). SpaceX would land up to 12 times per year at SLC-4 and up to 12 times per year at SLC-6, including five Falcon

Heavy missions per year. For Falcon Heavy launches, the two side core first stage boosters would land simultaneously.

Some Falcon 9 payloads necessitate orbits or destinations which require additional transport from the first stage. In these instances, the use of additional propellant from the booster would prevent the Falcon 9 first stage from being able to boost back and land aboard the drone ship or at VSFB. As such, the first stages during these Falcon 9 launches would be discarded into the open ocean, likely outside of state and federal waters. These types of Falcon 9 missions, in which the first stage is unable to boost back, are rare and SpaceX has not done an expendable Falcon 9 mission from VSFB since 2018, despite carrying out several dozen launches over that period. The CD submittal does not specify how many expendable Falcon 9 missions may occur under the proposed increased launch cadence.

The Falcon Heavy center core first stage booster would typically be expended each launch and discarded into the ocean, likely outside of state and federal waters.

Booster Roll-On Roll-Off, Ground Operations, Support, and Transport

After salvage and landing operations are complete, any first stages, fairings and other materials would be transported via barge to the VSFB harbor. Transport would be accomplished via a “roll-on roll-off” (RORO) barge. The first stage would be transferred from the drone ship to SpaceX’s Self-Propelled Modular Transport (SPMT) that is positioned on a small, low draft barge. The first stage would be pulled by a tug using a Tier 3 (or higher) engine from the Port of Long Beach into the VSFB Harbor. A support tug would be launched from the Port of Hueneme and travel up the coast to assist the barge and primary tug in maneuvering into and out of the VSFB Harbor, the exact arrival time would depend on tide. On day two, the support tug would hotel (also known as berthing while producing in-port emissions while moored) at VSFB harbor for 24 hours. On day three, SpaceX would perform the RORO operation, requiring approximately 15 hours for the primary tug to execute the operation. The support tug would assist the operation, then hotel at the VSFB harbor for the remainder of the time. On day four, the support tug would remain hoteling at VSFB harbor for 24 hours. On day five, the support tug would travel back to the Port of Hueneme, with the exact departure time dependent on tide. The proposed project would include up to 100 events per year utilizing the RORO barge and tugs.

Once at the harbor, the rocket first stage, equipment and materials would be loaded onto trucks for transport back to processing facilities at VSFB. SpaceX would continue to use an existing fleet of specialized trucks for any overland transport of boosters and marine barges for transport of any boosters, fairings, and other materials.

Engine Noise and Sonic Booms

There are four components of the Falcon 9 and Falcon Heavy launches described by DAF in its CD submittal and May 2025 Draft Environmental Impact Statement (DEIS) that would generate significant, potentially disruptive sound and noise: 1) continuous engine noise created by the launch vehicle during static fire tests (lasting several seconds); 2) continuous engine noise created during ascent (lasting several minutes);

3) impulsive sonic booms created by the launch of the rocket as well as returning first stage (both lasting less than one second); and 4) continuous engine noise as the first stage lands (lasting approximately 60 seconds). Engine noise is measured in decibels (dB) while sonic booms create both noise and pressure waves and are measured in pounds per square foot (psf). **Tables 1 and 2** below compare the two measurements and provide context by referencing sound levels from typical sources.

Table 1: Pounds per square foot (psf) to peak dB (unweighted) conversion chart

psf	peak dB	psf	peak dB
1	127.58	7	144.48
2	133.60	8	145.64
3	137.12	9	146.67
4	139.62	10	147.58
5	141.56	11	148.41
6	143.15	12	149.17

Table 2. Comparison of sound pressures and sound levels from typical sources

<u>Sound pressure level (psf)</u>	<u>Sound level (dB)</u>	<u>Typical source</u>
<u>4.17</u>	<u>140</u>	<u>Jet aircraft at 25 meters</u>
<u>0.41</u>	<u>120</u>	<u>Human pain threshold</u>
<u>0.04</u>	<u>100</u>	<u>Very noisy factory</u>
<u>0.004</u>	<u>80</u>	<u>Alarm clock at 1 meter</u>
<u>0.0004</u>	<u>60</u>	<u>Ordinary conversation at 1 meter</u>

Engine Noise

During launch operations and static fire tests, the rocket engines for Falcon 9 are predicted to produce noise of over 140 (decibels) dB near SLC-4 and SLC-6 and exceeding 110 dB over a large coastal area within an approximately 10-mile radius of the launch sites. Maps showing the extent of modeled engine noise are included in **Exhibit 5a** (which shows model sound levels from Appendix G of the project DEIS at both SLC-4 and SLC-6 for launches, landings, and static fire tests, of both Falcon 9 rockets and Falcon Heavy rockets). During launch operations and static fire tests, the rocket engines for Falcon Heavy are predicted to similarly produce noise of over 140 (decibels) dB near SLC-6. Appendix D¹⁴ of DAF's CD also notes that engine noise may reach as high as 150 dB and states the following in reference to engine noise modeling:

[...] During Falcon 9 launches from SLC-4 and SLC-6, engine noise produced during launches would be audible across VSFB and the surrounding areas.

¹⁴ Appendix D of the CD is DAF's April 2025 Biological Assessment submittal to USFWS

Engine noise during Falcon 9 first stage landings at SLC-4 and SLC-6 would impact a smaller area, between Purisima Point and Point Conception along the coast and inland to Lompoc. During the 5 annual projected Falcon Heavy launches from SLC-6, a larger area would receive engine noise since there are 3 first stages on the launch vehicle. Noise during Falcon Heavy launches would reach the Santa Maria Valley and the Gaviota Coast. When landing at SLC-4 or SLC-6, landing engine noise follows the associated launch engine noise by approximately 5 to 7 minutes and typically occurs slightly before or simultaneous with the sonic boom that impacts land. Static fire engine tests at SLC-4 and SLC-6, which typically occur 1 to 3 days prior to launch and last up to 7 seconds per event, would also generate engine noise across VSFB and off base areas, including the Santa Rita Hills and Gaviota Coast.

Additional information on engine noise is provided below in Sections IV.C and IV.D, in the context of potential impacts to marine mammals and sensitive species habitat.

Noise associated with launches, static fire tests, and landings, occurs at and near multiple launch facilities across VSFB and may contribute to cumulative impacts to sensitive species and their habitat. Prior to 2023, VSFB has supported an average of 6.2 launches per year with approximately 13 in 2022. During 2023 a total of approximately 28 Falcon 9 missions were performed on VSFB and in 2024 a total of 46 launches were performed. As of the date of this staff report, Commission staff have counted a total of approximately 33 SpaceX launches in 2025, with the most recent launch on July 31, 2025. The complete description of these cumulative VSFB launch activities and engine noise is included in [Appendix D](#) of this report, along with background technical information on sonic booms.

Sonic Booms

As described by DAF in its CD, rocket launches and landings, either in the ocean atop the drone ship or back at VSFB at SLC-4 or SLC-6, would produce a sonic boom. As shown in the table above, the overpressure from sonic booms of 0.1 to 7.5 pounds per square foot (psf) is roughly equivalent to sound pressure in the range of 108 to 145 dB. Because sonic booms also generate pressure waves, they can also have direct physical effects. To provide context for psf levels, **Table 3** below is included to illustrate the types of damage to structures that can be caused by sonic booms at different psf levels. This table was developed from research carried out by DAF on the impacts of sonic booms generated by aircraft.¹⁵

¹⁵ <https://apps.dtic.mil/sti/tr/pdf/ADA213919.pdf>

Table 3: Possible Damage to Structures from Sonic Booms

Possible Damage to Structures From Sonic Booms		
<i>Sonic Boom Overpressure Nominal (psf)</i>	<i>Type of Damage</i>	<i>Item Affected</i>
0.5 - 2	Cracks in plaster	Fine cracks; extension of existing cracks; more in ceilings; over door frames; between some plaster boards.
	Cracks in glass	Rarely shattered; either partial or extension of existing.
	Damage to roof	Slippage of existing loose tiles/slates; sometimes new cracking of old slates at nail hole.
	Damage to outside walls	Existing cracks in stucco extended.
	Bric-a-brac	Those carefully balanced or on edges can fall; fine glass, e.g., large goblets, can fall and break.
	Other	Dust falls in chimneys.
2 - 4	Glass, plaster, roofs, ceilings	Failures show that would have been difficult to forecast in terms of their existing localized condition. Nominally in good condition.
4 - 10	Glass	Regular failures within a population of well-installed glass; industrial as well as domestic greenhouses.
	Plaster	Partial ceiling collapse of good plaster; complete collapse of very new, incompletely cured, or very old plaster.
	Roofs	High probability rate of failure in nominally good state, slurry-wash; some chance of failures in tiles on modern roofs; light roofs (bungalow) or large area can move bodily.
	Walls (out)	Old, free standing, in fairly good condition can collapse.
	Walls (in)	Inside ("Party") walls known to move at 10 psf.
	Glass	Some good glass will fail regularly to sonic booms from the same direction. Glass with existing faults could shatter and fly. Large window frames move.
Greater than 10	Plaster	Most plaster affected.
	Ceilings	Plaster boards displaced by nail popping.
	Roofs	Most slate/slurry roofs affected, some badly; large roofs having good tile can be affected; some roofs bodily displaced causing gale-end and will-plate cracks; domestic chimneys dislodged if not in good condition.
	Walls	Internal party walls can move even if carrying fittings such as hand basins or taps; secondary damage due to water leakage.
	Bric-a-brac	Some nominally secure items can fall; e.g., large pictures, especially if fixed to party walls.

Source: Haber and Nakaki 1989

Sonic Booms from Landings (On-Base)

Up to 12 first stage landings out of the total proposed 100 launches would occur on-base at the SLC-4 launch complex. Boost back landings at SLC-6 for the first stage from Falcon 9 launches would be similar in magnitude to landings at SLC-4. However, due to the landing trajectory required for SLC-6, the boom contour is oriented more

north-south as opposed to west-east for landings at SLC-4 (**Exhibit 5b**). A total of seven Falcon 9 launches per year would land back at SLC-6 along with up to five landings of the Falcon Heavy rockets. Each Falcon Heavy landing would consist of two first stage boosters landing simultaneously. Because the Falcon Heavy transitions from supersonic to subsonic speeds at a lower altitude compared to the Falcon 9, it would cause higher overpressure levels centered closer to the landing pad compared to Falcon 9 landings. The two boosters landing simultaneously would also result in higher cumulative noise levels.

Appendix D¹⁶ of DAF's CD summarizes information about sonic booms from landings as follows:

During first stage landings at SLC-4, PCBoom modeling has predicted that landing (i.e., descent) sonic booms may reach up to approximately 7 psf in the area around SLC-4 (see Figure 4.3-2 for an example from the Bandwagon-2 mission in December 2024, but also Appendix A for potential variability). However, during the Transporter 10 mission, a 9.86 psf sonic boom was measured at Honda Creek, 2.1 mi south of SLC-4 (Appendix B). The 1 psf contour may extend as much as approximately 27 mi north of SLC-4 and up to approximately 38 mi to the east (see Appendix A for examples).

Falcon 9 first stage landings at SLC-6 would have similar extents and levels as landings at SLC-4, although shifted to the south. For Falcon Heavy missions at SLC-6, two boosters would land nearly simultaneously at SLC-6. Modeling predicted that the boosters would produce sonic booms up to 13 psf in the immediate area surrounding SLC-6 and the 1 psf contour would extend approximately 17 mi north and 40 mi to the east of SLC-4 (Figure 4.3-5). Focal booms (relatively small areas where high sonic boom levels may occur) are predicted to reach up to an estimated 5 psf approximately 40 mi to the east (Figure 4.3-5).

Although unlikely, sonic booms up to 3.1 psf may also impact the [Northern Channel Islands] during landing events at SLC-4, SLC-6, or on dronships in offshore areas near VSFB, depending on the landing trajectory and weather conditions. However, during the majority of downrange dronship landings in the proposed landing areas, sonic booms would be directed entirely at the ocean surface without impacting any land. Landing sonic booms can vary substantially depending on mission requirements and the associated landing trajectories and various examples of sonic booms model results for Falcon 9 landings at SLC-4 are included in Appendix A to depict that variability.

Exhibit 5b shows three examples of model results (in psf), included in Appendix G of the project DEIS for (1) a Falcon 9 landing at SLC-4, (2) a Falcon 9 landing at SLC-6, and (3) a Falcon Heavy Landing at SLC-6. However, it is important to note that

¹⁶ DAF's April 2025 BA submittal to USFWS

modeling of sonic booms is highly dependent on atmospheric conditions and rocket trajectories, and these three modeled estimates are not representative of all situations. Additional modeling of sonic booms from landings is included in sections of the report below focusing on potential impacts to specific species.

Sonic Booms from Launches (Off-Base Extent)

Sonic boom profiles included in DAF's CD for the proposed Falcon 9 launches are similar to those included in the CD for 50 launches per year recently considered by the Commission. DAF expects peak sonic boom levels from Falcon Heavy launches to be similar to Falcon 9 launches except that the area affected would be larger.¹⁷ **Exhibit 5c** shows three examples of model results (in psf), included in Appendix G of the project DEIS for (1) a Falcon 9 launch from SLC-4 with a WSW trajectory, (2) a Falcon 9 launch from SLC-6 with a southerly trajectory, and (3) a Falcon Heavy launch from SLC-6 with a SSE trajectory. However, as mentioned above, modeling of sonic booms is highly dependent on atmospheric conditions and rocket trajectories, and these three modeled estimates are not representative of all situations. Additional modeling of sonic booms from landings is included in sections of the report below focusing on potential impacts to specific species.

The factors that influence expected and actual sonic booms, and how sonic booms were modeled for the proposed project, as described in the CD, are included below. The outputs from the sonic boom modeling described below are also included in **Exhibit 2¹⁸**, but only show the impact area over the mainland coast.

Note that sonic boom model results can vary in geographic impact locations and intensity as a result of specific mission trajectories and meteorological conditions on the day of the launch. The sonic boom contours depicted in the figures included in Appendix D represent example predicted model results for median meteorological conditions, not actual measurements nor precise predictions. For easterly trajectories, sonic booms may impact southeastern Santa Barbara County, Ventura County, and Los Angeles County on the mainland (Figure 3.2-6). The vast majority of the sonic booms that would affect these areas would be less than 1.0 psf. Even with identical trajectories, atmospheric conditions create considerable variation in where sonic booms impact and the level at which they impact. To account for this variation, PCBoom can utilize meteorological parameters in the model that effect where and at what level a sonic boom may impact the surface of the earth. In the late 1990's, SRS Technologies, Inc. assembled a series of daily meteorological profiles across 10 years (1984-1994, one per day for 10 years) from radiosonde data for weather balloons released by the VSFB weather squadron. The data include pressure, temperature, wind speed, and wind direction along an elevational profile from ground, every 1,000 feet (ft), to 110,000 ft. Figure 3.2-6 depicts the overlaid output from sonic boom

¹⁷ As described in Section 3.4.2.1.4 of the DEIS for 100 launches

¹⁸ See also Exhibit 4 of the revised findings report for the February 6, 2025, hearing for CD-0007-24 ([Appendix A](#)), discussed above.

modeling software (PCBoom) for eight actual SpaceX easterly trajectories, each trajectory run between 29 and 34 times, each run representing 1 of between 29 and 34 randomly selected meteorological profiles that capture potential weather conditions throughout the year (308 model outputs total) overlaid in the image. In order to depict the potential variability in results from multiple model outputs under many potential conditions, these results have not been transformed into contours. This also enables an evaluation of the likelihood that specific areas within the overall potential impact area may be impacted at different sonic boom intensities...These estimated values have been generally consistent with sonic boom measurements in these areas, with the exception of one 4.4 psf sonic boom being detected in Santa Barbara County during one Falcon 9 mission.

Appendix D of DAF's CD also summarizes additional information about sonic booms from launches as follows:

Falcon Heavy sonic boom impacts were modeled using PCBoom software (KBR 2024). During ascent, a sonic boom (overpressure of impulsive sound) typically with a peak of approximately 3.0 to 5.0 psf, but up to approximately 8.0 psf, would be generated. Depending on the launch trajectory, the sonic boom may or may not impact the surface of the earth. Since 2017, approximately 10 percent of the ascent sonic booms generated during Falcon 9 launches from SLC-4 did not impact the surface of the earth because the ascent of the rocket was too steep. When ascent sonic booms do impact the earth's surface, they primarily impact the Pacific Ocean, but often overlap the Northern Channel Islands (NCI; see example shown in Figure 4.9-8). From 2017 through 20 October 2024, of the launches that produced ascent sonic booms that impacted the surface of the earth, approximately 67% have impacted the NCI. As discussed in the 2023 Section 7 consultation (USFWS 2023), modeling determined that sonic booms generated during ascent for missions with northerly mission profiles (launch azimuth between 305 and 325 degrees) will only impact the ocean's surface with no impacts to land.

[...] Only 13% of model runs resulted in sonic booms that overlapped eastern Santa Barbara County, 85% of model runs resulted in sonic booms that overlapped Ventura County and 58% of model runs resulted in sonic booms that overlapped western Los Angeles County (Figure 2.2-7). Of the sonic booms model results that overlapped each county, the proportion of the ranges of predicted boom levels across each area is shown in Table 2.2-5.

When considering these discussions and modeled sonic boom areas and levels included in the current consistency determination, it is important to note that prior consistency determinations submitted by DAF for SpaceX launches have varied wildly in how sonic boom levels and areas of effect were identified. For example, CD-0003-24, considered by the Commission in April of 2024, only described and identified limited sonic boom impacts to a single offshore island from SpaceX launches and no effects to any areas of the mainland coast or human populations were acknowledged. This

contrasted greatly with actual observations and acoustic monitoring results that demonstrated elevated sonic booms generated during launches can spread across three counties. The current consistency determination from DAF – for mostly the same types of rockets and trajectories considered in April of 2024 – now acknowledges sonic boom effects at levels of up to nearly four pounds per square foot across those same three counties (as shown in **Exhibit 2**). This discrepancy calls into question the accuracy of the models used by DAF to evaluate launch effects and whether predictions and assumptions in the current consistency determination continue to underestimate sonic boom extent and severity, particularly for the new proposed launches of the larger Falcon Heavy rockets. While DAF appears to have taken steps in recent months to attempt to address this issue and respond to the concerns raised by the Commission and public, as discussed below, the accuracy of DAF’s predictive modeling efforts remains highly uncertain.

Sonic Boom Modeling and Monitoring (Overall)

Information on off-base sonic booms has previously been made available to Commission staff by DAF and through the federal regulatory documents that have been prepared, including the earlier Draft Environmental Assessment and United States Fish and Wildlife Service (USFWS) Biological Opinions for other SpaceX launch projects at VSFB, including the 36-launch cadence and the 50-launch cadence. This information was primarily derived from predictive models however and demonstrated that such sonic booms modeling results are highly variable and may not align with real-world conditions. For example, initial results provided by DAF from limited acoustic monitoring efforts carried out by researchers from Brigham Young University (BYU) and California State University, Bakersfield (CSU Bakersfield), included as **Exhibit 6**, confirm that measured sonic boom extent and magnitude often does not align with modelled predictions.

This is further demonstrated in Appendix D of DAF’s CD which includes a table as “Appendix B” compiling “Falcon 9 SLC-4 Noise Measurements through 21 January 2025” (see **Exhibit 7**). These data include comparisons between modeled and measured (by measurement location, where available) engine noise and sonic boom levels from select launches and landings at SLC-4 for the period from October 2018 through late January 2025. However, data are only provided for some launches during that period, not all. Generally, the data presented indicate that while measurements of engine noise and sonic boom sound pressure levels tend to fall within the predicted model ranges by general location, several exceeded the model ranges, sometimes by as much as double (as highlighted by orange marking in the exhibit). It should also be noted that this table provides only select data and does not include all of the measurement locations reported in **Exhibit 6** for several launches in the summer of 2024 and does not provide any measurements on the Northern Channel Islands or data collected since January 2025.

Through DAF’s previous descriptions (discussed below) of its efforts to meet Condition 2 of the Commission’s previous conditional concurrence with DAF’s CD for 36 launches per year, DAF committed to carrying out this additional work. Specifically, DAF

continued the BYU/CSU Bakersfield Sonic Boom Assessment Plan (acoustic monitoring program) and invited Commission staff's feedback on how to adapt it to more effectively cover areas of sensitive coastal resources such as Channel Islands National Park and National Marine Sanctuary. In addition, DAF also previously committed to evaluating the results of the data collection effort and use them and feedback from the interagency working group in order to minimize sonic booms:

DAF will evaluate inputs from the Working Group when considering launch times and trajectory to minimize the spatial extent and severity of sonic booms experienced in those off-base areas to the greatest extent practicable. The DAF will carry these inputs into its Current Launch Schedule Review Board process when considering decisions on adjustments to launch times and trajectories.

However, DAF has failed to provide any indication in the current CD that sonic boom extent and severity has been minimized or that input from the working group has been considered by its review board process or resulted in any adjustments or changes to launch times and trajectories. In fact, information from the Draft Environmental Assessment and USFWS Biological Opinion for 50 launches showed that while the proposed number of landing events for the first stage on VSFB would not increase from the 12 previously concurred with by the Commission, the sonic booms from these landing activities may have been more powerful than previously considered. The differences in the various revisions to model results provided to the Commission over time are discussed in more detail in Section IV.A of the revised findings report for the February 6, 2025, hearing ([Appendix A](#)). DAF stated in correspondence to Commission staff on September 17, 2024, that the reason for the variability in depicted sonic boom strength is that: "The sonic boom footprint varies for each trajectory and the conditions assumed in that specific model run. The figure [in the CD for 50 launches per year] is not meant to be all inclusive but is simply an example of a single model run."

The subject CD and DEIS prepared for the project also present specific model runs, discussed above, in which predicted sonic boom extent and intensity differ from previous modeling provided. These new models of sonic booms on base also include samples of predicted extent and intensity for landings at SLC-6 and for landings of two rockets simultaneously, as is proposed for the Falcon Heavy. As described above, sonic boom impact areas depend significantly on trajectory and atmospheric conditions for a given launch or landing. The expanded modeled sonic boom footprint with higher peak overpressures (in comparison to the footprint analyzed for the USFWS 2023 Biological Opinion and the consistency determination for 36 launches per year) have resulted in an expanded potential impact area associated with on-base landings. These expanded potential impact areas are discussed in Sections IV.C and IV.D below (and in [Appendix E](#)) for coastal waters and marine resources and for environmentally sensitive habitat areas (ESHAs), respectively. Expanded sonic boom footprint in recent modeling highlights the sensitivity to input conditions, as well as the uncertainties in projecting sonic boom strength for any given launch, and thus the potential on-the-ground effects at an event scale. Better, more accurate modeling is necessary to more accurately predict and evaluate event-scale impacts and provide clarity on the potential for the

increased launch frequency, operating over an extended period of time, to adversely affect marine and terrestrial biological resources.

Lack of Information Regarding Sonic Booms and Engine Noise

Despite previous commitments by DAF related to Conditions 2 and 3 from the Commission's conditional concurrence with consistency determination CD-0003-24 to further study and improve modeling accuracy and to use that information in making decisions about how and when launches would be planned based on various environmental factors (addressed below), the current DAF CD does not address what, if any, measures DAF would take to carry forward previous commitments to (a) take steps to minimize the spatial extent and magnitude of sonic booms from SpaceX launches or (b) develop and implement a biological monitoring program to evaluate sonic boom effects on coastal biological resources if those minimization measures would not result in avoidance of sonic boom effects.

On June 27, 2025, Commission staff asked DAF the following:

Please provide an update on the sonic boom assessment and minimization measures (conditions 2 and 3 of Consistency Determination No. CD-0003-24) per DAF's prior commitments, as they apply to this CD. Please provide an assessment of the feasibility of limiting the spatial extent and severity (in terms of overpressure levels) of sonic booms caused by launches for proposed new launch location, increased cadence, and addition of Falcon Heavy vehicle. Please provide an evaluation of if the Falcon Heavy trajectories could be focused so the launches result in less potential sonic boom impacts over the NCI and mainland coast (i.e. are the limitations for trajectories, such as to achieve polar orbits with less fuel, characteristically different than the Falcon 9 missions).

In response, DAF simply stated on July 23, 2025: "This update will be provided to the Interagency Working Group on 26 August 2025 meeting." Since the Commission has to consider this CD at its August 2025 hearing because DAF only extended the review period for the CD to August 27, 2025, the Commission will not be able to consider DAF's update on August 26, 2025, which is after the Commission hearing.

As discussed in Sections IV.C and IV.D below for coastal waters and marine resources and for environmentally sensitive habitat areas (ESHAs), respectively, this information is critical to the assessment of the potential for impacts to sensitive species off-base from sonic booms from launches.

Additionally, Commission staff requested information from DAF on June 27, 2025, on sonic boom modeling methodology, hindcasting for previous launches with atmospheric conditions from the time of the launch, sonic boom modeling specific to Falcon Heavy, and engine noise models as they relate to topography. This information is also key to completing an accurate assessment of the intensity and spatial distribution of noise from the proposed project and has also not been provided by DAF.

The CD's estimates of the extent and severity of sonic booms from both launches and landings relies heavily on a set of weather balloon data from over three decades ago. While some on-the ground measurements have been conducted over the past year in attempts to check model accuracy, those measurements have been geographically limited and only conducted during certain launches. Further examination of the modeling is necessary to establish confidence in the models and to better refine them. While Section 3.4.2.1.4 of the project DEIS details the sonic boom modeling methodology, DAF has not explained¹⁹ how the inputs (10-year weather balloon data from 30 years ago, launch trajectories, etc., discussed in more detail above) are representative of the conditions for the launches proposed in this CD. Similarly, it has not explained the rationale for the varying number of times each trajectory is modeled (between 29 and 40 times). As a way to assess the appropriateness of using such old meteorological data, Commission staff has also requested that DAF provide "hindcasted" models for sonic booms using actual weather data from specific launch events/days, and for them to compare those with the randomized selection of historical weather data from the data set from 1984-1994. This information is important to assess the accuracy of the sonic boom modeling results presented in this CD, and which appear to be generated prior to individual launches for review by base command. In its July 23, 2025, response to Commission staff's request for hindcasting models, DAF declined to provide this information and stated: "Hindcasting is not currently part of the DAF's sonic boom modeling efforts."

While the CD and DEIS provide separate modeling for engine noise for both Falcon 9 and Falcon Heavy rockets, the CD does not appear to provide comprehensive modeling of the range of potential sonic booms these rockets could generate. **Exhibits 5b and 5c** do include a single model run for both a landing and a launch of the Falcon Heavy, but no figures similar to **Exhibit 2** of this report or Exhibit 4 of the revised findings report for the February 6, 2025, hearing for CD-0007-24 ([Appendix A](#)) are provided to demonstrate the range of potential overpressure levels off-base²⁰ for various launch trajectories or weather conditions. Commission staff asked DAF to provide figures for the Falcon Heavy sonic boom modeling for launches and landings, including separate maps for different sound pressure levels, over land and over water, and for different trajectories, similar to what was provided for earlier submittals for Falcon 9 and to describe how the inputs and modeling for Falcon Heavy launches differs from Falcon 9 launches. This information has not been provided and without it, the Commission is unable to assess the extent to which Falcon Heavy launches and booster landings would produce different sonic boom overpressure levels than the Falcon 9 launches and

¹⁹ In response to Commission staff's June 27, 2025 request for DAF to describe how the model inputs are representative of the actual conditions for launches proposed in this CD, and to explain the rationale for the number modeling runs used, DAF, on July 23, 2025, simply asserted that predictions are consistent with ground recordings. However, this response does not align with previously provided statements— in particular, statements made in April of 2024 that SpaceX launches do not generate sonic booms that affect the mainland coast.

²⁰ For eastern Santa Barbara, Ventura, and Los Angeles Counties, over water, or over the northern Channel Islands.

booster landings and whether stronger levels are to be expected in areas with coastal resources off-base.

In DAF's July 23, 2025, response to Commission staff's request for this information, DAF stated:

Modeling inputs and methodology do not differ from Falcon 9 modeling other than vehicle specifications. Sonic booms produced by Falcon Heavy are expected to result in similar sonic boom levels and areas of geographic impact as Falcon 9 as depicted in DEIS dot map figure 3.4-9.

However, DAF did not provide any technical information to support its assumption that two very different types of rockets differing in size, lift capacity, engine power and aerodynamic profile would produce similar sonic boom signatures.²¹

Additionally, while the CD states that engine noise models are considered conservative since they do not take into account attenuation due to landforms and assume the surface of the earth is flat, DAF has not provided any information to clarify whether there are cases where topography could focus and/or magnify the sound waves in some areas (rather than attenuate them).²² DAF has also not provided additional modeling for engine noise with software that can account for topography, nor has it verified with measurements from a wider range of topographically unique locations for Falcon 9 launches to assess model accuracy (or clarified whether either of those could be conducted).²³ Without considering the potential shortcomings of its engine noise modeling, it is unclear whether the information provided in the CD portrays an accurate description of engine noise impacts on and off base.

Specific instances of the lack of information described above related to engine noise and sonic booms are summarized below. This information is important to the Commission's ability to conduct a complete assessment of the proposed project's consistency with the marine biological resource and environmentally sensitive habitat area (ESHA) policies of the California Coastal Management Program (CCMP), specifically Sections 30230, 30231, and 30240. Assessment of the project's consistency

²¹ Appendix G of the DEIS also states: "The Falcon Heavy pitches over faster (at a lower altitude) than the Falcon 9 which, along with its shape factor, contributes to the wider crescent-shaped contour and higher maximum overpressure levels [...];" and "Overpressure levels for the Falcon Heavy stage 1 landing at SLC-6 are also like those for Falcon 9 landings, except higher overpressure levels are expected near the oval boom footprint region, centered on the landing pad, due to the vehicle transitioning from supersonic to subsonic at a lower altitude."

²² DAF stated on July 23, 2025, that "The current version does not calculate reflections/focuses/or magnifications at the ground level."

²³ DAF stated on July 23, 2025, that: "While there could be local influences on received sound levels from topography and vegetation (either slight increases or decreases in received noise levels), data collection throughout the counties have shown high accuracy to the modeled received boom levels. Additionally, due to the logarithmic nature of sound, if two reflected waves of the same intensity were to meet (which also could be interpreted as two sound events of the same intensity) the resultant combined wave would only increase by approximately 3 dB. It is not anticipated that local topography or vegetation would significantly increase local received sound levels." However, Commission staff notes that on-the-ground verification measurements so far have been somewhat limited in geographical/topographic distribution.

with those policies requires an accurate estimate of the intensity and geographical distribution of noise from the proposed project.

- Information on whether sonic boom assessment and minimization measures would be implemented and what they would be
- An assessment of the feasibility of limiting the spatial extent and severity of sonic booms caused by launches from the new proposed launch location, increased cadence, and Falcon Heavy rocket
- An evaluation of if the Falcon Heavy trajectories could be focused so the launches result in less potential sonic boom impacts over the NCI and mainland coast
- An explanation of how the sonic boom modeling inputs (e.g. weather balloon data from 1984-1994, launch trajectories) are representative of the conditions for the launches proposed in this CD and of the rationale for the number of times each trajectory is modeled
- Results of hindcasted models for sonic booms using actual weather data from specific launch events/days, and a comparison of them with the randomized selection of historical weather data used from 1984-1994
- A representative set of Falcon Heavy sonic boom modeling, over land and over water for launches with a range of different trajectories and atmospheric conditions
- A description of how the inputs and modeling for Falcon Heavy launches differs from Falcon 9 launches
- Modeling for engine noise with software that can account for topography
- Verification of engine noise modeling with measurements from a wider range of topographically unique locations for Falcon 9 launches to assess model accurately

Progress on Satisfying Requirements of the Conditions from Consistency Determination No. CD-0003-24

On August 8, 2024, the Commission conditionally concurred with DAF's consistency determination for SpaceX's increase from six to 36 Falcon 9 launches per year from VSFB, finding that only through implementation of the coastal resource protective measures established through seven conditions would the project be carried out consistent with the public coastal access, commercial fishing, and terrestrial and marine biological resource protection policies of the California Coastal Management Program (CCMP). DAF accepted the conditions of the Commission's conditional concurrence. As described in further detail in [Appendix C](#), while DAF has largely met the intent of Conditions 5 through 7, it has failed to implement or not provided sufficient information to demonstrate its adherence to Conditions 1 through 4. Thus, the Commission is missing key information needed to demonstrate that SpaceX launches are and would be carried out consistent with relevant enforceable policies of the CCMP.

B. OTHER AGENCY APPROVALS

United States Fish and Wildlife Service

The Department of the Air Force (DAF) reinitiated Section 7 consultation with the United States Fish and Wildlife Service (USFWS) on 9 April 2025. USFWS is expected to issue a Biological Opinion (BO) by the end of August 2025.

National Marine Fisheries Service

The DAF completed Section 7 consultation with the National Marine Fisheries Service (NMFS) on 17 April 2024. The existing SLD 30 Letter of Authorization (NMFS 2024 LOA) issued by NMFS for Level B harassment of marine mammals incidental to launch activities is valid April 10, 2024, through April 9, 2029. This LOA supersedes the previous Letter of Authorization (LOA) from April 10, 2019 (NMFS 2019 LOA), for rocket launches at VSFB. Both of these LOAs are discussed in more detail in the marine resources findings in Section IV.C, below. Subsequent to the issuance of the NMFS 2024 LOA, DAF coordinated with NMFS regarding potential for take of pinnipeds at the Carpinteria Harbor Seal Rookery and the Point Mugu Lagoon haulout due to sonic booms created during launches, which had not been addressed in that their Section 7 consultation that resulted in the NMFS 2024 LOA. Ultimately, as described in more detail in the CD and [Appendix E](#) of the CD, DAF determined that they did not find it necessary to increase the number of permitted takes by Level B harassment of Pacific harbor seals under the LOA, despite a change in geographic area of potential impact.

Federal Aviation Administration

The Federal Aviation Administration (FAA) has a role in licensing commercial space launch operations and approving airspace closures for launch operations. FAA issues launch licenses that can cover multiple years of launches and can be amended to reflect changes in launch operations – including increases in cadence or revisions to safety protocols following a launch mishap. SpaceX has been launching Falcon 9 vehicles from SLC-4E under a launch license that was most recently modified on September 29, 2023. Based on discussions with FAA staff, it is Commission staff's understanding that the scope of activities authorized under this launch license are established by the associated document prepared by the U.S. Space Force (USSF) under the National Environmental Protection Act. The Draft Environmental Impact Statement (EIS) was released by FAA and DAF on June 2, 2025, for an increase in Falcon 9 launch activities at Vandenberg Space Force Base (VSFB) from 50 to 95 per year, launches of SpaceX Falcon Heavy up to five times per year, modifications to Space Launch Complex (SLC)-6 and construction of two new landing zones. As such, it is Commission staff's understanding that SpaceX's FAA license would need to be amended. In addition, the FAA must also approve related airspace closures for individual launch operations.

United States Environmental Protection Agency

The United States (US) Environmental Protection Agency (EPA) reviewed May 2025 Draft Environmental Impact Statement (DEIS) pursuant to the National Environmental Policy Act (NEPA) and EPA's review authority under Section 309 of the Clean Air Act

(CAA). Section 309 of the CAA requires EPA to review and comment on the environmental impact of any proposed federal action subject to NEPA's EIS requirements and to make its comments public. EPA reviewed the DEIS and identified public health, welfare, or environmental quality concerns in the analysis. EPA provided a comment letter to DAF on July 3, 2025, with comments including recommendations for protecting water resources, addressing noise impacts, assessing impacts from launch and reentry emissions, and integrating new and emerging information into future implementation of the project (**Exhibit 9a**).

Central Coast Regional Water Quality Control Board

The Central Coast Regional Water Board (Central Coast Water Board) is a state regulatory agency with the responsibility for protecting the quality of the waters of the state within its area of jurisdiction, which is along the central coast of California. Wastewater discharges that may occur during project activities, including accumulated stormwater and non-stormwater discharges, would continue to be managed in accordance with the Central Coast Water Board letter for Enrollment in the General Waiver of Waste Discharge Requirements for SLC-4E Process Water Discharges. DAF has committed to ensuring that SpaceX will obtain a National Pollutant Discharge Elimination System (NPDES) Permit for operations at SLC-6.

In addition, Central Coast Water Board staff reviewed the Draft EIS and provided general and specific comments to provide clarification within the document and identify potential adverse impacts to surface water and/or groundwater resulting from the project (**Exhibit 9b**).

Santa Barbara County Air Pollution Control District

The Santa Barbara County Air Pollution Control District (SBAPCD) has jurisdiction over stationary emission sources, including federal activities, in its air basin and California coastal waters; VSFB is within its jurisdictional air basin and construction and operations at SLC-6, operations at SLC-4, and marine vessels associated with the project transiting through state waters are all within SBCAPCD jurisdiction. The SBCAPCD has locally adopted air emission thresholds that are used to evaluate the significance of air quality and GHG impacts from a project's construction and operations and applicable regulatory requirements under its rules and regulations. In the context of launch projects and operations, stationary source emissions include roll-on roll-off tugboat and barge operations, fuel transfer on space launch complexes, and also include air emissions from ancillary sources such as diesel generators, special equipment, and solvents to clean equipment. The SBCAPCD does not have jurisdiction over emissions from rocket liftoff, as liftoff is considered a mobile emissions source subject to either California Air Resources Board or U.S. EPA emission standards. To ensure that the proposed project will be consistent with the requirements imposed by the SBCAPCD, DAF has committed to ensuring that SpaceX will receive and comply with all of the relevant permits from the SBCAPCD prior to construction and operation of the proposed project.

South Coast Air Quality Management District.

The South Coast Air Quality Management District (SCAQMD) has jurisdiction over stationary emission sources within the South Coast air basin (western portions of Riverside and San Bernardino Counties, the southern two-thirds of Los Angeles County, and all of Orange County), including federal activities, and California coastal waters. Marine vessels associated with the proposed project would transit through state waters in SCAQMD jurisdiction. The SCAQMD has locally adopted air emissions thresholds that are used to evaluate the significance of air quality and GHG impacts from a project's construction and operations and applicable regulatory requirements under its rules and regulations.

The project would not require any permits from SCAQMD. However, project operations would take place within the jurisdiction of the SCAQMD and would exceed general conformity requirements for nitrogen oxides (NO_x). In order to accommodate projects subject to general conformity requirements, general conformity budgets for criteria pollutants are established within each air quality management district (AQMD). As described in the draft EIS, the SCAQMD currently has a general conformity budget for NO_x and the project is not anticipated to exceed the budget. DAF anticipates receiving a letter from SCAQMD granting use of budgeted NO_x shortly. SCAQMD, SpaceX and DAF have been coordinating and developing a methodology to track annual project emissions and return any unused credits.

Tribal Outreach and Consultation

As described in the Draft EIS and the CD submittal, DAF engaged with the California State Historic Preservation Office (SHPO) on January 16, 2025. The Section 106 consultation considered demolition, construction, static fire, launch and boost back noise vibrations effects in the Cultural Resources Study Area for the project. The Study Area reached outside the Base boundaries to include the mainland and Northern Channel Islands (NCI). However, the noise study areas were not included in the delineation of the Area of Potential Effects (APE) because the DAF concluded that those noise levels have no potential to affect cultural resources. The SHPO concurred with the DAF's finding of no historic properties affected for demolition of SLC-6 on October 16, 2024, and construction and operation on February 6, 2025. The DAF also engaged with the Santa Ynez Band of Chumash Indians (SYBCI) over potentially affected historic properties. The SYBCI responded on January 21, 2025, that the Tribe has concerns the Proposed Action would affect a perceived traditional cultural landscape on VSFB and therefore requested a site visit. The Installation Tribal Liaison Officer (ITLO) responded on January 21, 2025, requesting the Tribe schedule a site visit. As of the date of this staff report, the Tribe had not scheduled a site visit or identified any perceived potential effects. The ITLO will continue open communication with the Tribe to gather comments and address any perceived potential effects.

Consistent with the Commission's Tribal Consultation policy, Commission staff received a list of Tribes with potential cultural connections to the project area from the Native American Heritage Commission and completed outreach to those Tribes. Consultation invitations were mailed on June 20, 2025, to the Barbareño/Ventureño Band of Mission

Indians, the Chumash Council of Bakersfield, the Coastal Band of the Chumash Nation, the Northern Chumash Tribal Council, the San Luis Obispo County Chumash Council, and the Santa Ynez Band of Chumash Indians. No responses or requests for consultation were received as of the date of publication of this report. Further discussion of potential project effects on cultural resources is available below in the Cultural Resources section of this report.

C. COASTAL WATERS AND MARINE RESOURCES

Section 30230 of the Coastal Act states:

Marine resources shall be maintained, enhanced, and where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.

Section 30231 of the Coastal Act states (in relevant part):

The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through...controlling runoff, preventing depletion of ground water supplies and substantial interference with surface waterflow, [and] maintaining natural vegetation buffer areas that protect riparian habitats.

The proposed project has the potential to adversely impact marine resources, including the biological productivity of marine waters and marine areas and species of special biological significance such as marine protected areas, national marine sanctuaries, and marine mammal breeding and haul-out sites, primarily due to marine debris and noise from rocket engines and sonic booms. Proposed construction activities at the SLC-6 launch complex and the discharge of deluge water during launch events and the ocean disposal of the rockets' fairings, weather balloons and first-stage boosters also introduce the potential for adverse impacts to coastal water quality. In addition, the proposed project has the potential to contribute to the depletion of groundwater supplies and interfere with surface water flow due to its proposed use of deluge water. Finally, the proposed project also has the potential to adversely affect marine resources due to artificial night lighting from rocket engines and illumination of the space launch complexes.

Regional Context

VSFB is located in unincorporated Santa Barbara County and encompasses 42 miles of coastline and an area of nearly 100,000 acres. The marine and coastal area surrounding the base is widely recognized as one of the most biologically productive and diverse areas in the world. The Channel Islands National Marine Sanctuary (CINMS) and Channel Islands National Park are located offshore approximately 40

miles south of the SLC-4 launch complex, and the coastline adjacent to VSFB from Purisima Point to south of Point Arguello has been designated the Vandenberg State Marine Reserve. The newly designated Chumash National Marine Sanctuary also extends across the waters offshore of VSFB.

There are approximately 14 marine mammal haul outs located along the VSFB coastline that are known to provide refuge for multiple species of pinnipeds, including California sea lions (*Zalophus californianus*) and Pacific harbor seals (*Phoca vitulina*). More recently, increasing populations of northern elephant seals (*Mirounga angustirostris*) have been recorded at the haul outs. In addition to these species, the nearby Channel Islands are known to support populations of northern fur seals (*Mirounga angustirostris*) and more rarely, Guadalupe fur seals (*Arctocephalus townsendi*) along with Stellar sea lions (*Eumetopias jubatus*). Southern sea otters (*Enhydra lutris*) occupy the nearshore ocean along the VSFB coastline and are often found within the kelp beds located at the southern end of VSFB.

The Vandenberg State Marine Reserve (SMR) includes coves, rocky reefs, undersea pinnacles and sandy seafloor areas. Vandenberg SMR contains a variety of fishes, invertebrates, seabirds, and marine mammals typical of northern and central California²⁴. Beyond the boundaries of VSFB and the Channel Islands, the area of the California coast and Pacific Ocean within the area of the launch trajectories includes the Santa Barbara Channel, and the coastal zones of Santa Barbara County, Ventura County, and western Los Angeles County. The Santa Barbara Channel (Channel) is known as a region of remarkably high biodiversity of marine organisms including marine mammals, seabirds, fish, invertebrates, plankton and algae. This high biodiversity is in part a result of the Channel and Point Conception area being a transition zone between the cold nutrient rich waters of the California Current and the warmer waters of southern California²⁵.

Notable areas along the Santa Barbara County coastline include Point Conception, where the California coast makes a dramatic turn to the east, the largely uninhabited Gaviota coastline, Devereux Slough, Carpinteria Marsh, and the Carpinteria harbor seal rookery. The Ventura County coastline includes the Ventura River estuary, the Santa Clara River estuary, Ormond Beach and Lagoon, and Mugu Lagoon, estuaries that are of global importance for over 270 migratory bird species, including five endangered species. Southern Ventura County and western Los Angeles County include miles of coastline with rocky outcrops and reefs.

Engine Noise and Sonic Booms

The proposed project has the potential to adversely affect marine biological resources through exposure of marine species and habitats to elevated levels of engine noise and sonic booms generated during rocket launches and landings. Proposed SpaceX launch events would occur roughly every three days and anticipated sound and sonic boom levels at haul out sites and other high use areas may exceed 130 decibels (dB) and 10

²⁴ <https://wildlife.ca.gov/Conservation/Marine/MPAs/Vandenberg>

²⁵ <https://sbclter.msi.ucsb.edu/about/>

pounds per square foot (psf). Marine mammals are sensitive to sound and are often considered to be indicator species to understand noise impacts on the marine environment. Marine mammals that may be present in the nearshore environment, particularly those that spend time above water, include southern sea otters, sea lions, and seals. [Appendix D](#) includes a summary of the available scientific information addressing the effects of aircraft noise and sonic booms on wildlife.

Although this discussion in [Appendix D](#) provides a useful point of reference, it should be noted that the historic launch frequencies at VSFB have typically been significantly lower than those currently being carried out by SpaceX and considered in the Department of the Air Force's (DAF's) consistency determination. As such, past observations are useful for demonstrating the types of effects on marine species generated by periodic individual launches and noise exposure events – e.g., alert behavior, flushing into the water, decreases in hearing sensitivity – but cannot provide an accurate indication of long term or cumulative effects from the steady cadence of 100 launches, 50 engine tests and 24 landing events at VSFB each year, as currently proposed by DAF.

More recent monitoring carried out on VSFB, in particular that summarized in the annual reports from 2022 through 2024 when the number of SpaceX launches began to increase sharply, provides another useful reference as to the types of effects that can be expected within marine mammal habitat areas of special biological significance such as haul outs. Similar to historical reports, those from recent years demonstrate that flushing of animals into the water is a common occurrence immediately following exposure to launch noise, in particular for those haul out sites located within the areas exposed to the highest levels of noise from engines and/or sonic booms. Although animals have been shown to return to the haul out site and resume previous behavior within a short time, flushing into the water is disruptive to individual animals and the colony, energetically expensive, and carries a risk of injury, particularly to young and smaller animals that may be trampled. Young animals may also become separated from their mothers and suffer stress and injury as a result. The severity of these effects is heavily influenced by the frequency of disturbance. The more frequent the disturbance, the more substantial the effect or risk. Although very few studies have been carried out on the long-term effects to marine mammals and habitat areas of exposure to sonic booms, engine noise or other elevated, short duration sounds, research into other sources of disturbance demonstrates that a threshold exists beyond which the animals and/or colony will abandon the area. It is also notable that while existing research on the effects to animals of noise disturbance indicates that some species and life stages can acclimate to similar types of disturbance events over time, the unpredictable nature of sonic booms and engine noise generated from SpaceX launch events, as well as the interval of roughly three days between them, makes it likely that each event would trigger a novel startle response and associated stress.

Engine Noise and On-Base Sonic Booms

Engine noise generated by launches and landings at SLC-4 is described in the project description provided in Section IV.A, above. Each launch event generates in-air noise up to a maximum of 140 decibels (dB) for several minutes in the immediate area of the launch pad (**Exhibit 5a**). This sound level would be generated during engine testing, rocket liftoff and boost-back landings. Based on modeling conducted by DAF, in-air noise levels directly off the coast where marine mammals could be located would be roughly 130 dB and would attenuate outward in all directions, reaching 110 dB up to 14 miles away.²⁶ Rocket landing of the Falcon 9 would also create sonic booms in the range of approximately one to seven and a half psf on VSFB in areas where there are several marine mammal haulouts, and up to eight psf at the nearest coastline where southern sea otters may be present. Rocket landings at SLC-6 of the Falcon 9 or two first stages from the Falcon Heavy would create sonic booms in the range of approximately one to ten psf in these same areas. The coastal areas of VSFB with southern sea otter populations and with marine mammal haulouts shown to experience a sonic booms are provided in **Exhibit 10**, in Figures C.0-58 to -62, and C.0-72 to -76, respectively.²⁷ Maps of the sonic boom overpressures expected from modeling landings at SLC-4 and SLC-6 (for both rocket types) are also included in **Exhibit 5b** (as described above in Section IV.A).

Off-Base Sonic Booms

As described in Section IV.A, above, rocket launches would also create sonic booms in the range above five psf at the northern Channel Islands, and over three psf along the off-base mainland areas of Santa Barbara, Ventura, and Los Angeles Counties with a highest predicted level of almost four psf (**Exhibits 2 and 5c**). The CD states that a 4.4 psf sonic boom was detected in Santa Barbara County during one Falcon 9 mission, but notes that is expected to rarely occur. There are dozens of known marine mammal haulout sites located on the Channel Islands and in the mainland areas that experience sonic booms from launches (see figures²⁸ in DAF's March 6, 2025, Pinniped Monitoring Plan, provided here as **Exhibit 11**) and that may be adversely impacted by the sudden loud noises and overpressures associated with these sonic booms.

Cumulative Noise Impacts

As discussed in [Appendix D](#) regarding the effects of elevated and sudden noise on pinnipeds from Mancini et al. (1998), sonic booms may result in startle or flushing (towards the surfline) reactions by pinnipeds at haulouts and potentially temporary decreases in hearing sensitivity of marine mammals. Additional information from that literary synthesis is included in [Appendix D](#) in a section providing general information regarding noise and wildlife. While that information is discussed below in the context of environmentally sensitive habitat areas (ESHAs), it also applies to the potential for noise and pressure waves to adversely affect the biological productivity of coastal waters, streams, wetlands, and estuaries because they can lead to impacts to wildlife that

²⁶ See **Table 2** in Section IV.A for examples of sound levels from typical sources.

²⁷ Also see Supplementary Figures 1 and 2 in DAF's March 6, 2025, Pinniped Monitoring Plan (**Exhibit 11**) for on-base haul-outs with names.

²⁸ Figures 2-1, 2-12, 3-1, and 3-2

inhabit these areas, including direct physical auditory changes and other stress, behavioral, and reproductive changes, that may cumulatively result in adverse impacts to species at a population or habitat scale. Through those potentially wide-ranging adverse effects, strong sonic booms that may cause these impacts would therefore be inconsistent with the requirements of Section 30231 of the California Coastal Management Program (CCMP).

To help evaluate potential adverse impacts to marine mammal hearing from elevated sound, Southall et al. (2019), identifies threshold levels for various marine mammal species beyond which temporary threshold shifts (i.e. temporary hearing loss) would be expected to occur. Although elevated, the sounds anticipated to be produced by the proposed project are expected to fall below these threshold levels. To evaluate the levels of disturbance and behavioral response triggered by launch noise, DAF has conducted monitoring of pinniped (seal and sea lion) responses to launch activities and previously found that historical launch activities have not had any observable long-term consequences for the pinniped populations on VSFB or their use of habitat at and around VSFB.

Previous Reviews of Pinniped Monitoring Reports

This section provides relevant information from the Section IV.C of the August 8, 2024, staff report ([Appendix A](#)) detailing Commission staff's previous reviews of the results of DAF's pinniped monitoring program for the years 2018-2023, while the section after provides updates from this new CD submittal and discusses results of the 2024 pinniped monitoring.

In preparation for the August 2024 hearing for CD-0003-24, Commission staff reviewed DAF's marine mammal monitoring program (including the annual reports provided to the National Marine Fisheries Service, NMFS, for the years 2018-2023) and detailed the following concerns about the efficacy of DAF's pinniped monitoring program and the conclusions being drawn from it: (1) there were limitations in the extent to which observations through monitoring (during and on either side of launches) could be affirmatively tied to noise impacts from an individual launch, (2) while there was abundant historical data for pinniped populations on VSFB, a rigorous statistical analysis of the changes in population trends using this data to analyze potential impacts from changes in launch activities had not been conducted nor had this on-site data been compared to historical data of pinniped populations nearby but outside the influence of launches and sonic booms, and (3) there were uncertainties about how more frequent noise events from the proposed increase in launch cadence might have unprecedented impacts on pinniped populations on-base. These three points, which were raised in Section IV.C of the August 8, 2024, staff report ([Appendix A](#)), are discussed again with some specific examples below.

First, those monitoring reports consistently conclude that there are no impacts on pinnipeds from launch activities, despite observations showing pronounced behavior responses. The 2023 Annual Report concludes that there was no impact to harbor seals, California sea lions, or elephant seals from any of the launches. However, the report does not include a discussion as to why it had no impact when on multiple

occasions some or all of the harbor seals fled the beach during a launch and didn't return until sometime after²⁹. Also, elephant seals routinely reacted with head lifts and in some instances erratic movement, but this reaction is not analyzed as a response to launches. In particular, during the surveys conducted for the April 2, 2023, launch, observers noted dead harbor seal pups that didn't exhibit any symptoms of emaciation. As such, it appears unlikely they were previously abandoned and died of starvation. The report documents harbor seals flushing during the launch when these dead seal pups were noted, so it is possible they were injured or killed during flushing. However, the report provides no in-depth analysis regarding the death of these pups. Additionally, the report contains no substantial analysis of the potential for adverse impacts resulting from more frequent disturbance and behavioral responses (e.g., more frequent flushing) under the proposed higher launch cadence.

In response to these concerns raised by Commission staff in preparation for the August 2024 hearing for CD-0003-24, DAF stated at the time:

Nineteen rocket launches required monitoring in accordance with the [National Marine Fisheries Service Letter of Authorization (NMFS LOA)] during CY 2023, and in several of the launch-specific events, it notes "Results indicate that there was no impact on pinnipeds by the launch". The intention of this statement is to indicate that neither permanent nor long-lasting behavioral changes were attributed to launch-specific events. We acknowledge that this can be confusing as written. NMFS differentiates between Level A harassment (injury or death) and Level B harassment (minor disturbance to behavior). Level A is prohibited under our LOA. The report concluded that "...no abnormal behavior, injuries, or mortalities resulted from the launch of any rocket, landing of Falcon 9 first stages, and their associated sonic booms. In prior years, consistent results have been obtained showing no indications of significant disturbances, abnormal behavior, injury, or mortality as a result of launch or aircraft operations. Responses to launches, when they did occur, were short-lived and insignificant." Elephant seals in only some reports lifted their heads, and with all species, animals resumed typical behavior shortly after launches, as they would if they, for example, encountered minor human presence or some other mild stressor.

In response to the dead harbor seal pups, 1 of these pups was observed deceased prior to launch and was noted 2 weeks prior outside of launch events and was therefore unrelated. The other harbor seal pups were assessed by NMFS-approved monitors and reported to NMFS via their Marine Mammal Health and Stranding Response Program. There was no evidence found suggesting that this death was attributable to the launch mission. While we cannot categorically state that there was no general impact from a launch, there is no indication that the deaths were caused by abandonment and may have been due to some other undetermined cause of death such as disease, etc.

²⁹ January 19, 2023, Starlink G2-4 launch; March 3, 2023, Starlink G2-7 launch; April 2, 2023, SDA-0A launch; April 27, 2023, Starlink G3-5 launch; May 10, 2023, Starlink G2-9 launch; May 20, 2023, Iridium OneWeb; July 7, 2023, Starlink G5-13; November 11, 2023, Transporter 9 launch; December 1, 2023, EROISat Launch.

Harbor seal pup mortality at this time of year (Mar-April being breeding months) is not generally abnormal throughout their range. In California and abroad, estimates of naturally-occurring, first-year pup mortality used in population models can be 20% to upwards of 50-65% of all pups born. Total annual numbers of deceased pups on Vandenberg are in line with those found range-wide. It is also important to note that pup mortality is more often found on Vandenberg during launch-specific monitoring because that is when survey effort is highest (72 hours of consecutive personnel hours pre- and post-launch) and there are more opportunities to find deceased marine mammals during these efforts. On a larger scale, Vandenberg coastline is also affected by environmental abnormalities such as annual patterns of ocean warming or domoic acid outbreaks that directly tie into pinniped stranding numbers throughout California. Our stranding data often mirrors those found at rescue facilities (The Marine Mammal Center, pers comms) and is reported to NMFS to contribute to range-wide understanding of these oceanographic events.

While DAF has drawn specific conclusions about the lack of adverse impacts from noise during individual launches from launch-specific monitoring, continued monitoring by launch event remains critical to observing behavioral trends of pinnipeds during launches and for identifying direct impacts to marine mammals if they are conclusively captured by the monitoring. Furthermore, the uncertainty around the potential significant adverse cumulative impacts (e.g., regarding pup survival, breeding success, site abandonment, etc.) of increasing launch and sonic boom frequency is an important reason for on-going monitoring.

Second, Commission staff was concerned that the lack of any kind of rigorous statistical analysis of the changes in population trends and other indicators, using the historic monitoring data that DAF has been collecting for decades, limits DAF's ability to detect adverse impacts that may be attributable to the on-going increases in launches. For example, the LOA annual report for 2023 identifies that the number of harbor seals using haul outs on VSFB is declining and that several haul outs have been abandoned entirely (although those haul-out abandonments have been attributed to erosion of bluffs and landslides reductions in beach width). The report anecdotally ascribes this change in haulout usage to several possible factors including predation risk from coyotes, increase in white shark (*Carcharodon carcharias*) predation, and increasing numbers of elephant seals in the region. Based on Commission staff's review of the monthly monitoring data included in the 2018-2023 LOA annual reports, there was some indication of a general decrease in peak pacific harbor seal and northern elephant seal population counts observed at haul outs base-wide, corresponding to a marked increase in SpaceX launch frequency (from an average of 2.75 launches per year in 2018-2021, to 13 launches in 2022 to 28 launches in 2023). For California sea lions, there was a sharp decrease in peak population counts base-wide between 2019 and 2020, however that was before the rapid increases in launch frequency and the populations observed in 2018 and 2019 may be outliers. To properly evaluate DAF's conclusions regarding a lack of adverse impacts to marine mammal populations, a multivariate statistical analysis for changes in population trends and a comparison of the historical data of on-base pinniped populations to that of nearby off-base pinniped

populations, outside the influence of launches and sonic booms, should be carried out and would allow for a more comprehensive evaluation of launch activities and their effects. This type of analysis is not included in the CD.³⁰

Commission staff also had concerns in preparation for the August 2024 hearing for CD-0003-24 about the potential for adverse effects from the increase in launch cadence. Between 2017 – 2021, VSFB averaged approximately 4.4 launches per year from all launch operators combined, with an increase to 21 and 36 launches in 2022 and 2023, respectively. Of these, SpaceX rockets accounted for 13 and 28 launches in 2022 and 2023, respectively. The proposed project for CD-0003-24 had requested an increase of SpaceX launches to 36 launches per year, which was an approximately eight-fold increase over the 2017 – 2021 baseline of total launches (all operators) at VSFB. The proposed 36 SpaceX launches reviewed then would continue the accelerated launch cadence beyond the prior two years of more frequent launches; and the increase would be effective immediately. Under a more controlled and cautious scenario, such a significant increase in launch cadence would be spread out over a longer period of time with defined, stepwise increases in cadence along with thorough monitoring and evaluation to assess adverse impacts, including those that may emerge over time from the accumulation of individual behavioral disturbances (e.g., flushing) occurring in response to more frequent launches. At a minimum, this approach would provide sensitive species in the area with a greater opportunity to adjust to the increase in launches. Crucially, this more measured approach could also be structured to provide sufficient time for monitoring to assess how species are reacting to the increase in disturbance and whether the increase is resulting in any significant adverse impacts. If significant impacts are detected, project changes and/or mitigation measures could be implemented and analyzed to determine whether they are effective, before continuing to increase the cadence.

Notably, these primary concerns were raised during a review for an increase to 36 launches per year. Currently, this CD submittal proposes 100 launches per year, an even more rapid increase in launch cadence, with little time for additional monitoring efforts and analysis of that data to occur. So while the concerns of the prior August review discussed above remain valid, there is even more urgency to address them appropriately. As discussed further below, the Commission has significant questions about the implementation and efficacy of the monitoring programs as well as the potential adverse impacts of the significant increase of launch events on marine mammals along the shoreline of VSFB.

³⁰ In response to these concerns raised by Commission staff in preparation for the August 2024 hearing for CD-0003-24, DAF stated at the time: “A multivariate statistical analysis has never been requested by NOAA/NMFS or the CCC. Within the LOA report, trends regarding monthly haul-out patterns are noted. Terms such as “significant variation” in animals observed or site changes were used in the colloquial sense, however, we are exploring future statistical analyses for population-level monitoring. We have starting to investigate using integrated population models that can tie in variables such as oceanographic conditions or pupping rates to assess our abundance metrics with reasonable accuracy.”

New CD and 2024 Pinniped Monitoring Results

In its new CD submittal for 100 launches per year and new use of SLC-6 and addition of Falcon Heavy rockets, DAF includes minimization, monitoring, and avoidance measures, in Appendix F of the CD (**Exhibit 14**), similar to those proposed in previous CDs, and states the following:

Noise and visual disturbance can cause variable levels of disturbance to pinnipeds that may be hauled out within the areas of exposure, depending on the species exposed and the noise levels. [the National Marine Fisheries Service (NMFS)] has previously determined that the only potential stressors associated with the specified activities that could cause harassment of marine mammals (i.e. rocket engine noise, sonic booms) only have the potential to result in harassment of marine mammals that are hauled out of the water (NMFS 2024a).

Pinnipeds at haulouts along the mainland coastline at VSFB, southeastern Santa Barbara, Ventura, northwestern Los Angeles Counties, and on the NCI would be disrupted by noise and visual disturbance associated with up to 100 Falcon launches and up to 24 landing events per year. The DAF has monitored pinnipeds at haulouts on VSFB and the NCI to characterize the effects of noise and visual disturbance during many launches over the past two decades and determined that there are generally no substantial behavioral disruptions or anything more than temporary affects to the numbers of pinnipeds hauled out on VSFB and the NCI. Reactions between species are different. For example, Pacific harbor seals and California sea lions tend to be more sensitive to disturbance than northern elephant seals. Normal behavior and numbers of hauled out pinnipeds typically return to normal within two to four hours or less (often within minutes) after a launch event. During Monitoring required by NMFS, no observations of injury or mortality to pinnipeds have been attributed to past launches.

The DAF assessed acoustic impacts on marine mammals to analyze potential acoustic impacts for pinniped haulouts in southeastern Santa Barbara, Ventura, and northwestern Los Angeles Counties to determine if the increased impact is covered by the estimated take totals in the LOA (NMFS 2024b; Appendix E). [...]

[...]

The DAF has determined that the Proposed Action would not result in population-level effects on any marine resources and biological productivity of coastal waters would be maintained for long-term commercial, recreational, scientific, and educational purposes. Therefore, the Proposed Action would be consistent with Sections 30230 and 30231 of the CCA.

The DAF annual report to the National Marine Fisheries Service (NMFS) for their Letter of Authorization (LOA), dated July 11, 2025, for marine mammal monitoring requirements of both the 2019 NMFS LOA (through its expiration in mid-April 2024) and the 2024 NMFS LOA (initiating in mid-April 2024) describes monitoring conducted

during 2024, and reactions observed by different pinniped species were generally similar to reactions described above in previous annual monitoring reports from prior years, including more minor reactions like elephant seals raising heads and more active reactions like a substantial portion of harbor seals at a haul out fleeing the beach (such as during the March 4 launch, when pinnipeds fled the beach multiple times, first in reaction to launch noise, and then again, after returning to the beach several minutes later, in response to the sonic boom from a landing at SLC-4).³¹

However, these types of detailed accounts for reactions of pinnipeds on-base mostly ended after the 2019 NMFS LOA expired and the 2024 NMFS LOA initiated, with significantly reduced requirements for on-base event monitoring. While monthly surveys of haul-outs in 2024 were conducted between January to April, with an increase to semi-monthly from May to December per 2024 LOA requirements, those data have not been used as part of a comprehensive multivariate statistical analysis to understand how population trends, or potential geographical shifts in use of haul outs, over time might be related to increasing launch activities on-base or to other environmental factors.

Lack of Information Regarding Effects to Pinnipeds On-Base

As discussed above, from the information provided by DAF on the potential effects of engine noise on nearshore marine mammals, there is an absence of data or analyses definitively demonstrating an absence of adverse impacts on marine resources and areas of special biological significance during similar launches over the past roughly 20 years of monitoring marine mammal populations along the shoreline of VSFB.

A previous consultation with NMFS under the Marine Mammal Protection Act for launches from VSFB resulted in the issuance of a Letter of Authorization (LOA) on April 10, 2019 (**Exhibit 12**). As part of this 2019 NMFS LOA, DAF committed to monitoring pinnipeds located on VSFB and the northern Channel Islands during all launches, including those proposed by SpaceX. The 2019 NMFS LOA required DAF to avoid launches that were predicted to produce a sonic boom over the northern Channel Islands during the harbor seal pupping season from March through June, whenever possible. The 2019 LOA also required DAF to conduct launch-specific pinniped monitoring at southern VSFB haul out locations, as well as additional acoustic and biological monitoring at the Northern Channel Islands based on modeled sonic boom thresholds. These measures appeared appropriately precautionary and, if carried out

³¹ From July 11, 2025, annual report to NMFS for 2024: “[...] Harbor seal counts ranged from 1-25 individuals. Elephant seals ranged from 33-36 individuals. At 2:06 p.m., in response to the launch disturbance, approximately 20 pinnipeds fled the beach. These were most likely harbor seals which tend to be more reactive to noise than other pinnipeds at VSFB. By 2:08 p.m., 3 minutes after the launch, pinnipeds began returning to the beach. At 2:12 p.m., 7 minutes after the launch; approximately 18 pinnipeds fled for a second time, likely harbor seals reacting to the sonic boom from the first stage landing. At 2:19 p.m., 7 minutes after the sonic boom and 14 minutes after the launch, pinnipeds began returning to the beach. The 2:00 p.m. to 3:00 p.m. count was conducted after South VSFB became accessible again and the monitor observed 14 harbor seals, 6 less than when they fled the beach in response to the launch disturbance. Results indicated that there was no Level A take attributed to launch events, and no prolonged/severe disturbance to normal behavior occurred during the monitoring period.”

over time with a static level of launch activities, would have yielded valuable information about potential impacts.

However, NMFS issued a revised LOA on April 10, 2024 (**Exhibit 13**), which DAF subsequently incorporated into its consistency determination for 36 launches (CD-0003-24). This LOA remains in place today and has been incorporated into the current CD for 100 annual SpaceX launches. As the Commission found in its August 2024 consideration of DAF's CD for 36 annual SpaceX launches, this 2024 NMFS LOA contains new requirements for mitigation, monitoring, and reporting that differ significantly from, and in key instances weaken, the requirements included in the 2019 NMFS LOA. In particular, the 2024 LOA eliminated the requirement for DAF to conduct on-base marine mammal and acoustic monitoring during Falcon 9 launches at SLC-4. Such monitoring is now required only for specific instances of launches of new, larger, or louder rockets, or those launched from new facilities³². Those requirements should apply to new launches at SLC-6 and new launches with the Falcon Heavy, but only require three instances of monitoring under the 2024 NMFS LOA, which is inadequate to fully understand the impacts of those new launch types over time. Continuing the monitoring required under the 2019 NMFS LOA would be more appropriate and would provide the information necessary to evaluate DAF's determination that the proposed project would be carried out consistent with the marine biological resource protection policies of the CCMP. The 2024 NMFS LOA also weakened the 2019 LOA requirements related to launch scheduling (i.e. avoidance of pupping season) and monitoring for the Northern Channel Islands (NCI). Similar to its CD for 36 annual launches, DAF's current CD does not provide sufficient information to allow the Commission to determine that the proposed project would be consistent with the relevant policies of the CCMP despite the elimination of these protective measures.

While on the whole the 2024 NMFS LOA significantly weakened the launch restrictions and marine mammal monitoring requirements contained in the prior LOA, it does include more specific requirements to conduct semi-monthly surveys (two surveys per month) to monitor the abundance, distribution, and status of pinnipeds at VSFB, with data collection for species, number, general behavior, presence and number of pups, age class, gender, and any reactions to natural or human-caused disturbances, as well as environmental conditions, including visibility, air temperature, clouds, wind speed and direction, tides, and swell height and direction. These monitoring requirements are expected to yield useful data about marine mammal population trends over time but would not provide insight into launch-specific responses, behavior changes or impacts. Further, this approach would not allow for definitive conclusions to be drawn about the cause of changes in habitat use patterns and/or population numbers that may be observed. Nor would it compel any adaptive management measures or impact avoidance and minimization steps to be taken if adverse effects occur. Accordingly, DAF has not provided sufficient information to allow the Commission to determine if the

³² Condition 6(c) of the 2024 NMFS LOA requires: "At VSFB, USSF must conduct marine mammal monitoring and take acoustic measurements for all new rockets, for rockets (existing and new) launched from new facilities, and for larger or louder rockets (including those with new launch proponents) than those that have been previously launched from VSFB during their first three launches and for the first three launches from any new facilities during March through July."

proposed project would be carried out consistent with the relevant enforceable policies of the CCMP.

Based on the inadequacies of DAF's proposal to only follow the 2024 NMFS LOA requirements regarding protection of seals and sea lions (as summarized above), the Commission included Condition 1 in its conditional concurrence for CD-0003-24. As discussed above and in [Appendix C](#), DAF agreed to that condition and its requirement to reinstate the protective measures established in the 2019 NMFS LOA. In its CD for 50 annual SpaceX launches, DAF also committed to adhering to this condition. However, the current CD for a further expansion to 100 launches per year and use of a new launch facility and larger rocket appears to eliminate DAF's prior commitment to comply with Condition 1 and the protective measures included in the 2019 NMFS LOA. In a July 23, 2025 response to Commission staff's inquiries about those previous commitments for biological monitoring, DAF states that "[It] will continue to adhere with all federal statutory requirements and implement and update the conservation measures of the [Integrated Natural Resources Management Plan (INRMP)] when funding is allocated" and that "DAF will only be submitting final annual reports required by the USFWS [Biological Opinion (BO)], NMFS LOA, and any other reports we are able to accomplish with INRMP funding to the Interagency Working Group" and referenced their memo to the Working Group dated June 12, 2025 (**Exhibit 8**). Therefore, less than one year later, DAF appears to be no longer committing to the enhanced biological monitoring program that the Commission found to be necessary (through establishment of Condition 1) to ensure CCMP consistency at a level of 36 launches per year. DAF's current CD does not provide sufficient information to allow the Commission to determine how the proposed lack of compliance with Condition 1 would ensure CCMP enforceable policy consistency at a launch level nearly three times greater.

The August 8, 2024, staff report ([Appendix A](#)) for Commission's conditional concurrence with CD-0003-24 includes the full text of Condition 1 (On-Base Enhanced Biological Monitoring Program), which included components for (a) monitoring for specific species³³, (b) analysis of monitoring data, and (c) reporting. DAF had previously committed, in accordance with Condition 1.a, to restoring the monitoring of pinnipeds at on-base haulouts during launches (with associated acoustic monitoring), consistent with the 2019 NMFS LOA, while also incorporating the revised monitoring required by the newer 2024 NMFS LOA. The resulting monitoring program, combining both launch-specific, on-base monitoring consistent with the 2019 NMFS LOA, and the semi-monthly surveys required by the 2024 NMFS LOA, would have allowed for ongoing assessment of both event-scale responses and impacts and broader population trends as the launch cadence increases. Condition 1.b and 1.c commitments are discussed further below for marine mammals, overall.

³³ Including western snowy plover, California least tern, California red legged frog, monarch butterfly, pallid bat, and western red bat

Lack of Information Regarding Effects to Pinnipeds Off-Base

As described in Section IV.A, above, there are dozens of known pinniped haulout sites located across Channel Islands National Park and mainland coastal areas that would be exposed to sonic booms from launches at SLC-4 and SLC-6 (see figures³⁴ in DAF's March 6, 2025, Pinniped Monitoring Plan, provided here as **Exhibit 11**). Rookeries and haulout sites are commonly in isolated locations relatively free from land predators and frequent harassment by humans and are essential areas for pinnipeds for reproduction and rest.³⁵ Haulouts are therefore considered by the Commission to be areas of special biological significance under Section 30230 of the CCMP because they are essential to the biological productivity of pinnipeds. These areas may be adversely affected by sudden noises and overpressures associated with sonic booms.

Given the presence of these sensitive species and the uncertainties in the extent and severity of regional effects of off-base sonic booms from launches (see Section IV.A, above), as well as uncertainty associated with how marine mammals experience sonic booms and the degree to which they may be affected over time under an increased launch frequency, the proposed project raises concerns that sound and pressure waves generated by sonic booms could adversely affect pinniped habitat on the Channel Islands and mainland coast. This would be inconsistent with the requirements of Section 30230 of the CCMP that areas and species of special biological significance be provided with special protection and marine resources be protected and enhanced. The Commission has significant questions about the implementation and efficacy of the monitoring program proposed according to the NMFS 2024 LOA, DAF's ability and commitment to implement effective sonic boom minimization measures, as well as the potential adverse impacts of the significant increase in launch events on off-base marine mammal habitats and areas of special biological significance.

Recent monitoring and modeling information provided by DAF has helped to better characterize the sonic booms resulting from Falcon 9 launches under certain conditions, but by DAF's own admission, any differences in meteorological conditions along the coast can cause the magnitude and spatial extent of a sonic boom to deviate from the results predicted in the modeling. DAF has not determined a way to accurately predict sonic booms or provided information needed to establish the full limitations of its current modeling efforts. Over the past year, DAF's acknowledgement and identification of off-base sonic booms from launch activities has varied widely, from statements that launches do not generate sonic booms that could affect the mainland coast to modeled results that demonstrate widespread effects across three counties and at levels not predicted by its modeling efforts. Without this issue being addressed and more accurate and reliable information provided, the Commission cannot adequately assess the type and likelihood of sonic boom effects to areas of special biological significance and thus cannot confirm DAF's determination that the proposed project would be carried out consistent with the marine resource protection policies of the CCMP.

³⁴ Figures 2-1, 2-12, 3-1, and 3-2

³⁵ <https://montereybay.noaa.gov/sitechar/mamm2.html>

This was an issue also raised during the Commission's August 2024 review of DAF's CD for 36 annual SpaceX launches. Based on the inadequacies of DAF's off-base pinniped monitoring efforts described in that CD (as summarized above regarding the limit to only following the NMFS 2024 LOA commitments) and concerns about the accuracy of DAF's assumption of no effects to pinnipeds off-base, the Commission found it necessary to include Conditions 2 and 3 in its conditional concurrence. As discussed in [Appendix C](#), DAF agreed to implement these conditions following the August 2024 hearing and carried through this commitment into its subsequent CD to increase the launch frequency to 50 per year (CD-0007-24).

However, in the current CD, submitted for a further expansion to 100 launches per year and use of a new launch facility and larger rockets, DAF appears to not be integrating those earlier commitments. As described above in [Appendix C](#), in a July 23, 2025, response to Commission staff's inquiries about those previous commitments, DAF referenced its memo to the Working Group dated June 12, 2025 (**Exhibit 8**). While that memo describes DAF's initiation of a study to improve the understanding of the sonic boom effects off-base and briefed the Working Group on initial efforts, it does not include any detailed procedures to be implemented for minimizing adverse impacts from sonic booms related to areas of special biological significance, including pinniped haulouts, nor any indication that any current efforts are being made, through changes to launch timing or trajectory, to minimize the effects of the on-going launch program. Commission staff also requested information specific to those conditions from DAF on June 27, 2025, and updates related to use of SLC-6 and Falcon Heavy Rockets. In response, DAF simply stated: "This update will be provided to the Interagency Working Group on 26 August 2025 meeting". That meeting is scheduled for after the Commission must act on this CD according to the review deadline established by DAF.

Commission staff also asked for clarification from DAF on June 27, 2025, for if monitoring of the Carpinteria seal haulout is proposed to occur during launches with modeled sonic boom psf levels over any particular threshold level, to which DAF responded on July 23, 2025, with the following:

No, monitoring of the Carpinteria seal haulout is not proposed to occur during launches. As stated in the Memorandum for the Interagency Working Group Members (June 13, 2025) the DAF will continue to adhere to all federal statutory requirements and applicable Executive Orders and we are committed to implementing all measures identified in the current USFWS Biological Opinions and NOAA NMFS Letters of Authorization.

The August 8, 2024, staff report ([Appendix A](#)) for the Commission's conditional concurrence with CD-0003-24 includes the full text of Conditions 2 and 3. Condition 2 (Off-Base Sonic Boom Minimization Measures) of CD-0003-24 called for DAF to take steps to minimize the spatial extent and magnitude of sonic booms from SpaceX launches through development of a Sonic Boom Minimization Plan that would include measures for evaluating modeling for specific atmospheric conditions to anticipate sonic boom effects on the Northern Channel Islands and off-base areas of the mainland coast of Santa Barbara, Ventura, and Los Angeles Counties, and measures for making

decisions on launch time and trajectory based on an analysis to minimize the spatial extent and severity of sonic booms experienced in those off-base areas. Condition 3 (Off-Base Acoustic and Biological Monitoring) called for the development and implementation of a biological monitoring program to evaluate sonic boom effects on coastal biological resources if those minimization measures would not result in avoidance of sonic boom effects, including (a) monitoring that quantifies species response to sonic booms, including in areas of special biological significance, such as marine mammal haulout sites, which could be affected by sonic booms; and (b) acoustic monitoring at those sites during launches to measure received sonic boom overpressure levels. The CD does not provide any specific information to address what measures DAF would take to avoid and minimize sonic boom impacts to marine mammal haulouts on the northern Channel Islands or off-base mainland areas, despite the fact that their modeling indicates that more westerly trajectories could ensure that sonic booms fully avoid those areas (as shown by the first two trajectories in **Exhibit 5c**).

Section IV.A also describes the lack of information provided by DAF related to engine noise and sonic booms which is critical for the Commission's assessment of consistency with the marine resources policies, specifically Sections 30230 and 30231, of the CCMP, since it requires an accurate estimate of the intensity and geographical distribution of noise from the proposed project, especially for Falcon Heavy rockets, which have not been launched from VSFB at the proposed level. (**Exhibit 11** includes Figures 2-1, 2-12, which show pinniped haulout areas on Santa Rosa and San Miguel Island, as well as some modeled sonic boom data showing a range of possible overpressures that could be experienced at those haulouts). **Exhibit 5c** (from the May 2025 Draft Environmental Impact Statement, "DEIS") also shows a single sonic boom model run for a Falcon Heavy launch at SLC-6, however, DAF has not provided sufficient information about how the model inputs are developed between Falcon 9 and Falcon Heavy rockets, as discussed above in Section IV.A. Exhibits 4b and 4c of the revised findings report for the February 6, 2025, hearing for CD-0007-24 ([Appendix A](#)) showed modeled sonic boom footprints, broken into several overpressure ranges and trajectories, over the Pacific Ocean and the northern Channel Islands.

Noise Impacts To Southern Sea Otters

While southern sea otters occasionally inhabit the coast along VSFB from Purisima Point to Point Arguello, the inshore area from the boat harbor and Sudden Flats, south, supports expansive kelp beds and a relatively high density of southern sea otters (**Exhibit 10**, Figures C.0-58 to -62). Notably, SLC-6 is located much closer to these denser areas of otters than SLC-4. In previous SpaceX projects at VSFB, DAF determined that SpaceX activities would not likely adversely affect southern sea otters. These determinations were made because DAF has monitored southern sea otters during launches to document their reaction to sound. As described in the 2024 United States Fish and Wildlife Service (USFWS) Biological Opinion (BO) for 50 launches, sea otters immediately offshore of SLC-4 during launches would experience maximum anticipated noise levels of 130 dB and sonic booms up to 5.0 psf. Sea otters at the breeding colony would experience lower levels of 110 dB during launches and sonic

booms of 4.0 psf. According to that monitoring, no abnormal behavior, mortality, or injury effects have been previously documented from launch-related noise. According to DAF, one reason that sea otters are not significantly affected by noise is because of their ability to dive under water when exposed to noise generated from launches at SLC-4. Since less sound is transmitted across the air-water interface, DAF has concluded that in-air sound would not physically damage or deafen otters that are below the water surface. In summary, it was DAF's position that ongoing monitoring indicated that past levels of launch activities had not resulted in injury or mortality to sea otters in the project vicinity, but may result in short-term behavioral changes, such as movement away from on-land haul-out areas and/or increased diving. DAF has repeatedly stated that under past launch cadences, there has been no indication that behavioral responses have translated into longer-term changes in habitat use or population levels. However, as noted above, past monitoring carried out during periods with relatively low launch cadences may not provide a useful or accurate indication of the long term or cumulative effects resulting from the higher frequencies of launches, engine tests and landing events proposed under the subject CD, highlighting the need for a robust, on-going monitoring program.

Sound modeling for the proposed project predicts sounds and sonic booms up to 140 dB and 8 psf for Falcon 9 operations at SLC-4 and 135 dB and 10 psf for Falcon 9 and Falcon Heavy operations at SLC-6. At these sound and pressure levels, DAF concludes that the proposed project may affect, and is likely to adversely affect, the southern sea otter. To address this, DAF states that it would implement all impacts avoidance and minimization measures included in the USFWS final Biological Opinion (BO). As of the date of this staff report, however, USFWS has not finalized the BO and as such it is unknown what avoidance and minimization measures it may include and an assessment of their efficacy and adequacy cannot be carried out.

Lack of Information for Southern Sea Otter

The absence of information in the project CD about the impact avoidance and minimization measures that would be implemented to address anticipated noise impacts to sea otters prevents the Commission from determining if DAF's conclusion about the proposed project's consistency with the biological resource protection policies of the CCMP is accurate. Without DAF providing for Commission review the specific avoidance and minimization measures it would implement to address the project's expected adverse impacts to sea otters, a species of special biological significance per Section 30230 due to its keystone role in marine ecosystems, the Commission has insufficient information to complete its review.

Another issue with DAF's assessment of the proposed project's effects to sea otters and consistency with Section 30230 is its focus on historic counts of otter populations before and after launch events. This monitoring approach and data went back as far as 1998 and DAF cites it as indicating that the launching of rockets did not and would not substantially affect the number of otters. However, the number of launches during the majority of this monitoring period was generally fewer than 10 launches per year. Since the proposed project requests a ten-fold increase in launch frequency compared to the historic launch levels it is vital for the monitoring program to more closely scrutinize how

more launches may be affecting otters. In order to better discern if otters are adversely affected by the more frequent launch intensity, DAF had previously committed to implementing both camera and in person biological monitoring during launch events to record behavioral responses and provide a summary of the observed behavior and share the data with resource agencies. However, the current CD does not specify if this approach would continue, as it defers entirely to protective measures to be identified at a future date by the forthcoming USFWS Biological Opinion. The only conservation measures specific to southern sea otter (SSO) in DAF's Biological Assessment (BA), included in the CD as Appendix D, is "The Action Agency will continue to conduct SSO population surveys at the current levels to monitor the densities and distribution of SSO along VSFB's coastline." This response does not provide the Commission with sufficient information to assess the veracity of DAF's consistency determination.

Lack of information for Marine Mammals (Overall)

There remains a high degree of uncertainty about how marine mammals will react to the proposed launches, whether adverse impacts to these species will result from their significantly increased frequency, and whether avoidance and minimization measures currently under development would be effective. As discussed in more detail above, the Commission has significant concerns about the implementation and efficacy of the monitoring programs for both pinnipeds and sea otters as well as the potential adverse impacts of the significant increase of launch events on marine mammals. DAF's CD does not provide sufficient information to address these concerns and allow its determination of consistency to be evaluated.

As discussed above and in [Appendix C](#), DAF is neither specifying what monitoring, data analysis, or other environmental protection measures, they are proposing to include for southern sea otter until the new USFWS Biological Opinion is finalized; they also are no longer committing to the enhanced biological monitoring program that the Commission found to be necessary (through establishment of Condition 1) to ensure CCMP consistency at a level of 36 launches per year. DAF's current CD does not provide sufficient information to allow the Commission to determine how the proposed lack of compliance with Condition 1 would ensure CCMP enforceable policy consistency at a launch level nearly three times greater.

The August 8, 2024, staff report ([Appendix A](#)) for Commission's conditional concurrence with CD-0003-24 includes the full text of Condition 1 (On-Base Enhanced Biological Monitoring Program), which included components for (a) monitoring for specific species³⁶, (b) analysis of monitoring data, and (c) reporting. The Commission previously determined that for SpaceX launch activities at VSFB, a comprehensive statistical analysis that considers physical (oceanographic conditions, climate, storms, beach width, etc.), biological (population size, population location, behavior, pupping rates etc.), temporal (frequency and time between launch events for species to recover, seasonal timing of launches and sensitive times of the year), and anthropogenic

³⁶ Including western snowy plover, California least tern, California red legged frog, monarch butterfly, pallid bat, and western red bat

(launches) variables would be required. Such an approach would help to synthesize the data from the monitoring reports in conjunction with historical data sets to more accurately evaluate the likely causes of population trends. The Commission's concurrence for 36 annual SpaceX launches (CD-0003-24) included a condition requiring this statistical analysis as part of Condition 1.b.

However, no information was provided in the current CD about any multivariate statistical analysis that has been conducted to date or that has been proposed to be conducted as part of the proposed program. In response to Commission staff's June 27, 2025, request for DAF to clarify if they are committing to further pursue multivariate statistical analysis of species data over time, if it has any preliminary conclusions for past/ongoing activities, and which species, variables, and time periods would be analyzed, DAF responded on July 23, 2025, with the statement, "Yes, the DAF will further pursue multivariate statistical analysis of species data" but did not elaborate further, provide that analysis or specify a timeline for when it may be provided for review.

In previous CD reviews, DAF committed to establishing a resource agency working group to increase coordination among the agencies and their individual requirements, and to provide a forum for reviewing the on-base monitoring efforts and results, and providing recommendations for improvements, additional protective measures, and/or mitigation. In response to the Commission's conditional concurrence with CD-0003-24 in August 2024, DAF prepared a Pinniped Monitoring Plan (**Exhibit 11**) in March 2025. After that plan was finalized by DAF, Commission staff had several outstanding concerns about the methods and adequacy for analyzing impacts, however, the CD does not reference that plan and DAF has not indicated that it would be implemented as part of the proposed project or if it has abandoned this effort.³⁷

The existing data that DAF has analyzed to determine that a much lower historical launch frequency at VSFB resulted in no adverse impacts to marine mammals are not currently adequate to demonstrate that the 100-launch per year cadence will likewise not have adverse impacts on coastal resources. Therefore, the Commission cannot currently find, based on existing evidence and analysis provided by DAF in its CD, that it has sufficient information to conclude that engine noise and sonic booms from the proposed project would not adversely affect the biological productivity of coastal waters or adversely affect marine mammal species and areas of special biological significance.

The short 18-month interval between the Commission's review of DAF's consistency determination for 36 launches, then 50 launches, and now 100 launches has created a data-lag and prevented monitoring efforts from occurring sufficiently. As discussed in this report, key monitoring plans are still being developed for the 36 annual launch level

³⁷ When asked by Commission staff on June 27, 2025, to clarify how the Marine Resource environmental protection measures from Appendix F of the current CD comports with the marine mammal monitoring plan prepared by DAF per commitment to the Commission, DAF responded on July 23, 2025, stating: "The DAF follows all requirements issued by the Federal agency that is charged with the protection of the marine mammal that may be affected by the proposed action."

and have not even begun to be implemented yet, leaving data uncollected, unanalyzed and unavailable for the Commission to consider in its evaluation of DAF's determination of the project's consistency with the CCMP. The plan to monitor marine mammals lacks substance and specificity. Many details have yet to be fully developed and provided regarding the manner in which DAF will conduct the monitoring and how the data will be analyzed and reported. As such, it is too early to know if the monitoring programs will be designed and implemented in a manner sufficient to accurately identify and quantify adverse impacts if they are occurring. Failure of the monitoring programs to be designed and implemented robustly brings with it a risk of "false negative" conclusions – those that determine adverse impacts are not occurring, not because they are absent, but because the monitoring is not carried out with the frequency and intensity required to record them. Also, as discussed in Section IV.A, there is still a lack of information related to engine noise and sonic booms, including information about how modeling could be improved to better understand potential noise generated from Falcon Heavy rockets, which have not been launched or landed at VSFB previously, and their potential to adversely affect areas of special biological significance, including pinniped haulouts.

Lastly, the proposed increase in launch frequency to up to 100 per year continues a rapid ramp-up that exceeds DAF's ability to effectively monitor for adverse impacts on coastal resources. Prior to 2022, VSFB supported an average of 4.3 launches per year. During 2022, a total of 13 Falcon 9 missions were performed on VSFB, increasing to 28 launches in 2023, 46 launches in 2024 (although in total, including other rockets, there were 51 launches³⁸ from VSFB in 2024) and 33 so far in 2025. It has been only twelve months since the Commission conditionally concurred with DAF's request for SpaceX to increase its launch cadence from six to 36 per year. In that time, the Commission has had to review a request to increase the launch cadence to up to 50 times per year and then 100 times per year without the benefit of adequate monitoring data from the 36-launch cadence. Even if the submittals from DAF for monitoring of sensitive species and minimization of impacts from sonic booms were sufficient, twelve months is not enough time for the monitoring programs to collect the data and perform the necessary statistical analysis to determine whether there have been any adverse effects, including changes in population trends, in response to the lower 36 launch per year cadence. In short, the increase to 100 SpaceX launches per year is occurring well before there is sufficient data to determine whether even a 36 launch per years cadence is having adverse effects or if the protective measures established through the Commission's conditional concurrence are successful.

Specific instances of the lack of information described above related to Engine Noise and Sonic Booms from launches and landings, and their potential effects on marine resources, are summarized below. These are necessary to assess consistency with the marine biological resource policies of the CCMP, specifically Sections 30230 and 30231.

³⁸ <https://www.vandenberg.spaceforce.mil/news/article-display/article/4034711/vsfb-achieves-historic-milestone-with-51-launches-in-2024/>

- The terms and conditions and reasonable and prudent measures for the avoidance and minimization of adverse impacts to southern sea otter to be identified as part of DAF's ongoing Section 7 consultation with USFWS and the resultant Biological Opinion. These yet-to-be developed measures are relied on in DAF's CD as a means of ensuring the project's consistency with the CCMP's marine biological resource protection policies.
- An analysis of how many years (and/or number of surveys events) of long-term monitoring would be required to gather enough data to provide statistically significant results about whether SpaceX launch activities are adversely affecting habitat for pinniped species and southern sea otter in the launch and landing noise impact areas and what reference information would be necessary for that analysis
- A comprehensive analysis of monitoring data available at this time for the species described above that includes multivariate statistical analyses of the changes in population trends³⁹ using: (a) relevant historical population data; (b) frequency of launches and on-base boost-back landings over different time scales; (c) seasonality of launches and sensitive times of year for respective species; (d) geospatial variability; (e) off-base reference site data; (f) climatic and oceanographic patterns (e.g. El Niño, Pacific Decadal Oscillation, storms, ocean temperature); (g) acoustic monitoring data; (h) and patterns of other variables including (as relevant to the respective species), but not limited to, pupping rates, breeding rates, beach width, behavior during launches, and forage base or food web trends.
- A sonic boom minimization plan for limiting the spatial extent and severity (in terms of overpressure levels) of sonic booms caused by launches to limit effects on the Northern Channel Islands and off-base areas of the mainland coast of Santa Barbara, Ventura, and Los Angeles Counties
- Information about acoustic and biological monitoring for affected coastal areas outside of VSFB if implementation of sonic boom minimization measures do not result in avoidance of sonic boom effects on the Northern Channel Islands and off-base areas of the coastal zone in mainland Santa Barbara, Ventura, and Los Angeles Counties
- The other lack of information points described above and in Section IV.A related to engine noise and sonic booms (including information about how impacts could be minimized and how modeling could be improved)
- Any information about proposed measures for equipment redundancy and data-handling improvements to help ensure further loss of monitoring data is avoided
- Long-term monitoring data collected over time at the 36 launch per year frequency previously concurred with by the Commission for each of the species of concern to determine with statistical confidence if adverse effects are occurring, even at this lower launch cadence, to species and their habitats, as measured in terms of population sizes, breeding success, habitat use patterns, and other relevant metrics.

³⁹ Relevant population trends to analyze include, but are not limited to, population sizes and locations

All of this uncertainty could mean that marine mammal monitoring is not effectively recording and analyzing potential adverse impacts to marine mammals. Without monitoring data supporting and corroborating DAF's conclusions that launch activities have not adversely affected marine mammals or their sensitive haul out areas on VSFB, the northern Channel Islands, and the mainland cost off-base, the Commission does not have sufficient information to determine if the proposed project would be consistent with the marine biological resource policies of the CCMP, specifically Sections 30230 and 30231. Additionally, while acknowledging that DAF has initiated a study to improve the understanding of the sonic boom effects off-base and briefed the Working Group on initial efforts, since DAF has not provided any detailed procedures to be implemented for minimizing adverse impacts from sonic booms related to potential marine mammal impacts, there is no information available as part of this CD for the Commission to analyze regarding the efficacy of sonic boom minimization measure consistent with Sections 30230 and 30231. DAF has not provided the information and the Commission has not been able to evaluate the extent of project-related impacts or the likelihood and magnitude of benefits that would be provided through implementation of adequate monitoring.

Launch Operations at SLC-4 and at Redeveloped SLC-6 Complex

Launching operations at SLC-4 and SLC-6, as described in the project description above, include the generation of deluge water, steam, and flames, as well as associated vegetation management. These project aspects have the potential to impact water quality, water supply, and wetlands, and are discussed in more detail below.

Water Quality

VSFB is divided into northern and southern portions by the Santa Ynez River. The two launch facilities (SLC-4 and SLC-6) where SpaceX would be operating are located on South VSFB (**Exhibit 1**). Major drainages in the area of South VSFB include Bear Creek, Cañada Honda Creek, and Jalama Creek. There are also several unnamed minor drainages with intermittent ephemeral streams. All of these creeks and streams flow west and ultimately release into the Pacific Ocean. The two most proximal water bodies to SLC-4 are Spring Canyon and the Pacific Ocean (**Exhibit 2**). Spring Canyon, which contains a seasonal, ephemeral stream, is located immediately adjacent to the southern perimeter of SLC-4, while the Pacific Ocean is approximately 0.5 miles to the west. SLC-6 is flanked by two drainages, Red Roof Canyon Drainage to the north and an unnamed drainage to the south, while the Pacific Ocean is approximately 0.5 miles to the west.

At SLC-4, the project would make use of existing launch and landing facilities, and no new construction is proposed. At SLC-6, the project includes demolition of existing structures and construction of various facilities to support launches and landings of Falcon 9 and Falcon Heavy. Development on land can result in runoff of pollutants, sedimentation, and other contaminants into nearby waterbodies. Additionally, new impervious surfaces can increase the volumes and velocities of stormwater, which can further degrade water quality. Pollutants commonly found in runoff associated with

development include petroleum hydrocarbons including oil and grease from vehicles, heavy metals, synthetic organic chemicals, sediment and vegetation, litter, herbicides, and pesticides, as well as excess nutrients (e.g., nitrogen and phosphorus). The discharge of these pollutants to coastal waters can cause cumulative impacts such as eutrophication and anoxic conditions resulting in mortality of marine species, diseases and adverse changes to species composition and size. Increased turbidity from excess sediment or algal blooms can reduce the penetration of sunlight needed by aquatic vegetation that provides food and cover for marine species. Pollutants can disrupt the reproductive cycle of aquatic species and result in acute and sublethal toxicity in marine organisms leading to adverse changes in reproduction and feeding behavior. These effects would reduce the biological productivity and the quality of coastal streams and waters and reduce optimum populations of marine organisms.

As described in the May 2025 Draft Environmental Impact Statement (DEIS), Best Management Practices (BMPs) would be implemented to avoid or minimize the discharge of pollutants that could leave the site and migrate into coastal waters. These BMPs include using erosion control devices and techniques to stabilize any areas of disturbed soil. Ensuring that any pollutants, construction materials and hazardous substances are stored and contained in appropriate and secure areas. SpaceX would develop and implement a stormwater pollution prevention plan (SWPPP) with monitoring and reporting requirements.

Even with implementation of the BMPs discussed above, the proposed rocket launches have the potential to result in release of sediment and various contaminants which could eventually migrate to the aforementioned water systems. This is because after ignition, a deluge of water would be flooded onto the launch pad. The purpose of this deluge of water is to absorb or deflect the high levels of acoustic energy that are released as the rocket lifts off in order to help avoid damage to the rocket and its payload. The exhaust cloud comprised of combusted fuel and water from the deluge would largely consist of steam which DAF has stated includes only insignificant amounts of hazardous materials due to the oxidizer-rich staged combustion engines. The propellant for the Falcon 9 and Falcon Heavy rockets would not include any solid fuels and would instead use liquid fuels consisting of rocket grade kerosene (RP-1) and liquid oxygen. Combustion of solid fuels release greater amounts of reactive chemicals and other pollutants compared to liquid fuels. Any deluge water that is not converted into steam would remain in the retention basin and would only be discharged after it meets the required certifications.

Lack of Information Regarding Water Quality

Central Coast Regional Water Quality Control Board (Water Board) staff noted in a comment letter on the DEIS (**Exhibit 9b**) that the area to the south (downslope) of SLC-4 appears to be eroding and this erosion appears to be from steam impacting vegetation that would otherwise stabilize the soil in the area. This destabilized soil could be released into Spring Canyon during overland flow or rain events. Water Board staff also noted a “burn scar” in the area of the southern drainage at SLC-6 that occurred as

the result of a previous rocket launch for another company (United Launch Alliance) which suggests that launches of SpaceX rockets from SLC-6 could also result in impacts at the ground level at that facility. Similar to SLC-4, this burn scar with denuded or reduced vegetation could result in erosion of the area. Because DAF did not identify or address these areas of erosion at SLC-4 and SLC-6 it is unclear whether launches of rockets at these facilities will continue to exacerbate erosion and thus result in sediment deposition into drainages and possibly coastal waters.

The Water Board's DEIS comment letter also stated that Water Board previously raised concerns in a letter dated October 17, 2024, related to rocket propellants and space launch complexes, including the proposal to increase the Falcon 9 launch cadence to 50 times per year, and that those concerns are still relevant for the proposed project. In the previous letter, Water Board staff noted that SLC-1 & 2, 3 and 4 have a history of pollution in soil and groundwater, and because of this legacy pollution those sites have been subject to soil and groundwater sampling and analysis. This sampling effort created a baseline of the conditions at those sites from which to evaluate the potential impacts of proposed launch-related activities (e.g. Falcon 9 launches and landings at SLC-4). However, this type of baseline chemical and groundwater information is not available for other SLCs at VSFB, including SLC-6. Water Board staff recommended that this type of testing be done at SLC-6 prior to the resumption of launches at this site. In its response to the Water Board's letter, DAF did not commit to testing and stated that it looked forward to coordinating with Water Board on development of future launch complexes.

The U.S. Environmental Protection Agency (EPA) also reviewed and commented on the DEIS, in a letter dated July 3, 2025. The EPA letter notes that recent soil sampling by the Space Force indicated that low levels of hydrocarbons have been found within Spring Canyon, located south of SLC-4. As discussed previously, SpaceX rockets use RP-1 and LOX for fuel. When combined and fully oxidized, the resulting emissions consist of water and carbon dioxide. However, if the fuel does not fully oxidize, the emissions can contain petroleum hydrocarbons. The potential adverse impacts of these petroleum hydrocarbons are dependent on several factors including the concentrations released and site-specific characteristics such as soil type and depth to groundwater. When EPA raised the issue of hydrocarbons detected in Spring Canyon, the DAF responded that the contamination is likely from historical sources, including a restoration program located in Spring Canyon, rather than as a result of operations at SLC-4. EPA suggested that the DAF should provide analysis and discussion demonstrating that the contaminants are not the result of operations at SLC-4 and should also develop a sampling methodology to confirm that current operations at SLC-4 are not resulting in soil contamination.

Specific instances of the lack of information described above related to water quality from launches and landings are summarized below. These are necessary to assess

consistency with the marine biological resource and water quality protection policies of the CCMP, specifically Section 30231.

- Information on: (a) the area downslope of SLC-4 that appears to be eroding; (b) whether the erosion is due to lack of vegetation; (c) if the erosion is a result of steam from launches at SLC-4; (d) whether the eroded area has the potential to release sediment into Spring Canyon.
- Information regarding the potential for SpaceX rocket landings at SLC-6 to result in burn scars and if a burn scar at SLC-6 has the potential for erosion and release of sediments into coastal waters.
- Information on how DAF will analyze whether launch and landing operations at SLC-6 are potentially resulting in the release of contaminants absent any kind of baseline data at SLC-6.
- Information on how DAF concluded that hydrocarbons detected in Spring Canyon are not the result of launch and landing operations at SLC-4.
- Information on how DAF will be able to conclude that current operations at SLC-4 are not resulting in soil contamination absent a sampling and analysis plan.

This uncertainty could result in significant adverse impacts to coastal waters. In order for the Commission to thoroughly analyze potential adverse impacts to water quality from launch and landing activities, evaluate their consistency with Section 30231 of the CCMP, and ensure they are avoided or mitigated, the information identified above is necessary. As of the date of this staff report, DAF has not provided the information and the Commission has not been able to evaluate the extent of project-related impacts or the project's consistency with the CCMP.

Water Supply

Water use for SpaceX launches would include water for personnel and operational activities as well as deluge water for the launches, as discussed above. At the full proposed cadence of up to 100 launches per year, the annual amount of water needed for SpaceX operations would be up to 21 million gallons (65.6-acre feet). As described in the DEIS:

This would represent an increase of approximately 2.3 percent of the total annual water usage on VSFB. The current water source for VSFB is via an existing connection between State Water and the VSFB water supply system. VSFB primarily relies on State Water; however, during annual maintenance that lasts two to three weeks, VSFB utilizes four water wells in the San Antonio Creek Basin. Even if pumping this entire volume of water from the San Antonio Creek groundwater basin, it would have an undetectable effect of water levels and flow rates in the creek over this short period of time (G. Cromwell, USGS, pers. comm.). Since VSFB relies primarily on State Water and the amount of annual usage proposed under the Proposed Action is negligible there would be no measurable impacts on groundwater water levels in San Antonio Creek or exacerbate water scarcity at VSFB or the surrounding area.

Lack of Information Regarding Water Supply

As described in the DEIS, San Antonio Creek is one of two major drainage basins within VSFB, with an area of approximately 154 square miles. Groundwater from the San Antonio Creek basin supplies water for various uses at VSFB including irrigation, domestic, industrial, and municipal uses. The DEIS notes that the Government Accountability Office (GAO) identified VSFB as vulnerable to water-scarcity issues in 2019.

In their comment letter on the DEIS, Water Board staff noted that DAF's analysis needs to consider the effect of drought conditions on water supply resources at VSFB. This is because during multiple consecutive drought years, State Water Project deliveries to VSFB can be reduced to 50 percent or less. These reductions would require VSFB to rely more heavily on the water wells within San Antonio Creek, beyond the two to three weeks described in the DEIS and could require months of water withdrawals from San Antonio Creek. Combined with withdrawals from San Antonio Creek by other users, this may result in a more significant cumulative effect than acknowledged by DAF in the analysis cited above.

Water Board staff also commented that the project must also more thoroughly evaluate the habitats associated with San Antonio Creek and the potential adverse effects of increased withdrawals during periods of drought may have on those habitats. As discussed in more detail in [Appendix E](#), San Antonio Creek provides habitat for several sensitive species, including tidewater goby (*Eucyclogobius newberryi*), unarmored threespine stickleback (*Gasterosteus aculeatus williamsoni*), and California red-legged frog (*Rana draytonii*). A 2025 study by Cromwell, Culling, Young and Larsen⁴⁰ provides background information on these species as well as how they could be adversely impacted by changes in water use within the San Antonio basin. In summary, changes in streamflow would limit the ability of tidewater goby to migrate upstream and downstream during reproductive windows. For unarmored threespine stickleback, a reduction in streamflow could increase the risk of deteriorated habitat conditions and also increase the risk of predation. Additionally, lower streamflow could lead to disconnection and prevent individuals from migrating away from deteriorated habitats to better conditions. Similarly, significant water withdrawal within San Antonio Creek could affect the amount of permanent water in the creek and as a result affect the aquatic breeding and non-breeding habitats of the California red-legged frog.

In the CD submittal, DAF states that a water reclamation system may be used to pump residual deluge water back into storage tanks. This could help conserve water during launches and reduce the amount of water extracted from local sources. If the water reclamation system is not implemented, the project would continue to contain and test deluge water and then discharge tested and approved deluge water to spray fields at SLC-4 and SLC-6. Water Board staff note that the spray field at SLC-4 is currently at maximum capacity under the current cadence of 50 launches per year and the proposal

⁴⁰ Cromwell, G.; Culling, D.P.; Young, M.J.; Larsen, J.D. Simulated Effects of Future Water Availability and Protected Species Habitat in a Perennial Wetland, Santa Barbara County, California. Water 2025, 17, 1238. <https://doi.org/10.3390/w17081238>

to increase to 100 launches per year would likely overwhelm the spray field. Also, soil investigations have determined that soil in the area of SLC-6 has limited percolation capacity compared to SLC-4. Specifically, the soils at SLC-6 are clayey sediments interbedded with silty sands and bedrock, compared to the more coarse-grained sediments at SLC-4. As such, there is a more limited percolation capacity and ability to receive deluge water at SLC-6. Because of these concerns with the spray field, the Water Board recommend that the project implement a water reclamation system. At present, it is unclear whether DAF and SpaceX will implement a water reclamation system, how the water reclamation would work, and whether the potential environmental impacts of exceeding the percolation capacity of the spray field have been evaluated.

There is also an inconsistency regarding the amount of water that may be used under the proposed higher launch cadence. EPA staff noted that the DEIS states the proposed project would use approximately 70,000 gallons of water per launch at SLC-4 in the flame bucket and as deluge. However, previous environmental analyses, including 2018 and 2023 environmental assessments (EA) for Falcon 9 launches at VSFB, indicate that the total was 100,000 gallons per launch (70,000 gallons for the flame bucket and 30,000 gallons for the deluge system). EPA also noted that the DEIS does not discuss the quantity of water used for landings, which previous EAs estimated at 40,000 gallons per landing. These discrepancies could mean that an additional 2,100,000 gallons of water could be used annually for launches at SLC-4 (30,000 gallons per launch times 70 launches) and 680,000 gallons of water could be used annually for landings (40,000 gallons per landing times 17 landings). Added together this additional water use could total 2,780,000 gallons per year, or a 13% increase beyond the 21,375,853 million gallons of water per year anticipated in the DEIS.

Specific instances of the lack of information described above related to water supply from launches and landings are summarized below. These are necessary to assess consistency with the marine biological resource policies of the CCMP, specifically Section 30231.

- Information on water supply within the San Antonio Creek Basin and whether there is enough supply to provide water for SpaceX launch operations during multiple consecutive drought years with limited deliver from the State Water Project.
- Information on the potential impacts to habitats and species associated with the San Antonio Creek Basins as a result of VSFB withdrawing water from the San Antonio Creek Basin during multiple consecutive drought years.
- Whether the project will implement water reclamation systems at SLC-4 and SLC-6, how the water reclamation systems would work, and the potential impacts to coastal resources from those systems.
- Information on whether the spray fields at SLC-4 and SLC-6 are capable of receiving discharged water under the proposed launch cadence if the project does not implement water reclamation systems.

- Clarity on how much water each launch at SLC-4 will require and whether landings of Falcon 9 and Falcon Heavy will require any water.

This uncertainty could result in significant adverse impacts to coastal waters. In order for the Commission to thoroughly analyze potential adverse impacts to water supply and water-dependent species and resources from launch and landing activities, evaluate their consistency with Section 30231 of the CCMP, and ensure they are avoided or mitigated, the information identified above is necessary. As of the date of this staff report, DAF has not provided the information and the Commission has not been able to evaluate the extent of project related impacts or the project's consistency with the CCMP.

Marine Debris

Several elements of the proposed project could result in the release of marine debris. These include the release and eventual abandonment into the ocean of weather balloons and atmospheric monitoring equipment called radiosondes, parafoils from payload fairings, and potential mishaps during a launch that lead to some or all of the rocket falling into the ocean, and the intentional abandonment into the ocean of the rocket first stage and fairings. It should be noted, however, that SpaceX has not had any mishaps during any of its Falcon 9 launches from VSFB since it began launch operations at the base. Section IV.C of the August 8, 2024, staff report ([Appendix A](#)) contains the complete information on the types of marine debris associated with SpaceX launches; that information is incorporated by reference herein as though fully described in this report. A difference between the proposed project and previous SpaceX projects at VSFB regarding marine debris is the addition of up to five Falcon Heavy launches per year. As part of Falcon Heavy launches, the center booster would typically be expended into the open ocean after each launch, but may land offshore on a drone ship, while the two boosters would either land back at SLC-6 or downrange on a drone ship. These center boosters are roughly two hundred feet long with a diameter of 12 feet and comprised of a mix of materials, primarily metals.

As described in [Appendix C](#), DAF confirmed its acceptance of Condition 6 from CD-0003-24 regarding marine debris. DAF has committed to implementing the marine debris reduction and minimization measures outlined in the condition as a part of the current CD for 100 launches per year. To address potential adverse impacts from marine debris including the weather balloons, fairing descent systems, and Falcon Heavy center booster, DAF would ensure that SpaceX provides contributions to the California Lost Fishing Gear Recovery Project and the National Marine Sanctuary Foundation (with the annual marine debris offset payment will be divided equally between those two organizations), with the intention of offsetting the release of unrecoverable debris into state and federal waters.

U.C. Davis's California Lost Fishing Gear Recovery Project has removed lost or discarded commercial fishing gear from California waters since 2005. Its work now focuses on fishing gear removal from the waters of Southern California, ensuring that gear recovery is occurring close to the areas that would be affected by the proposed

project. Lost fishing gear such as nets, traps and lines is hazardous to wildlife, including seabirds, fish, turtles, sea otters, whales and other marine animals. It is anticipated that the entanglement hazards posed to wildlife by the weather balloons are similar to those posed by lost fishing gear. Lost fishing gear, specifically traps, typically have a buoy attached to several dozen feet of nylon line; similarly, the weather balloon, which is relatively buoyant, is attached with lightweight lines to heavier scientific instruments. Thus, lost gear recovery would provide a reasonable means of offsetting the entanglement impacts associated with weather balloons. The National Marine Sanctuary Foundation works closely with California State University Channel Islands' (CSUCI) Santa Rosa Island Research Station (SRIRS) marine debris program team, which conducts debris collection and removal activities and supports their work. That program has collected a wide variety of marine debris from the Northern Channel Islands and the mainland coast since 2016, including fishing gear, trash, weather balloon fragments, and weather instruments like radiosondes.

To address the increased costs of fishing gear recovery efforts due to inflation, DAF has committed to ensuring that SpaceX would adjust its payment amounts annually for inflation. Further, DAF's commitment would also help address the inclusion of lithium ion batteries and electronic materials, consisting of circuit boards with heavy metals like lead or mercury in the radiosonde, by increasing the amount of the annual marine debris offset payment from \$10 per pound to \$20 per pound to be provided to the Lost Fishing Gear Recovery Project and the National Marine Sanctuary Foundation (NMSF). The NMSF was identified as part of a collaborative effort required in Condition 6 for DAF and the Executive Director to identify a public or non-profit organization focused on removal of hazardous waste from the marine environment or battery/electronic waste recycling and reduction efforts that could also receive funding. Since the CSUCI SRIRS marine debris program has recovered radiosondes in their past debris removal efforts and focuses on the collection and removal of debris from the remote beaches of the Channel Islands that often accumulate material discarded into the open ocean, such as weather balloons and material from military activities, it is well-positioned to help offset marine debris generated by the proposed project activities.

In addition, on September 25, 2024, DAF provided to Commission staff an update report⁴¹ describing its recent efforts to evaluate and implement measures to reduce the amount of marine debris released as part of launch activities. DAF stated that since December 2023 it has used improved technology and revised protocols to reduce the required number of balloons released per launch from 10 to 20, down to five. DAF is continuing to review and update protocols to see if there are any specific weather conditions or other opportunities that would allow DAF to waive or reduce the requirement for weather balloons. DAF is working on incorporating a new radiosonde unit for use with weather balloons. Compared to the previous model, the new radiosonde is half the weight, one third the size, and uses one third of the battery power. Lastly, DAF has been actively exploring alternatives to using weather balloons including tropospheric doppler radar profilers, high-altitude lidar for atmospheric sensing

⁴¹ Exhibit 8 of the February 2, 2024, revised findings staff report for CD-0007-24 ([Appendix A](#))

(HALAS), and unmanned aircraft. None of these technologies are currently being deployed, but they are in various stages of exploration and testing.

DAF has stated that if technological and/or operational advancements in the future allow for further reductions in the use of weather balloons or marine debris associated with launches, DAF will consider further marine debris reduction efforts. DAF has also committed to providing an annual report to the Executive Director by January 1st of each year that includes the amounts and types of marine debris released as part of each SpaceX launch and provides details about the amounts of plastics and other materials within the released debris.

Artificial Night Lighting

In its consistency determination, DAF also provided information about operations in the VSFB harbor and use of lighting at night. After salvage and landing operations are complete, any first stages, fairings and other materials would be transported via barge to the VSFB harbor. Once at the harbor, the equipment and materials would be loaded onto trucks for transport back to processing facilities at VSFB. Several marine species including pinnipeds and the federally threatened southern sea otters are known to frequent the area in and around the VSFB harbor. Based on previous CD submittals, stage one offloading operations at the harbor occurring at night would require the use of artificial lighting to help facilitate project operations. The effects of artificial night light on marine species have been documented in recent years and include effects on physiology, navigation, reproductive behavior, predation success, and community structure. Likely effects of artificial night lighting on mammals include avoidance, disorientation, disruption of foraging patterns, increased predation risk, disruption of biological clocks, increased mortality on roads, and disruption of dispersal movements through artificially lighted landscapes⁴². In order to minimize adverse effects to marine species from harbor operations, Appendix F of the CD (**Exhibit 14**) includes some minimization and avoidance measures for marine biological resources, including artificial night lighting, the project incorporates several measures, including: “Activities that could result in the startling of wildlife in the vicinity of the harbor will be allowed so long as they are initiated before dusk and not interrupted by long periods of quiet (in excess of 30 minutes). If such activities cease temporarily during the night, they will not be reinitiated until dawn”. DAF’s Biological Assessment (BA) prepared for USFWS review also mentions that project-related boats that utilize the harbor during hours of darkness operate under a lighting management plan to reduce potential impacts to rafting southern sea otter and other marine mammals from visual disturbance, but no specifics are provided at this time.

Lack of Information

As discussed in [Appendix C](#), to ensure consistency with Sections 30230 and 30231 of the CCMP, DAF has committed to preparing a lighting management plan for submittal to USFWS, and to providing the Commission with a copy of the approved management plan. Implementation of the lighting management plan was initially required pursuant to

⁴² J. Engel & N. Sadrpour memo: Pepperdine University, CLP; Component 5 August 23, 2013

Condition 4 of CD-0003-24. DAF confirmed its acceptance of that condition for that project and also committed to implementing the lighting management plan as part of the current CD for 50 launches per year. The lighting management plan for the SpaceX launch complex, if prepared in accordance with DAF's outlined plan from September 2024, would include Best Management Practices (BMPs) such as shielding, modifying the direction of lights to avoid sensitive receptors, and outlining parameters when lighting at night would be necessary. Based on DAF's communication from July 23, 2025, discussed above, two separate lighting plans would be provided for SLC-4 and SLC-6, respectively. However, it is unclear to what extent operations at the harbor would be included. While DAF is still communicating that they are committed to developing and implementing a Lighting Management Plan, the details and scope of this plan remain unclear at the time of the publication of this staff report. As such, the Commission does not have sufficient information about lighting management proposed to be implemented to determine if the proposed project would be consistent with the marine resource and water quality resource policies of the CCMP, specifically Sections 30230 and 30231.

Conclusion

VSFB is located immediately adjacent to the Pacific Ocean and the VSFB State Marine Reserve, while the Santa Barbara Channel, Northern Channel Islands and multiple other marine biodiversity hotspots are located further south within the range of the likely trajectories for the Falcon 9 and Falcon Heavy launches. Falcon 9 and Falcon Heavy launches have the potential to adversely impact sensitive species within the marine environment in several ways including engine noise and sonic booms, as well as by the generation of various forms of marine debris.

Coastal Act Section 30230 requires new development to protect, and where feasible enhance, the marine environment. Coastal Act Section 30231 requires the biological productivity and quality of coastal waters appropriate to maintain optimum populations of marine organisms to be maintained and, where feasible, restored. As discussed above, due to a lack of sufficient information regarding the efficacy and implementation of DAF's plans to monitor marine mammals and areas of special biological significance, avoid, minimize and monitor sonic booms and provide mitigation for any adverse impacts they generate. The Commission therefore objects to DAF's consistency determination, based on a lack of adequate information to determine the project's consistency with the marine biological resource policies of the CCMP (Coastal Act Sections 30230 and 30231).

D. ENVIRONMENTALLY SENSITIVE HABITAT AREAS

Section 30240 of the Coastal Act states:

- (a) Environmentally sensitive habitat areas shall be protected against any significant disruption of habitat values, and only uses dependent on those resources shall be allowed within those areas.

(b) Development in areas adjacent to environmentally sensitive habitat areas and parks and recreation areas shall be sited and designed to prevent impacts which would significantly degrade those areas, and shall be compatible with the continuance of those habitat and recreation areas.

Section 30107.5 of the Coastal Act Defines Environmentally Sensitive areas as:

“Environmentally sensitive area” means any area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which could be easily disturbed or degraded by human activities and developments.

The Department of the Air Force (DAF) states in its consistency determination that the proposed project is consistent with Section 30240, citing the fact that launch operations would take place within an existing launch facility at SLC-4 and would not require any construction within environmentally sensitive habitat areas (ESHAs). However, aspects of the project, including the sounds generated during launch and landing activities and pressure waves from sonic booms, can extend dozens of miles outward from the launch site and rockets, and directly into ESHAs located both within and outside VSFB (see **Exhibit 10**, which provides maps with sensitive species in relation to modeled launch and landing noise impacts on and off-base from Appendix C of the CD). The project description above also contains updates to modeled sonic boom footprints for landings.

In evaluating the potential effects of the proposed launch activities on an ESHA and its constituent species, it is crucial to recognize that a “habitat” consists not just of its solid, liquid and biological components (e.g. soil and substrate, hydrological and chemical processes, plants and animals) but also the surrounding atmosphere and aural environment. Noise and extreme changes in air pressure, such as associated with launch activities and sonic booms, represent disturbances to the habitat itself, with potentially significant effects on organisms. Similarly, perturbations to the light environment, especially at night, can have impacts on both plant and animal species. The project has the potential to adversely affect ESHAs on-base due to engine noise during launches, as well as from sonic booms during on-base landings. Similarly, noise and blast waves from launch-related sonic booms could result in impacts to off-base ESHAs over a broad area spanning the Santa Barbara, Ventura and Los Angeles County coasts and the Channel Island coasts, and to numerous parks and coastal recreation areas such as Jalama Beach County Park, Channel Islands National Park, and numerous state beaches. The project also has the potential to adversely affect ESHAs on-base through impacts from artificial lighting at night.

[Appendix D](#) provides a brief review of the scientific literature that has been published on wildlife responses to elevated and sudden noise and sonic booms and is incorporated by reference into these findings. In summary, repeated behavioral disturbances from noise or overpressure events are disruptive to individual animals and to populations, can induce stress responses and physiological changes, increase

energy expenditures, and carry a risk of injury, particularly to eggs or young. The severity of such effects is likely to be influenced by the pattern and frequency of disturbance, as well as the timing in relation to an organism's life cycle (e.g. breeding or nesting periods). Generally, the more frequent and unpredictable the disturbance, the more substantial the risk of adverse effects. Although few studies have been carried out on the long-term effects to seabirds and other sensitive wildlife (e.g. amphibians, bats, insects) of exposure to sonic booms, engine noise or other elevated, short duration sounds, research into other sources of disturbance demonstrates that a threshold exists beyond which the animals and/or colony/aggregation will abandon the affected area.

Types of Environmentally Sensitive Habitat Areas

[Appendix E](#) includes detailed information initially provided in Section IV.D of the staff report for the August 8, 2024, hearing (CD-0003-24) and Section IV.D of the revised findings report for the February 6, 2025, hearing (CD-0007-24, [Appendix A](#)) about types of ESHAs at VSFB supporting rare and sensitive species, including western snowy plover, California least tern, California red-legged frog, pallid bat, western red bat, monarch butterfly, and southwestern pond turtle, that are located within the affected areas for the 36 and 50 launch per year projects. Since these areas substantially overlap the potentially affected areas for the currently proposed, 100 launch per year project, this information remains relevant for the Commission's review of the subject CD and is incorporated by reference into these findings. While there are other rare and sensitive species discussed in the CD for which there is potential for impacts, this report focuses on the species listed above, based on Commission staff's understanding of the types of ESHAs and associated species most likely to be adversely impacted by the proposed activities.

Park and Recreation Areas

In addition to ESHAs, there are numerous significant park and recreation areas and resources distributed throughout the area that would experience sonic booms from launches or landings throughout Santa Barbara, Ventura, and Los Angeles Counties. These include Channel Islands National Park, the Santa Monica Mountains Recreation Area, approximately ten State Beaches and eight State Parks (with a total of nine State Parks-run campgrounds), four State Historic Parks, Jalama Beach County Park and campground, and several other County and City beaches, parks, and camping areas.

Engine Noise and On-Base Sonic Booms

The proposed project has the potential to cause adverse impacts to ESHAs and their dependent wildlife occurring on VSFB through exposure to elevated sound levels and pressure waves during static fire tests, launches and landings. Potentially affected resources include wildlife inhabiting rivers, creeks, and the associated riparian habitat (in Jalama Creek, Bear Creek, Honda Creek, and the Santa Ynez River), western snowy plover and California least tern breeding and nesting habitat in nearby coastal beaches and dunes, and several eucalyptus groves known to support overwintering monarch butterflies. Launch and landing noise would be expected to last for several minutes, and static fire noise would be expected to last for several seconds. Maps from

Appendix C of the CD of expected sound levels (from launch, landing and engine testing activities, at SLC4 and SLC-6 for Falcon 9 and Falcon Heavy rockets) in relation to nearby wildlife occurrences, including of western snowy plover, California least tern, California red-legged frog, pallid bat, western red bat, monarch butterfly, and southwestern pond turtle, are shown in **Exhibit 10**. Engine noise and on-base sonic booms are described above in the project description provided in Section IV.A (and illustrated in **Exhibit 5**), and potential impacts to marine mammals are described in Section IV.C.

The currently proposed SpaceX launch activities include an increase in Falcon 9 rocket launch activities from 50 up to 95 per year from either SLC-4 or SLC-6 (after proposed reconfiguration of SLC-6), as well as up to five Falcon Heavy launches per year from SLC-6. During these events, the maximum decibel (dB) levels in the riparian area of Honda Creek, where bats, California red-legged frogs, and southwestern pond turtles are present, would be expected to reach approximately 130 dB for Falcon Heavy launches based on modeling carried out by DAF. The western snowy plover nesting habitat would receive sound levels between 100 and 130 dB. The California least tern nesting sites at Purisima Point and roosting sites at the Santa Ynez River would receive sound levels of up to approximately 113 dB from Falcon Heavy launches from SLC-6 and up to approximately 118 dB from Falcon 9 launches at SLC-4, respectively.

SpaceX would land up to 12 first stage boosters per year at SLC-4 and land up to 12 first stage boosters per year at SLC-6, including five Falcon Heavy missions where two boosters would land simultaneously. Each landing of the first stage back at VSFB would also generate a sonic boom lasting a fraction of a second and would create an overpressure blast wave across the majority of VSFB and reaching intensity of up to 13 pounds per square foot (psf) directly adjacent to SLC-6 during Falcon Heavy landings. Maps of the sonic boom overpressures expected from modeling landings at SLC-4 and SLC-6 (for both rocket types) are included in **Exhibit 5b** (as described above in Section IV.A) and **Exhibit 10** provides maps with modeling results in relation to species localities and critical habitat. There are maps for the species specifically discussed in these findings but **Exhibit 10** also includes figures for other species discussed in the CD, including western spadefoot, marbled murrelet, southwestern willow flycatcher, least Bell's vireo, California condor, California gnatcatcher, California Ridgway's rail, northern California legless lizard, seabirds, shorebirds, American badger, and other bat species. As discussed above in the project description, there has been significant variability depicted in the figures which present the sonic boom footprints and peak overpressure levels modeled for sonic booms associated with the first stage landing of Falcon 9 rockets at SLC-4 in various new submittals. However, this section of the report will focus on the sonic boom modeling provided in this CD submittal to evaluate the ESHA impacts from the Falcon 9 and Falcon Heavy launches and landings at SLC-4 and SLC-6.

CRLF and southwestern pond turtle habitat would experience sonic boom overpressures estimated up to 9.5 psf within Honda Creek, up to 5 psf within the Santa

Ynez River, and up to 3 psf within Jalama Creek from the Falcon 9 and Falcon Heavy launches and landings at SLC-6. For western snowy plovers, the level of overpressure is dependent upon which stretch of Surf Beach they are occupying at the time of the landing event, but overpressures could reach up to 7 psf. California least tern nesting, foraging, and roosting sites are estimated to experience overpressures up to 3 to 5 psf. The extent to which these sound and pressure levels could significantly degrade wildlife habitat would be dependent on each species' individual sensitivity and respective phenology (life cycle stage) and the time between successive noise events. DAF has not identified any scheduling limitations that would ensure a certain duration of quiet between launches, landings or engine tests to mitigate noise impacts to ESHAs.

The sporadic, short-duration and high intensity noise and overpressure events generated by the launches and landings represent a significant disruption of the aural and barometric environment of these habitat areas. The potential for these habitat disruptions to cause adverse effects on sensitive wildlife species, including western snowy plover, California least tern, California red-legged frog, pallid bat, western red bat, monarch butterfly, and southwestern pond turtle, along with the need for continued, effective monitoring, is discussed in detail in [Appendix E](#) of this report, but summarized below by species, with updates from the information provided by DAF in the CD and elsewhere since the recent hearings on other CDs covering 36 and 50 launches per year.

As of the date of this staff report, DAF has prepared and submitted a Biological Assessment (BA) to the United States Fish and Wildlife Service (USFWS) for the proposed project. However, USFWS has not issued a Biological Opinion (BO) in response. Without the USFWS BO for the proposed project, the Commission was unable to fully analyze the potential adverse impacts to ESHAs, which include federally-listed species under the Endangered Species Act and their habitats, and what mitigation measures would be implemented by DAF to avoid and minimize impacts. Therefore, the findings discussed in this Section and in [Appendix E](#) are based upon the incomplete information provided in the CD submittal (which includes DAF's BA for the proposed project), previous USFWS BOs for other SpaceX launch activities at VSFB, and monitoring reports prepared and provided by DAF pursuant to measures required by USFWS per the previous BOs.

Western Snowy Plover & Noise (On-Base)

[Appendix E](#) provides a detailed description, included in previous Commission staff reports, of habitat for western snowy plover (*Charadrius nivosus nivosus*) in coastal areas that would experience impacts from the proposed project and the Commission's identification of western snowy plover habitat as ESHA. It also provides a detailed discussion from those prior reports about DAF's monitoring of western snowy plover nests during past launches at VSFB and the reactions of birds and analysis of potential impacts to eggs from engine noise and sonic booms on-base, as well as information included in earlier Biological Opinions issued by USFWS about the potential for launch

noise to adversely impact western snowy plover. Earlier USFWS reviews identified a lack of information available for how plovers would be expected to respond to the significant increase in annual launches and relied on DAF's commitments at that time (for launch cadence levels less than currently proposed in the new CD) to augmenting their western snowy plover monitoring and mitigation program on VSFB. [Appendix E](#) also provides Commission staff's review of DAF's western snowy plover monitoring program and reporting for the years 2018 – 2023 and identifies outstanding concerns about the efficacy of the analysis of available monitoring data and the conclusions being drawn from it. Key concerns include the types of reactions (e.g. startling and flushing) observed during launch events, a lack of consistency and overall low number of monitoring events, potential adverse trends in the metrics measured, and a lack of multivariate statistical analysis of population trends in relation to the frequency of noise events from launches. Both USFWS and the Commission concluded that without long term population level effects analysis on the novel effects of increased launch cadence, it is difficult to accurately anticipate the magnitude of the response from western snowy plover.

Figures C.0-39 through C.0-46 of **Exhibit 10**⁴³ provide maps with engine noise and sonic boom modeling results in relation to western snowy plover localities (including nesting areas) and critical habitat. In the BA, DAF states that there is currently no specific data or information related to the hearing sensitivity of western snowy plover. Weighting functions are used for particular species to de-emphasize noise at frequencies where susceptibility is lower and emphasize noise at frequencies where sensitivity is higher. Lacking a species-specific weighting function for western snowy plover, DAF implemented a weighted noise function based on the buderigar (*Melopsittacus undulatus*), which DAF determined could be used as a surrogate due to its similar vocal spectrum, size, and body mass to the western snowy plover. DAF processed the hearing curve of the buderigar using methods established in Southall et al. (2019) and applied this weighting function to a recording of a June 2022 Falcon 9 launch, which resulted in an estimate of the peak sound level received by western snowy plover during launches of approximately 104 decibels (dB), roughly equivalent to the noise level at a typical music concert. DAF concluded that this level of noise, in conjunction with visual stimuli of the rockets during launch, is consistent with the behavior reactions observed during monitoring.

In the CD, DAF describes the following reactions observed from western snowy plover (SNPL) monitoring over 2023 and 2024:

Incubating SNPLs were captured on video during two Falcon 9 launches with first stage landing in 2022, eleven Falcon 9 launch events, some with first stage landing, in 2023, and thirteen Falcon 9 launch events, some with first stage landing, in 2024. The majority of these SNPL's only exhibited alerting behavior involving minor head movements; a smaller proportion showed a startle effect, where the bird was observed to physically jolt, often accompanied by quick head

⁴³ **Exhibit 10** provides the figures included in Appendix C of the CD (Sensitive Species and Wildlife Occurrence within the Proposed Action Area and the Coastal Zone).

movements; and an even smaller proportion “hunkered down” on the nest (Robinette & Rice 2022a, 2022b; Robinette et al. 2024a, 2024b). In 2023, these videos showed SNPL that 92% had minor alerting, 11% startled, 7% hunkered, and 0% flushed off nests during launch noise events (n=26; Robinette et al. 2024a). In response to sonic booms during first stage SLC-4 landings in 2023, 100% exhibited minor alerting, 43% startled, 14% hunkered, and 0% flushed off nests during sonic booms (n=7; Robinette et al. 2024a). In 2024, SNPL video nest monitoring during launches showed that 95% had minor alerting, 69% startled, 35% hunkered, and 5% flushed off nests during launch noise events (n=77; Robinette et al. 2024b). Video monitoring of nests for sonic booms during first stage SLC-4 landings showed that 91% startled, 54% hunkered, and 0% flushed (n=24; Robinette et al. 2024b). In 2022, 2023, and 2024, there were no significant changes in incubation rates, overall plover abundance, or nest attendance before and after the launches and boost-back events to rocket noise. Rates of nest abandonment were lower in 2024 compared to 2023 when a high abandonment rate was documented for the Surf South beach section closest to SLC-4, which was likely attributed to many high surf and wind events during 2023 (Robinette et al. 2024a, 2024b). Additionally, both hatch rates and abandonment rates were similar among north and south VSFB beaches in 2024 (Robinette et al. 2024c).

In 2024 video/in-person monitoring of non-nesting SNPL was performed, as required under the 2024 BO (USFWS 2024), for the first time during two launch events. During the OneWeb-4 mission on 19 October 2024, thermal scopes were used to attempt to film reactions to the launch and subsequent landing at SLC-4. Although challenges were encountered with this first attempt at obtaining video footage during a nighttime launch, a small number of SNPL were observed to have brief behavioral reactions to the launch and subsequent boom, but appeared to return to normal behavior quickly. For the 24 October 2024 NROL-167 mission, video monitoring was not performed but two monitors observed a flock of 78 SNPL during the launch. The flock responded to the launch by tilting their head, appearing to look at the rocket as it took off. This response was observed prior to the noise of the rocket heard on the beach by the monitors. No other movement or response by the plovers was observed. No birds flushed, all remained roosting in the same area.

In the BA, DAF also explains that during 2019 through 2024, there have been five cases of failed eggs being found within areas that were exposed to launch and landing noise and that may have been damaged on or around the date of the launch. However, DAF stated that in each case there was no evidence of what caused the damage to the eggs or caused the chicks inside to stop developing. DAF further noted the following: “Although VSFB does not yet have data on how often eggs are damaged under normal (i.e., non-launch) circumstances, it is common that one or more eggs from a successful nest do not hatch (Robinette and Rice 2019; Robinette & Rice 2022b). Overall, all the monitoring that has been performed has shown there are no changes in bird abundance, nest attendance, or hatching rates, before and after launches.”

The BA also provides the following information comparing population trends between north and south VSFB beaches:

Despite an increase in launch cadence (16 launches in 2024 breeding season and 11 launches in 2023 breeding season) and the associated minor behavioral responses, the number of adult SNPL observed on all VSFB beaches combined during the nesting season was 309 in 2024, a 31% increase from that observed in 2023 (235; Robinette et al. 2024c). In recent years, the number of adult plovers on South Beaches has shown a curvilinear trend, increasing from 2009 through 2017 and then decreasing through 2024. Adult numbers on North Beaches have shown the opposite trend, with numbers increasing since 2017. These trends are suspected to be primarily driven by restoration efforts on South Beaches in 2013 and 2014. Vegetation removal on Surf North in 2013 and Wall in 2014 increased the amount of nesting habitat for SNPL, and adult numbers quickly responded to both restoration efforts. However, vegetation has since grown in these areas, reducing the amount of available nesting habitat on South Beaches which has likely led to adult SNPL moving to North Beaches (Robinette et al. 2024c). Nesting habitat availability, predation, and nest destruction by wind and tides are the primary factors of nesting locations, hatch success, and fledging success on VSFB (Robinette et al. 2024c). Overall, the breeding population and number of nests on VSFB has been relatively stable since 2011, although year to year fluctuations are observed (Robinette et al. 2024d).

DAF's BA concludes that western snowy plover monitoring over the last 24 years, including SpaceX launch and landing activities, has demonstrated that launch noise only has a minor effect on western snowy plover behavior, and no incidents of injury or mortality to adults, young, or eggs attributable to launch activities have been documented. However, there are clearly significant percentages of birds reacting to launch noise and sonic booms from landings (when they occur), instances of failed eggs with inconclusive evidence as to whether they can be attributed to launches, and evidence of recent population shifts from south (closer to SLC-4) to north beaches (further from SLC-4).

DAF recently provided a statistical analysis ("FINAL Statistical Analysis for Vandenberg Western Snowy Plover", prepared for DAF by SWCA Environmental Consultants, May 2, 2025) of changes in certain population trends for western snowy plover in relation to the frequency of noise events from launches that made use of historical data. This report only covered three snowy plover metrics: breeding population count; hatch rate; and fledge rate; but provided interesting insight into historical monitoring data in relation to increased launches and reinforces the value of developing such analysis on a more expansive scale (using more variables and expanding analysis to other species). An expansion on that statistical analysis report to cover a wider range of parameters and to be annually updated to provide statistical analysis for future years, particularly with consistent monitoring parameters, is important for DAF to develop to support its conclusions that the proposed project will not disrupt or degrade western snowy plover habitat in the coastal zone. This is especially necessary because under the proposed project, not only will the number of launches increase, but with the addition of Falcon

Heavy, the intensity of sound from engine noise and sonic booms will also increase. These points are discussed in more detail the “Overarching ESHA Considerations” section below.

Regarding measures to avoid, minimize or mitigate for any adverse impacts to western snowy plover, Appendix F (**Exhibit 14**) of the CD submittal from DAF states that:

The terms and conditions and reasonable and prudent measures identified during the Section 7 consultation and current consultation with the USFWS and the resultant BO would be implemented.

However, as of the date of this staff report, the updated BO had not yet been issued, and the USFWS analysis of potential impacts to western snowy plover and recommended specific protective measures were not available for Commission review and consideration.

Lack of Information Regarding Western Snowy Plover

The weighting function used in the DAF BA to analyze potential adverse impacts to western snowy plover from the noise of SpaceX launches and landings was based on the hearing curve of another bird, the budgerigar, which was assumed to be a valid surrogate. DAF cites several studies suggesting correlations between certain bird characteristics (e.g., vocal spectrum, size, body mass) and hearing sensitivity. As such, because the budgerigar has characteristics similar to the western snowy plover, applying the hearing curve to the western snowy plover was deemed acceptable. DAF conferred with a researcher involved in one of the aforementioned studies, Dr. Robert Dooling, while in the process of developing this approach.

Although the individual studies cited by DAF suggest correlations between certain bird characteristics and hearing sensitivity, it does not appear that any of the studies specifically analyzed the anatomy and the hearing sensitivity of the western snowy plover, and whether the assumptions about the connectivity of these characteristics and hearing sensitivity apply to the western snowy plover. Further, it does not appear that any of the studies used a conglomeration of characteristics (e.g. vocal spectrum plus body mass) to draw conclusions about hearing sensitivity. As such, due to the lack of specific scientific evidence analyzing the hearing sensitivity of western snowy plovers and a lack of evidence demonstrating that the approach used by DAF wherein characteristics are conglomerated is appropriate, there is not sufficient information to confidently model the hearing curve of the western snowy plover.

With regard to the recently observed western snowy plover population shifts from south to north beaches, the BA posits that recent vegetation regrowth may be reducing the amount of available nesting habitat on South Beaches, but rejects the possibility that increased launch frequency at SLC-4, in the southern part of VSFB, could be a contributing factor. However, this assessment is in conflict with DAF’s more recent

statistical analysis report,⁴⁴ for western snowy plover (also referenced above). The executive summary of this report states [emphasis added]:

The model for breeding population count determined that years with higher modeled engine noise were associated with lower breeding population counts at some southern beach segments and higher breeding population counts at some northern beach segments. Because total breeding population counts have been relatively stable across VSFB from 2011 to 2024 (Figure A-1) and have not significantly declined from 2021 to 2024 (Appendix D), one interpretation of this relationship is that western snowy plovers are selecting habitat farther from launch activities to reduce their exposure to engine noise and overpressure.

This report, employing some of the statistical analysis methods previously called for by the Commission, did assess variables of beach width and vegetation cover but does not cite those as contributing factors in discussing of the shift in population to more northern beaches. Therefore, it is unclear what information or analysis DAF relied on in the BA to assert that the observed population shifts can be explained by beach width and vegetation cover.

Further, Appendix D of the statistical analysis report mentions that a statistically significant decline in fledge rate was detected in two consecutive years, 2023 and 2024, at Surf South Beach, but not base-wide. While the report does indicate that it is possible this decline could be due to exogenous factors not quantified in the report, that observed change did meet the mitigation threshold criteria included in the 2023 and 2024 USFWS Biological Opinions. A similar threshold⁴⁵ was previously included in Condition 1.c of the Commission's concurrence with CD-0003-24, however, the current CD does not address this mitigation threshold exceedance, assess whether it can confidently be attributed to other natural- or human-caused catastrophic factors not related to the launch and landing activities, or whether DAF will prepare a proposal for avoidance, minimization and mitigation measures to address the impacts.

Specific instances of the lack of information described above related to western snowy plover are summarized below. This information is necessary to assess consistency with the ESHA policies of the California Coastal Management Program (CCMP), specifically Section 30240.

- Information about: (a) scientific studies specifically showing that the buderigar is an appropriate surrogate to the western snowy plover with respect to hearing curves; (b) scientific studies showing that a conglomeration of characteristics can

⁴⁴ "FINAL Statistical Analysis for Vandenberg Western Snowy Plover", prepared for DAF by SWCA Environmental Consultants, May 2, 2025.

⁴⁵ Condition 1.c for CD-0007-24 included the following: "If significant disruption or degradation of habitat values are identified from these conclusions in terms of either (i) a statistically significant change, or (ii) a change greater than the baseline annual variation over the course of two consecutive years, in monitored indicators of species population or reproductive success, and cannot confidently be attributed to other natural- or human-caused catastrophic factors not related to the launch and landing activities, DAF shall prepare and provide for the Commission's federal consistency review a proposal for avoidance, minimization and mitigation measures to address the impacts."

be used to determine the hearing curve for an individual bird species; and (c) why DAF wasn't able to create or find a study specific to western snowy plover to determine the hearing curve and weighting factor for the species and whether that will be pursued moving forward.

- Information, including statistical analysis, to support DAF's assessment in the BA that trends in vegetation cover and available nesting habitat are the suspected drivers of shifts in breeding population counts from more southern to more northern beaches, and how those the influence of those variables compares to increases in launch activities.
- An assessment of whether the mitigation threshold exceeded for fledge rate at South Surf Beach can confidently be attributed to other natural- or human-caused catastrophic factors not related to the launch and landing activities, or whether DAF will prepare a proposal for avoidance, minimization and mitigation measures to address the impacts

California Least Tern (LETE) & Noise (On-Base)

[Appendix E](#) provides a detailed description, included in previous Commission staff reports, of habitat for California least tern (*Sternula antillarum browni*) in coastal areas that would experience impacts from the proposed project and the Commission's identification of California least tern nesting habitat as ESHA. It also provides a detailed discussion from those prior reports about DAF's monitoring of California least tern nests during past launches at VSFB and the reactions of birds and analysis of potential impacts to eggs from engine noise and sonic booms on-base, as well as information included in earlier Biological Opinions issued by USFWS about the potential for launch noise to adversely impact California least tern. Earlier USFWS reviews identified a lack of information available for how terns would be expected to respond to the significant increase in annual launches and relied on DAF's commitments at that time (for launch cadence levels less than currently proposed in the new CD) to continuing their California least tern monitoring and mitigation program on VSFB. [Appendix E](#) also provides Commission staff's review of DAF's California least tern monitoring program and reporting for the years 2018 – 2023 and identifies outstanding concerns about the efficacy of the analysis of monitoring available and the conclusions being drawn from it. Concerns raised included the types of reactions (e.g. startling and "hunkering down" behavior), a lack of consistency and overall low number of monitoring events, and a lack of multivariate statistical analysis of changes in population trends in relation to the frequency of noise events from launches. Both USFWS and the Commission concluded that without long term population level effects analysis on the novel effects of increased launch cadence, it is difficult to accurately anticipate the magnitude of the response from California least tern.

Figures C.0-47 through C.0-52 of **Exhibit 10** provides maps with engine noise and sonic boom modeling results in relation to California least tern (LETE) localities (including on-base areas for nesting, foraging, fledging, and roosting). In the BA, DAF describes the following reactions observed from monitoring over 2023 and 2024:

In 2023, monitoring over the entire season showed no significant difference in incubation rates before and after launches (Robinette, et al. 2024a). Video

footage of incubating LETE during Falcon 9 launches in 2023 (n=7) showed that 100% of LETE reacted, 43% flushed off nests, and all flushed birds returned to nest within 45 seconds (Robinette, et al. 2024a). Video footage of incubating LETE for Falcon 9 launches with SLC-4 landings during the LETE nesting season in 2023 (n=5) showed that 100% reacted, 100% startled, 40% hunkered, 40% flushed, and all returned to nest within 45 seconds. In 2024, video footage of incubating LETE during Falcon 9 launches (n=21) found that 90% of the adults alerted, 50% were startled, less than 20% hunkered or shifted on their nests, and less than 10% flushed off their nests (Robinette et al. 2024b).

In 2024, there were no Falcon 9 launches with SLC-4 landings during the LETE breeding season. However, there were active LETE nests during five Falcon 9 launches with downrange barge landings in 2024 (Starlink G8-8, Starlink G9-1, Starlink G9-2, NROL-186, and Starlink G9-3). During these launches, video cameras were used to record 21 LETE acute responses to initial launch noise. The video footage showed that the majority (~90%) of incubating adults reacted to initial launch noise, were startled during almost 50% of launches, hunkered or shifted on their nests during <20% of events, and flushed off their nests during <10% of events (Robinette et al. 2024d). There was no difference in incubation rates before and after launches and LETE reproductive success at VSFB was well above the long-term average for the first time since 2016 (Robinette et al. 2024d). There was only one LETE nest abandoned in 2024, and this was due to one of the breeding adults being depredated by an owl. Thus, aside from increased disturbance resulting in a short-term response, we have no direct evidence that launches from SLC-4 had an impact on nesting LETE at VSFB in 2024 (Robinette et al. 2024d).

While DAF claims there is no evidence to suggest that rocket engine noise and sonic boom exposure has affected the number of nesting adults or reduced productivity of the nesting colony, similar to snowy plover, there are clearly significant percentages of birds reacting to launch noise and sonic booms from landings (when they occur) and DAF has still not provided a multivariate statistical analysis of changes in population trends in relation to the frequency of noise events from launches to corroborate their claims. Such an analysis, particularly with consistent monitoring parameters, is especially important because under the proposed project, not only will the number of launches increase, but with the addition of Falcon Heavy the intensity of sound from engine noise and sonic booms will also increase. This lack of information is discussed in the “Overarching ESHA Considerations” section below.

Regarding measures to avoid, minimize or mitigate for any adverse impacts to California least tern, the CD submittal from DAF includes the same commitment to implement the terms and conditions and reasonable and prudent measures identified during the Section 7 consultation and current consultation with the USFWS and the resultant BO (see Appendix F of CD, **Exhibit 14**), which, as noted previously, has not yet been released; as a result, DAF’s proposed protection measures remain unspecified.

Lack of Information Regarding California Least Tern

While DAF implemented a weighting function to analyze potential adverse impacts to western snowy plover from SpaceX launches and landings, this was not provided in the CD or BA for California least tern, and DAF does not address why this was not established. It is necessary to develop unique weighting factors by species to understand the sounds levels experienced by those species based on the “raw” unweighted dB levels in relation to their species-specific sensitivity thresholds.

Specific instances of the lack of information described above related to California least tern are summarized below. These are necessary to assess consistency with the ESHA policies of the CCMP, specifically Section 30240.

- Information about why a weighting function to analyze potential adverse impacts to California least tern was not established to assess the potential for adverse impacts from noise based on species-specific sensitivity thresholds

California Red-Legged Frog & Noise (On-Base)

[Appendix E](#) provides a detailed description, included in previous Commission staff reports, of habitat for California red-legged frog (*Rana draytonii*, CRLF) in coastal areas that would experience impacts from the proposed project and the Commission’s identification of CRLF habitat as ESHA. It also provides a detailed discussion from those prior reports about DAF’s monitoring of CRLF during past launches at VSFB and the reactions of CRFL from engine noise (and associated vibrations) and sonic booms on-base, as well as information included in earlier Biological Opinions issued by USFWS about the potential for launch noise and vibrations to adversely impact CRLF. Earlier USFWS reviews identified a lack of information available for how CRLF would be expected to respond to the significant increase in annual launches and relied on DAF’s commitments at that time (for launch cadence levels less than currently proposed in the new CD) to augment their CRFL monitoring and mitigation program on VSFB.

[Appendix E](#) also provides Commission staff’s review of DAF’s CRLF monitoring program (collection began in 2023, with limited monitoring before that) and results and identifies outstanding concerns about the efficacy of the analysis of monitoring available and the conclusions being drawn from it. Concerns raised included the types of reactions and potential for chronic stress, a lack of consistency and overall low number of monitoring events, and a lack of reference sites. Both USFWS and the Commission concluded that without long term effects analysis on the novel effects of increased launch cadence, accounting for natural variability, it is difficult to accurately anticipate the magnitude of the response from CRLF.

DAF has documented CRLF within Bear Creek and Honda Creek, located 0.75 miles and 2 miles to the south of SLC-4, respectively. CRLF have also been documented in isolated natural wetlands on south VSFB. At SLC-6, CRLF were previously documented in various industrial ponds and drainages that are currently dry or provide temporary transitory habitat. Currently, at the southwestern corner of SLC-6, the southern drainage likely provides long-lived, open water that could provide temporary occupation by CRLF. Additionally, the vault structure and flame trench at SLC-6 have collected water during

rainstorms and could be attractive to transiting CRLF. Figures C.0-1 through C.0-7 of **Exhibit 10** provides maps with engine noise and sonic boom modeling results in relation to CRLF localities and critical habitat.

DAF states in the BA that CRLF may be inadvertently injured or killed during removal of vegetation, site grading and contouring, construction, firebreak and fire establishment, and site maintenance from the operation of heavy equipment, machinery, and vehicles at SLC-6. To minimize this potential, biologists would monitor construction activities and search for any CRLF trapped in open holes and trenches, which would be covered overnight to reduce the risk of entrapping CRLF. Any CRLF detected within the construction area would be captured and relocated to suitable habitat. During any vegetation-clearing activities a USFWS-approved biologist would be present for monitoring of CRLF. Noise from construction could also impact CRLF. However, there are no known CRLF populations or suitable breeding habitat within areas of construction that would experience 80 dB or greater levels of noise.

In the BA, DAF implemented a weighting function to analyze potential adverse impacts to CRLF from SpaceX launches and landings. The weighting function was based on “several species in the same family that are similar in size and have similar call frequency spectra”, i.e. the pool frog (*Pelophylax lessonae*), the marsh frog (*P. ridibunda*), and the edible frog (*P. esculentus*). Regarding the potential adverse impacts of engine noise and sonic boom on CRLF habitat, the BA states that CRLF have low hearing sensitivities to engine noise and sonic booms, but that engine noise and sonic booms would still trigger a startle response in CRLF due to vibrations of the substrate occupied by the frogs. A team of researchers conducted a study of vibrations caused by Falcon 9 launch and landing events at SLC-4. At Spring Canyon, mild vibrations were detected at a maximum peak particle velocity (PPV) of 0.96 inches per second, which is roughly equivalent to a magnitude 3 – 4 earthquake at a distance of several miles from the epicenter. At Bear Creek, the PPV measured was 0.04 inches per second, roughly equal to a magnitude 2 or less earthquake at 2 miles from the epicenter. The BA goes on to state that earthquakes of this magnitude are common in California as 41% of earthquakes throughout the state had a magnitude between 1 and 2. This section of the BA concludes that based on this information, CRLF near the launch site would experience a temporary behavioral disruption, but farther away at Spring Canyon and Bear Creek, any effect due to vibration is unlikely.

Lastly, the BA includes monitoring survey data from 2024 and contends that CRLF populations in Honda Creek and Bear Creek have increased significantly, despite the increased launch cadence in 2024. According to that data, during 2024 both the total number of adult CRLF and CRLF detected per survey hour were double the numbers prior to project implementation. The baseline data averaged approximately 7.2 adult CRLF and 2.9 CRLF per survey hour, the 2024 data recorded 14 adult CRLF and 5.2 CRLF per survey hour. However, DAF has still not provided a multivariate statistical analysis of changes in population trends in relation to the frequency of noise events from launches. Such an analysis, particularly with consistent monitoring parameters, is especially important because under the proposed project, not only will the number of launches increase, but with the addition of Falcon Heavy, the intensity of sound from

engine noise and sonic booms will also increase. This lack of information is discussed in the “Overarching ESHA Considerations” section below.

Regarding measures to avoid, minimize or mitigate for any adverse impacts to CRLF, the CD submittal from DAF includes the same commitment to implement the terms and conditions and reasonable and prudent measures identified during the Section 7 consultation and current consultation with the USFWS and the resultant BO (see Appendix F of CD, **Exhibit 14**) which has not yet been released. Thus, DAF’s proposed protection measures remain unspecified.

Lack of Information Regarding California Red-Legged Frog

In the BA, DAF presents data indicating that earthquakes with magnitude between 1 and 2 are very frequent on a statewide basis, but does not describe how the locations of populations of CRLF on VSFB compare to the locations of earthquakes, nor does it compare the frequency of launches under the proposed project with the frequency of earthquakes with a magnitude of 1 to 2 within a locally-relevant area. The BA also concludes that a seismic event (earthquake or launch) with a magnitude of 1 to 2 is unlikely to disturb a CRLF, but provides no evidence or analysis to verify that claim.

For the bioacoustic monitoring, the Commission would note that greater call rates following a sonic boom compared to rates before a launch could indicate an impact to the species, such as an increase in energy expenditure, eardrum damage, or distress. As acknowledged in the BA, there is substantial scientific evidence that anthropogenic noise has behavioral and adverse physiological effects on frogs, but long-term effects on populations remain unclear⁴⁶. The BA states:

Whether a result of minor physical vibrations caused by noise or overlap of some noise stimuli with various species hearing sensitivity range, there is a growing body of literature on the effects of anthropogenic noise disturbance on anurans. These studies have typically examined the impact of sustained vehicle noise associated with roads near breeding ponds and have generally shown negative effects on individual frog behavior and physiology which potentially have consequences for populations (see examples in Parris et al. 2009 and Tennessen et al. 2014). For instance, a variety of anurans have been shown to alter call signal structure in response to chronic exposure to traffic noise (Bee & Swanson 2007; Lengagne 2008; Cunningham & Fahrig 2010; Kaiser et al. 2011; Hanna et al. 2014) and airplane noise (Sun & Narins 2005, Kruger & Du Preez 2016). Researchers studying chronic exposure to sustained anthropogenic noise in anurans have also found higher levels of stress hormones, lowered immunity, and impacts to reproductive physiology and behavior, all of which may have negative consequences for populations. [...] There are no thresholds in the literature that quantify what level of noise or frequency of disturbance would elicit stress hormone responses, impacts to breeding and reproduction, or negative

⁴⁶ The BA also cites results of behavioral reactions to noise from specific studies on wood frogs, European tree frogs, White’s treefrogs, Pacific chorus frogs, Japanese tree frogs, and Eastern sedge frogs. Discussion of those studies are omitted from the BA text provided below for brevity.

population level effects. While these studies show effects on behavior and physiology that could have impacts on fitness and populations, none of them present direct evidence of population impacts, so the long-term effects of chronic exposure to anthropogenic noise on populations is unknown for these species.

While the BA also finds that “[n]one of the preceding studies are directly comparable to the noise impacts of the Proposed Action”, the existing research suggests there is a clear potential for adverse effects over time, and supports the need for a robust monitoring and analysis program to assess the on-going impacts of launches and sonic booms.

Given the very limited monitoring data collected to date under the new 2023 USFWS Biological Opinion monitoring requirements, it appears that there has not been enough CRLF bioacoustic monitoring to determine that this species is not adversely impacted by launches or sonic booms, especially since modeling of sonic booms/boost backs includes sound levels reaching 3 and 4 psf in areas of known CRLF habitat. Moreover, as noted previously in discussing the habitat of other sensitive species, multiple years of monitoring data at a given launch cadence may be necessary to adequately assess the effects of launch noise and sonic booms on CRLF over time, while accounting for natural variability. Additionally, it is the Commission’s understanding that the discussion between DAF and USFWS regarding potential reference sites existing outside VSFB that could replicate local environmental conditions is still ongoing, and the Commission would support establishment of one if necessary. Similar to USFWS requirements for monitoring western snowy plover and California least tern on-base, as described above, DAF would also be required to continue its ongoing monitoring program for California red-legged frog during launches, including monitoring of long-term habitat use and local species populations.

Although the monitoring survey data from 2024 appears to show an increase in adult CRLF detected and CRLF detected per survey hour compared to 2023, one year of monitoring does not provide sufficient data to draw conclusions about how populations of CRLF may be responding to launch activities at VSFB at present, or how they may respond in the future under a significantly higher launch frequency. Particularly because the analysis of the monitoring survey data from 2024 does not include any statistical analysis about how the monitoring survey data could be used to draw conclusions about CRLF populations nor does it include any statistical analysis of the data itself. Instead, it compares two datasets and makes a general numerical analysis to draw conclusions. Specific instances of the lack of information described above related to California red-legged frog are summarized below. This information is necessary to assess consistency with the ESHA policies of the CCMP, specifically Section 30240.

- An explanation of how DAF was able to conclude that earthquakes with a magnitude of 1 to 2 would be unlikely to disturb CRLF, including information about the proximity of locations of populations of CRLF to locations where the earthquakes occurred and how the frequency of earthquakes with a magnitude of 1 to 2 compared to the proposed launch frequency at VSFB

Bats, Monarch Butterfly, Southwestern Pond Turtle and Noise

[Appendix E](#) provides a detailed descriptions, included in previous Commission staff reports, of habitat for pallid bat (*Antrozous pallidus*), western red bat (*Lasiurus frantzii*), Monarch butterflies (*Danaus plexippus*), and Southwestern pond turtles (*Actinemys pallida*) in coastal areas that would experience impacts from the proposed project and the Commission's identification of habitats for pallid and western red bats, monarch butterfly, and southwestern pond turtle, habitats as ESHA.

[Appendix E](#) also includes a detailed discussion from those prior reports about the sensitivity to sound of bat species found in the riparian habitats of Honda Canyon, expected exposure to engine noise, and DAF's past assessments that significant degradation of bat habitat in Honda Canyon from launch-related noise is unlikely (despite exceeding CDFW's sound exposure level recommendations for other types of projects). The Commission has expressed concerns that the greater frequency of launch activities would result in a commensurate increase in elevated noise episodes and the potential for disruptions to bat habitat. Figures C.0-63 through C.0-67 and C.0-72 through C.0-76 of **Exhibit 10** provides maps with engine noise and sonic boom modeling results in relation to bat species localities, roosts, and bat acoustic sampling locations, in and adjacent to VSFB.

For monarch butterflies, [Appendix E](#) also includes a detailed discussion from prior Commission staff reports about two monarch aggregations sites located in the eucalyptus tree stands in Spring Canyon immediately adjacent to SLC-4, which could be impacted by noise and other launch activities, including from steam from launches, engine noise, and sonic booms. It also details DAF's annual overwintering counts of monarch butterflies at VSFB, but explains the Commission's concerns about the lack of comprehensive analysis of this data and assertion that monarch monitoring and statistical analyses should include two or more monarch aggregation reference sites outside the influence of the launches and sonic booms that would be surveyed at similar times to the impact site for comparison. Figures C.0-72 through C.0-76 of **Exhibit 10** provides maps with engine noise and sonic boom modeling results in relation to monarch butterfly overwintering areas on-base.

[Appendix E](#) also includes a detailed discussion from the Commission's revised findings for CD-0007-24 regarding the analysis in the USFWS 2024 Biological Opinion for potential impacts to southwestern pond turtle habitat from various aspects of the proposed project (including firebreak maintenance activities, lighting, flame duct use and associated vegetation maintenance, water extraction, engine noise, and sonic booms) and USFWS's requirements for DAF to implement long-term monitoring of annual population and distribution trends associated with local southwestern pond turtle populations, to develop a monitoring plan that adequately addresses potential short- and long-term project effects that may result from sensory pollutants, and to conduct vegetation removal clearance surveys and monitoring. Figures C.0-14 through C.0-19 of **Exhibit 10** provides maps with engine noise and sonic boom modeling results in relation to southwestern pond turtle localities.

Other than monarch butterfly, which is briefly addressed in the CD submittal, the other species in this section are not discussed in either the CD or the BA. “Bat Acoustic Sampling” locations and “Bat Roosts”, monarch butterfly overwintering areas, and southwestern pond turtle localities, are identified in several figures of the CD showing engine sound levels and overpressure from sonic booms, but there is no analysis about how engine noise and sonic booms could adversely impact these habitat areas or the species. Monarch butterfly is discussed in the CD submittal as follows:

The non-listed monarch butterfly (*Danaus plexippus*) overwinters on VSFB and has been proposed for listing as threatened (89 FR 100662-100716). Although there are no requirements in the ESA to consult or confer on actions due to their effects on candidate species, the Department of Defense (DOD) proactively initiated formal conference with the USFWS under Section 7(a)(4) of the ESA pursuant to the DOD’s 7(a)(1) Conservation Strategy for the Monarch Butterfly for Mission and Mission Sustainment Operations within the Continental United States. The Proposed Action included a Conservation Strategy and routine mission and mission sustainment activities that may affect monarch habitat and/or individuals. The Conservation Strategy was developed in collaboration with the USFWS to ensure the program will serve the purposes of advancing monarch conservation and continuing to fulfill DOD’s responsibilities under 7(a)(1). The USFWS issued a Conference Opinion (CO) on 10 December 2024, which determined that the DOD’s proposed launch, reentry, and infrastructure improvement activities are not likely to jeopardize the continued existence of the monarch butterfly (USFWS 2024c). Therefore, monarch butterfly is not considered further in this BA.

Lack of Information Regarding Bats, Monarch Butterfly, and Southwestern Pond Turtle

As part of its response to the Commission’s conditional concurrence with CD-0003-24 (36 launch per year cadence) DAF committed to developing an enhanced biological monitoring program to better evaluate the effects of engine noise and sonic booms on sensitive species, including monarch butterfly, pallid bat and western red bat. On January 15, 2025, DAF shared a draft of the monarch butterfly monitoring plan intended to fulfill its commitment and meet the requirements of the biological monitoring condition (Condition 1) from CD-0003-24. CCC staff reviewed the draft plan and provided comments to DAF on January 28, 2025. In summary, CCC staff’s comments included questions and suggestions to clarify the approach that would be used to monitor and analyze whether launch and landing activities are having an adverse impact on monarch butterflies. DAF never replied to CCC staff’s comments and never provided what it would consider a final version of the plan.

On July 11, 2025, DAF shared a report titled “2023-2025 VSFB Monarch Butterfly Report.” This report included information on surveys of overwintering monarchs at 35 sites at VSFB as well as overwintering habitat assessments and information on a pilot Motus tagging project and mapping of monarch feeding and breeding locations. The report states that it was prepared pursuant to monarch habitat and conservation measures included in VSFB’s Integrated Natural Resources Management Plan. The

report does not include any reference to CD-0003-24 nor does it include any analysis of how the information included in the report satisfies the requirements of Condition 1(c).

In September 2024, DAF provided a final version of the bat monitoring plan it had prepared per Condition 1(c) of CD-0003-24. The approach in that monitoring plan would follow the protocols of the Bat Conservation International (BCI) North American Bat (NABat) Monitoring Program. DAF has monitored 23 locations at VSFB since 2023 pursuant to that approach and the requirement of Condition 1(c) would be a continuation of those efforts. As of the date of this staff report, DAF has yet to share the 2024 report for bat monitoring.

Regarding southwestern pond turtles (SWPT), the 2024 USFWS Biological Opinion included a conference opinion for the southwestern pond turtle and found that the proposal from DAF for 50 SpaceX launches in 2024 was likely to adversely affect but would not likely jeopardize the continued existence of this species. Information about SWPT habitat and requirements from the 2024 USFWS Biological Opinion are included in [Appendix E](#) and summarized above. However, as of the date of this staff report, DAF has not provided any monitoring data or reports to Commission staff regarding SWPT and SpaceX launch activities at VSFB. Additionally, SWPT is not identified or discussed in the CD submittal⁴⁷ or BA from DAF for the proposed project. Further, the lack of information about commitments from earlier CDs for enhanced biological monitoring, including multivariate statistical analyses is addressed in the discussion of “Overarching ESHA Considerations” below.

Specific instances of the lack of information described above related to monarch butterfly, pallid bat, western red bat and southwestern pond turtle, are summarized below. This information is necessary to assess consistency with the ESHA policies of the CCMP, specifically Section 30240.

- Monitoring data or reports on monarch butterfly, pallid bat and western red bat, that include initial conclusions (including those from an analysis of multivariate statistical analyses of the changes in population trends) regarding potential effects on any monitored species as a result of launch and landing activities on VSFB
- Information about whether DAF is monitoring SWPT per the 2024 USFWS Biological Opinion and whether the proposed project would include any new monitoring for SWPT
- Discussion and analysis of potential habitat impacts from the proposed project, with increase launch cadence and new use of SLC-6, for pallid bat, western red bat, and SWPT

⁴⁷ With the exception of its inclusion in the species lists and maps of Appendix C of the CD

Overarching ESHA Considerations for Engine Noise and On-Base Sonic Booms

[Appendix E](#) provides a detailed discussion from previous Commission staff reports⁴⁸ about overarching ESHA considerations for engine noise and on-base sonic booms, including: (1) concerns with the earlier proposed projects (for lower launch cadences than now proposed) and the associated monitoring for these sensitive species because of the potential for the significant and rapid increase in cadence compared to the number of historic launches at VSFB to result in more frequent behavioral responses that could lead to lower nesting success and, over time, population level impacts that would be indicative of increasingly severe disruption of their habitats; (2) concerns about the lack of comprehensive statistical analysis to assess changes in populations trends using the historic data that DAF has been collecting for decades; (3) weaknesses in the design of the various monitoring programs reviewed at those times and their implementation; (4) concerns about the methods of mitigation proposed (e.g. predator control) to be implemented by DAF if adverse impacts are observed; and (5) concerns about potential energy expenditures by birds reacting to launch engine noise and landing sonic booms. The appendix also includes a high-level description of the 2023 and 2024 USFWS Biological Opinions and some of their requirements.

Updates that include monitoring information from 2024 that were not available during previous Commission reviews and the status of monitoring programs are detailed above, by species, for western snowy plover, California least tern, California red legged frog, monarch butterfly, pallid bat, western red bat, and southwestern pond turtle. In addition to the lack of information specific to the species discussed above, the Commission has significant questions about the details, implementation, and efficacy, of the monitoring programs to be implemented for the proposed project and whether the proposed project would protect on-base ESHAs and associated species against significant disruption and degradation of habitat values, and if it would be compatible with the continuance of those habitat areas. DAF's assessment of the project's potential effects and consistency with the terrestrial biological resource protection policies of the CCMP is also problematic in that it is largely limited to considerations of impacts on wildlife populations, which does not necessarily align with the requirements in the CCMP for sensitive habitats to be protected from disturbance and degradation. In other words, a population may continue to persist while also losing or abandoning important habitat areas as a result of degradation or consistent disturbance. DAF's approach appears to apply the same analysis to CCMP policies as it does to its USFWS consultation without acknowledging that the CCMP's ESHA policies establish a different approach and standard than that used by USFWS through its Endangered Species Act authority.

Lack of Information for Overarching ESHA Considerations

Emblematic of DAF's incomplete consideration of the potential for adverse effects to ESHAs is the fact that Subsection (a) of Section 30240, or "Section 30240(a)," is not acknowledged or evaluated in the CD, and the information, analysis, and proposed

⁴⁸ Initially provided in Section IV.D of the staff report for the August 8, 2024, hearing and Section IV.D of the revised findings report for the February 6, 2025, hearing (see [Appendix A](#))

monitoring and protective measures included in the CD are not sufficient to determine whether and how the proposed project would protect ESHA against any significant disruption of habitat values, despite the fact that there are numerous ESHAs that would be subject to engine noise and sonic booms from the proposed rocket launches and landings.

The BA does describe preliminary conservation measures for western snowy plover, California least tern, or California red-legged frog (CRLF), but it is unclear whether those are being proposed as part of the CD, and, as discussed more below, whether they would even be implemented as proposed or modified, replaced or eliminated following release of the pending BO.⁴⁹ For western snowy plover, tentative measures include long-term monitoring of annual population and distribution trends along Surf Beach, and use of motion triggered video (during the breeding season, typically March through September) during the first three Falcon Heavy missions. For California least tern they include long-term monitoring of annual population and distribution trends, and use of motion triggered video (during the breeding season, typically mid-April to mid-August) and acoustic monitoring during the first three Falcon Heavy missions at the Purisima LETS colony. For CRLF they include some measures related to construction at SLC-6, as well as long-term monitoring proposed of population and distribution trends for CRLF populations (including quarterly night surveys and passive bioacoustics monitoring). General conservation measures are also proposed that include best management practices for construction at SLC-6 and operations at SLC-4 and SLC-6.

However, the preliminary measures proposed for long-term monitoring would be discontinued five years after the initiation of monitoring, which began with the 2023 – 2024 breeding season for CRLF and with the 2024 breeding season for western snowy plover and California least tern. In its July 23, 2025, submittal, DAF stated that it is anticipated that after five years, enough data will have been collected at that point to evaluate the impacts of the action and that “[u]nder the projected launch schedule the full cadence would be reached during the second year; therefore, the 5 year period would include 4 years at full cadence”. However, Table 2.1-1 of the CD seems to indicate that the full launch cadence between SLC-4 and SLA-6 is not estimated to be reached until approximately 2027. Either way, it is not clear whether five years would be enough time to statistically establish whether or not launch activities are adversely affecting habitat for western snowy plover, California least tern, or CRLF with an appropriate level of confidence. It is also unclear what reference habitat areas would be used for comparison to assess impacts.

The CD acknowledges that the proposed project is likely to adversely affect several species of special biological significance, including California least tern, western snowy plover, and California red-legged frog, and the consistency review conclusion provided

⁴⁹ In response to Commission staff’s June 27, 2025, request to clarify whether all “Conservation Measures” from the BA (Appendix D, Section 2.3) are proposed as part of the CD, and to what extent those measures would also involve coordination with or reporting to the Commission, DAF responded on July 23, 2025, stating: “All measures included within the BA are proposed and may change based on the USFWS BO. The CCC will receive all final documents/reports required by the USFWS as part of the BO.” Therefore, those measures are not considered final at this time.

by DAF in Section 3.2.6 goes on to state, in part: “With continued species monitoring and implementation of measures required by the USFWS and the implementation of the [environmental protection measures (EPMs)] described in [Appendix F (**Exhibit 14**)] the Proposed Action would not result in population-level impacts on any biological resource or disrupt or degrade state sensitive habitats or the habitat of the species of concern listed in Appendix C in the coastal zone.” Therefore, DAF’s consistency statements for the enforceable CCMP policies in Section 30240(b) rely heavily on the EPMs. However, as the statements in Section F.2 of Appendix F of the CD describing those EPMs make clear, specific EPMs are still in development and have yet to be identified or provided to the Commission.

Instead, the EPMs reference the final terms and conditions and reasonable and prudent measures that will be developed and specified in the USFWS BO, which is still in preparation and has not been included with the CD. In other words, the likelihood, type and magnitude of the proposed project’s coastal effects depend in part on protection measures that have yet to be developed and are not provided in the CD. Until DAF provides these EPMs, the Commission cannot evaluate the proposed project’s reasonably foreseeable effects on coastal resources. As of the date of this staff report USFWS has not finalized the BO. As such, the Commission does not know whether the USFWS concurs with DAF’s BA, what reasonable and prudent measures will be required by USFWS for western snowy plover, California least tern, or California red-legged frog, and whether any measures are sufficient to meet the requirements of Section 30240 of the Coastal Act.

Based on the inadequacies of DAF’s biological monitoring programs proposed and data analysis provided in its CD for an increase to 36 Falcon 9 launches per year (as further discussed in [Appendix E](#) and summarized above), the Commission included Condition 1 in its conditional concurrence. As discussed above and in [Appendix C](#), DAF committed to enhanced biological resources monitoring, including measures to improve monitoring of the species considered in this section, following the August 2024 hearing, and included these commitments in its CD to increase the launch cadence to 50 per year. However, the current CD, for a further expansion to 100 launches per year and use of a new launch facility and larger rocket, appears to eliminate DAF’s prior commitment to comply with Condition 1.

In a July 23, 2025, response to Commission staff’s inquiries about those previous commitments for biological monitoring, DAF states that “[It] will continue to adhere with all federal statutory requirements and implement and update the conservation measures of the [Integrated Natural Resources Management Plan (INRMP)] when funding is allocated” and “DAF will only be submitting final annual reports required by the USFWS BO, NMFS LOA, and any other reports we are able to accomplish with INRMP funding to the Interagency Working Group” and referenced their memo to the Working Group dated June 12, 2025 (**Exhibit 8**). Therefore, less than one year later, not only is DAF not specifying what monitoring, data analysis, and other environmental protection measures will be carried out for sensitive species, including western snowy plover, California least tern, California red legged frog, until the new USFWS Biological Opinion

is finalized (which it is not yet); it also appears to be no longer committing to the enhanced biological monitoring program that the Commission found to be necessary (through establishment of Condition 1) to ensure CCMP consistency at a level of 36 launches per year. DAF's current CD does not provide sufficient information to allow the Commission to determine how the proposed lack of compliance with Condition 1 would ensure CCMP enforceable policy consistency at a launch level nearly three times greater.

In that July 23, 2025, response, they also stated⁵⁰ that “[l]andscape level camera monitoring has proven to be ineffective (birds are small and cryptic and therefore are not discernable in landscape level images) which is why it is not proposed”, but did not elaborate further (it is also unclear at this time if USFWS will require this). Further, the CD does not specify any monitoring proposed for potential impacts for monarch butterfly, pallid bat, western red bat, or southwestern pond turtle.

The August 8, 2024, staff report ([Appendix A](#)) for Commission's conditional concurrence with CD-0003-24 includes the full text of Condition 1 (On-Base Enhanced Biological Monitoring Program), which included components for (a) monitoring for specific species⁵¹, (b) analysis of monitoring data, and (c) reporting. The Commission previously determined that for SpaceX launch activities at VSFB, a comprehensive statistical analysis that considers physical (oceanographic conditions, climate, storms, beach width, etc.), biological (population size, population location, behavior, etc.), temporal (frequency and time between launch events for species to recover, seasonal timing of launches and sensitive times of the year), and anthropogenic (launches) variables would be required. Such an approach would help to synthesize the data from the monitoring reports (e.g. reactions to launch activities, egg failures or damaged eggs, migration of plovers from South Beach to North Beach) in conjunction with historical data sets to more accurately evaluate the likely causes of population trends. The Commission's concurrence for 36 annual SpaceX launches (CD-0003-24) included a condition requiring this statistical analysis as part of Condition 1.b. To date, the only such analysis provided has been a May 2, 2025, report (mentioned above) provided to the Commission on western snowy plover population trends that includes a multivariate statistical analysis. The report appears to have been prepared in response to the USFWS BO for 50 launches. Commission staff were not consulted with during preparation of the report, and it is unclear whether that report includes all of the parameters identified by the Commission as necessary to study in CD-0003-24. It is also unclear why no other species have been similarly analyzed or if such analysis is pending. The report also only considered three snowy plover metrics (breeding population count, hatch rate, and fledge rate) while Condition 1.b of CD-0003-24 considered it necessary to study relevant population trends that included, but were not limited to, population sizes and locations, rates of breeding success (including number

⁵⁰ In a response to Commission staff's June 27, 2025, request to clarify if the landscape-level camera monitoring for western snowy plover and California least tern required by the 2023 USFWS BO (also part of CD-0003-24, Condition 1.b – see item 9a, below) would be carried forward or if only motion-triggered cameras are now proposed

⁵¹ Including western snowy plover, California least tern, California red legged frog, monarch butterfly, pallid bat, and western red bat

of hatched chicks and fledglings), nest/colony abandonment, injury, or mortality to eggs or chicks.

As mentioned above, according to that 2025 report (which primarily analyzed data from 2011 through 2024), during years with higher numbers of launch events during the breeding season, the populations of western snowy plovers at VSFB moved away from southern beaches to northern beaches. This could be because southern beaches are closer to SLC-4 where SpaceX launch activities occur, with plovers moving towards northern beaches in order to reduce their exposure to engine noise and overpressure. The report concludes that there were no significant differences in western snowy plover hatch rate or fledge rate. The report identifies several limitations with the approach, namely, that as a retrospective regression analysis, the report is useful in identifying possible relationships, but cannot be used to explicitly assign cause and effect. Additionally, refinements to the report could identify a greater number of meaningful covariates and thus increase the ability to detect a true relationship. Lastly, there may be a lag time for western snowy plover responses to exposure given breeding site fidelity by individual birds or the cumulative effects of exposure.

While the report has limitations and cannot explicitly determine cause and effect, it does provide some indication that western snowy plovers may be reacting to launch activities and relocating to other beaches to avoid rocket noise disturbance. This information is helpful in allowing the Commission to better understand what potential effects launch activities could have on western snowy plover, but more significantly it speaks to the need to slow or halt the increase in launch cadence so monitoring approaches and data can be more fully refined and analyzed, instead of further increasing the launch cadence as proposed in this CD. The report also demonstrates the value of such types of analysis, which the Commission finds are also necessary for the other species described in this section.

The short 18-month interval between the Commission's review of DAF's consistency determination for 36 launches, then 50 launches, and now 100 launches has created a data-lag and prevented monitoring efforts from occurring sufficiently. As discussed in this report, key monitoring plans are still being developed for the 36 annual launch level and have not even begun to be implemented yet, leaving data uncollected, unanalyzed and unavailable for the Commission to consider in its evaluation of DAF's determination of the project's consistency with the CCMP. The plan to monitor ESHAs lacks substance and specificity. Many details have yet to be fully developed and provided regarding the manner in which DAF will conduct the monitoring and how the data will be analyzed and reported. As such, it is too early to know if the monitoring programs will be designed and implemented in a manner sufficient to accurately identify and quantify adverse impacts if they are occurring. Failure of the monitoring programs to be designed and implemented robustly brings with it a risk of "false negative" conclusions – those that determine adverse impacts are not occurring, not because they are absent, but because the monitoring is not carried out with the frequency and intensity required to record them. Also, as discussed in Section IV.A, there is still a lack of information related to engine noise and sonic booms, including information about how modeling could be improved to better understand potential noise generated from Falcon Heavy

rockets, which have not been launched or landed at VSFB previously, and their potential to adversely affect ESHAs.

The proposed increase in launch frequency to up to 100 per year continues a rapid ramp-up that exceeds DAF's ability to effectively monitor for adverse impacts on coastal resources. Prior to 2022, VSFB supported an average of 4.3 launches per year. During 2022, a total of 13 Falcon 9 missions were performed on VSFB, increasing to 28 launches in 2023, 46 launches in 2024 (although in total, including other rockets, there were 51 launches⁵² from VSFB in 2024) and 33 so far in 2025. It has been only twelve months since the Commission conditionally concurred with DAF's request to increase the launch cadence from six to 36 per year. In that time, the Commission has had to review a request for SpaceX to increase its launch cadence to up to 50 times per year and then 100 times per year without the benefit of adequate monitoring data from the 36-launch cadence. Even if the submittals from DAF for monitoring of sensitive species and minimization of impacts from sonic booms were sufficient, twelve months is not enough time for the monitoring programs to collect the data and perform the necessary statistical analysis to determine whether there have been any adverse effects, including changes in population trends, in response to the lower 36 launch per year cadence. In short, the increase to 100 SpaceX launches per year is occurring well before there is sufficient data to determine whether even a 36 launch per year cadence is having adverse effects or if the protective measures established through the Commission's conditional concurrence are successful.

Specific instances of the lack of information described above related to Engine Noise and On-Base Sonic Booms are summarized below. These are necessary to assess consistency with the ESHA policies of the CCMP, specifically Section 30240.

- An analysis of consistency with CCMP Section 30240(a) and for significant disruption of habitat values
- The terms and conditions and reasonable and prudent measures for the avoidance and minimization of adverse impacts to California least tern, western snowy plover, and California red-legged frog, to be identified as part of DAF's ongoing Section 7 consultation with USFWS and the resultant Biological Opinion. These yet-to-be developed measures are relied on in DAF's CD as a means of ensuring the project's potential adverse impacts to sensitive species and habitats are addressed.
- Information about whether DAF would monitor on-base pallid bat and western red bat, monarch butterfly, and southwestern pond turtle populations in a manner sufficient to assess potential changes in habitat use patterns and population levels
- A comprehensive analysis of monitoring data available at this time for the species described above that includes multivariate statistical analyses of the

⁵² <https://www.vandenberg.spaceforce.mil/news/article-display/article/4034711/vsfb-achieves-historic-milestone-with-51-launches-in-2024/>

changes in population trends⁵³ using: (a) relevant historical population data; (b) frequency of launches and on-base boost-back landings over different time scales; (c) seasonality of launches and sensitive times of year for respective species; (d) geospatial variability; (e) off-base reference site data; (f) climatic and oceanographic patterns (e.g. El Niño, Pacific Decadal Oscillation, storms, ocean temperature); (g) acoustic monitoring data; (h) and patterns of other variables including (as relevant to the respective species), but not limited to, , breeding rates, beach width, behavior during launches, and forage base or food web trends.

- An analysis of how many years (and/or number of surveys events) of long-term monitoring (including surveys and bioacoustics data collection) would be required to gather enough data to provide statistically significant results about whether SpaceX launch activities are adversely affecting habitat for western snowy plover, California least tern, or California red-legged frog, in the launch and landing noise impact areas, and what reference information would be necessary for that analysis.
- Long-term monitoring data collected over time at the 36 launch per year frequency previously concurred with by the Commission for each of the species of concern to determine with statistical confidence if adverse effects are occurring, even at this lower launch cadence, to species and their habitats, as measured in terms of population sizes, breeding success, habitat use patterns, and other relevant metrics.
- More detailed information about why landscape-level camera monitoring for western snowy plover and California least tern is proposed to be discontinued.
- The other lack of information points described above and in Section IV.A related to engine noise and sonic booms (including information about how modeling could be improved)

All of this uncertainty could mean that monitoring of ESHAs is not effectively recording and analyzing potential adverse impacts to ESHA. Further, without monitoring data and the actual set of environmental protection measures to be proposed (as to be required by USFWS) supporting and corroborating DAF's conclusions that launch activities have not adversely affected ESHAs, the Commission does not have sufficient information to determine if the proposed project would be consistent with the ESHA policies of the CCMP, specifically Section 30240.

Off-Base Sonic Booms

Section IV.A, above, describes the off-base sonic booms generated by launches, and the sudden noises and overpressures associated with them, have the potential to adversely affect a significant distribution of ESHAs and park and recreational land across the northern Channel Islands and along the mainland coasts of Santa Barbara, Ventura and Los Angeles Counties. DAF's modeling suggests rocket launches could

⁵³ Relevant population trends to analyze include, but are not limited to, population sizes and locations, and for western snowy plovers and least terns, rates of breeding success (including number of hatched chicks and fledglings), nest/colony abandonment, injury, or mortality to eggs or chicks.

create sonic booms in the range above five pounds per square foot (psf) at the northern Channel Islands, and over three psf along the off-base mainland areas of Santa Barbara, Ventura, and Los Angeles Counties with a highest predicted level of almost 4 psf (**Exhibits 2 and 5c**). The CD states that a 4.4 psf sonic boom was detected near Santa Barbara during one Falcon 9 mission but notes that is expected to occur only rarely.

As with on-base launch noise events and sonic booms, the sporadic, short-duration sonic booms occurring along certain launch trajectories represent a disruption to the aural and barometric (air pressure) conditions within a wide range of rare and/or sensitive habitat areas in the region, and have the potential to adversely affect both habitat values and the species that depend on them. The extent to which sonic booms could significantly degrade wildlife habitat would be dependent on each species' individual sensitivity and the frequency and magnitude of the sonic booms. Given the widespread presence of sensitive species and ESHAs in off-base coastal areas (including those shown in the figures for eastern Santa Barbara, Ventura, and Los Angeles Counties of **Exhibit 10**) and the uncertainties in the extent and severity of regional effects of sonic booms from launches, the proposed project raises concerns that sound and pressure waves generated by sonic booms (especially from strong ones) could result in the degradation and significant disruption of ESHAs over a broad area.

DAF states the following in its consistency review in the CD for Section 30240(b), regarding ESHAs off-base:

[...] multiple federally listed species protected under the ESA, potential habitat that supports these listed species, and several state special status species occur within the Action Area in the vicinity of SLC-4 and SLC-6 at VSFB, southeastern Santa Barbara County, Ventura County, northwestern Los Angeles County, and on the NCI that could experience impacts due to launch and landing. Pursuant to Section 7 of the ESA, DAF prepared a Biological Assessment for the USFWS (Appendix D) and will comply with the terms and conditions of the resultant BO.

This makes clear that DAF's focus is limited to Endangered Species Act compliance rather than CZMA compliance through a meaningful assessment of relevant CCMP policies and efforts to determine and ensure the proposed project's consistency with them. As further evidence of this approach, its CD does not include acknowledgement or analysis of the CCMP's primary ESHA policy, Section 30240.

Lack of Information Regarding Off-Base Sonic Boom Impacts

As discussed above, the CD does not acknowledge Section 30240(a), and does not provide sufficient information, analysis, monitoring plans and protective measures for the Commission to determine whether or how the proposed project would protect ESHAs against any significant disruption of habitat values, despite the fact that there

are numerous ESHAs within the Coastal Zone off-base that would be subject to frequent and severe sonic booms from the proposed rocket launches.

The CD's environmental protection measures (EPMs) for sensitive terrestrial species (**Exhibit 14**) only reference the final terms and conditions and reasonable and prudent measures that will be developed and specified in the USFWS BO, which is still in preparation and has not been included with the CD. These EPMs would also be relied on for off-base sonic booms from launches that may impact sensitive species on the Northern Channel Islands and eastern Santa Barbara County, Ventura County, and Los Angeles County. Until DAF provides these EPMs to the Commission, the Commission cannot evaluate their effectiveness and understand the proposed project's reasonably foreseeable effects on coastal resources.

While recent acoustic monitoring and modeling information provided by DAF has helped to better characterize the sonic booms resulting from Falcon 9 launches under certain conditions, by DAF's own admission, any differences in meteorological conditions along the coast can cause the magnitude and spatial expression of a sonic boom to deviate from the results predicted in the modeling, often to a significant degree. DAF has not determined a way to accurately predict sonic booms.

To address this, the August 8, 2024, staff report ([Appendix A](#)) for Commission's conditional concurrence with CD-0003-24 includes the full text of Conditions 2 and 3. Condition 2 (Off-Base Sonic Boom Minimization Measures) of CD-0003-24 called for DAF to take steps to minimize the spatial extent and magnitude of sonic booms from SpaceX launches through development of a Sonic Boom Minimization Plan that would include measures for evaluating modeling for specific atmospheric conditions to anticipate sonic boom effects on the Northern Channel Islands and off-base areas of the mainland coast of Santa Barbara, Ventura, and Los Angeles Counties, and measures for making decisions on launch time and trajectory based on an analysis to minimize the spatial extent and severity of sonic booms experienced in those off-base areas.

Condition 3 (Off-Base Acoustic and Biological Monitoring) called for the development and implementation of a biological monitoring program to evaluate sonic boom effects on coastal biological resources if those minimization measures would not result in avoidance of sonic boom effects, including (a) monitoring that quantifies species response to sonic booms, including in Environmentally Sensitive Habitat Areas (ESHAs), including dune ESHAs and significant bird breeding, nesting, foraging, or roosting sites, which could be affected by sonic booms; and (b) acoustic monitoring at those sites during launches to measure received sonic boom overpressure levels.

Based on the inadequacies of DAF's biological monitoring programs for off-base ESHAs provided in its CD for an increase to 36 Falcon 9 launches per year (as discussed in [Appendix E](#) and summarized above) and concerns about the accuracy of DAF's assumption of no effects to ESHAs and parks and recreation areas as a result of sonic booms, the Commission included Conditions 2 and 3 in its conditional concurrence for CD-0003-24. As discussed in [Appendix C](#), DAF agreed to some commitments to

address those conditions following that hearing and carried them through into their proposed increase for 50 launches per year. However, for this CD submittal for a further expansion to 100 launches per year that also includes use of a new launch facility and the Falcon Heavy rocket, DAF is not integrating those earlier commitments. The CD does not provide any specific information to address what measures DAF would propose to take to avoid and minimize sonic boom impacts to ESHAs on the northern Channel Islands or off-base mainland areas, despite the fact that their modeling indicates that more westerly trajectories could avoid those impacts (e.g. the first two trajectories shown in **Exhibit 5c**). As described above in [Appendix C](#), in a July 23, 2025, response to Commission staff's inquiries about those previous commitments, DAF referenced its memo to the Working Group dated June 12, 2025 (**Exhibit 8**). While that memo describes DAF's initiation of a study to improve the understanding of the sonic boom effects off-base and briefed the Working Group on initial efforts, it does not include any detailed procedures to be implemented for minimizing adverse impacts from sonic booms related to potential ESHA impacts. Commission staff also requested information specific to those conditions from DAF on June 27, 2025, and updates related to use of SLC-6 and Falcon Heavy rockets. In response, DAF simply stated: "This update will be provided to the Interagency Working Group in 26 August 2025 meeting". That meeting is scheduled for after the Commission must act on this CD according to the review deadline established by DAF.

Figure C.0-44 is the only figure in **Exhibit 10** that shows modeling for sonic boom overpressure levels over the northern Channel Islands. It shows designated western snowy plover critical habitat on Santa Rosa Island, but only provides a single model run for a Falcon 9 rocket without information about rocket trajectory or atmospheric conditions (or modeling for Falcon Heavy rockets). However, this single figure indicates that snowy plover habitat on Santa Rosa island may experience at least 5 psf during certain conditions for Falcon 9 rockets. **Exhibit 5c** (May 2025 Draft Environmental Impact Statement, "DEIS") also shows a single sonic boom model run for a Falcon Heavy launch at SLC-6, but DAF has not provided information about how the model inputs are developed (or modified) between Falcon 9 and Falcon Heavy rockets, as discussed above in Section IV.A. Exhibits 4b and 4c of the revised findings report for the February 6, 2025, hearing for CD-0007-24 ([Appendix A](#)) showed modeled sonic boom footprints, broken into several overpressure ranges and trajectories, over the Pacific Ocean and the northern Channel Islands.

Those figures make it clear the degree to which the modeled sonic boom magnitudes and footprints depend on atmospheric conditions and trajectories, but also indicate that more western trajectories could avoid impacts to western snowy plover critical habitat areas from sonic booms from launches. Therefore, the lack of information points described above in Section IV.A related to sonic booms (including information about how impacts could be minimized and how modeling could be improved) also apply here and are necessary in the assessment of the project's potential to significantly disrupt or degrade habitat values on the northern Channel Islands, as well as for numerous species in eastern Santa Barbara, Ventura, and Los Angeles Counties.

Specific instances of the lack of information described above related to Off-Base Sonic Booms are summarized below. This information is necessary to assess consistency with the ESHA policies of the CCMP, specifically Section 30240.

- An analysis of the project's consistency with Section 30240(a), and in particular, how it would protect off-site ESHAs against any significant disruption of habitat values.
- The terms and conditions and reasonable and prudent measures for the avoidance and minimization of adverse impacts to California least tern, western snowy plover, and California red-legged frog, to be identified as part of DAF's ongoing Section 7 consultation with USFWS and the resultant Biological Opinion. These yet-to-be developed measures are relied on in DAF's CD as a means of addressing potential adverse impacts to sensitive species and habitats.
- A sonic boom minimization plan for limiting the spatial extent and severity (in terms of overpressure levels) of sonic booms caused by launches to limit effects on the Northern Channel Islands and off-base areas of the mainland coast of Santa Barbara, Ventura, and Los Angeles Counties
- Information about acoustic and biological monitoring for affected coastal areas outside of VSFB if implementation of sonic boom minimization measures do not result in avoidance of sonic boom effects on the Northern Channel Islands and off-base areas of the coastal zone in mainland Santa Barbara, Ventura, and Los Angeles Counties
- The other lack of information points described above and in Section IV.A related to sonic booms (including information about how impacts could be minimized and how modeling could be improved)

While acknowledging that DAF has initiated a study to improve the understanding of the sonic boom effects off-base and briefed the Working Group on initial efforts, DAF to date has not provided any specific or detailed procedures to be implemented for minimizing adverse impacts to ESHAs from sonic booms; as a result, there is no information available as part of this CD for the Commission to analyze regarding the efficacy of sonic boom minimization measures consistent with Section 30240. DAF has not provided the information and the Commission has not been able to evaluate the extent of project related impacts or the likelihood and magnitude of benefits that would be provided through implementation of adequate monitoring.

Artificial Night Lighting

As discussed in more detail in the August 8, 2024, staff report ([Appendix A](#)) for the Commission's conditional concurrence with CD-0003-24, artificial night lighting associated with the proposed project has the potential to adversely affect ESHAs and associated species occurring at VSFB (including birds, bats, and California red-legged frog); that detailed discussion is incorporated by reference herein as though fully described in this report. While that report was limited to operations at SLC-4, the potential impacts raised also apply to the proposed redevelopment of and use of facilities at SLC-6.

The increased frequency of launches represents a novel disturbance to the habitats and species of VSFB and there currently is not sufficient data to understand how species within the area could be reacting to the associated artificial night lighting. USFWS recently started investigating the increase in artificial night lighting from launch activities at VSFB, including the SpaceX launches proposed in the subject CD, and has been coordinating with DAF. DAF is working with USFWS on measures to minimize the potential adverse impacts from artificial night lighting, including development of a lighting management plan. The USFWS 2024 BO also included new terms and conditions intended to enhance the impact minimization measures to be included in the lighting management plan.

DAF had clarified in correspondence dated June 28, 2024, that the type of artificial night lighting required at SLC-4E is operational and safety lighting to support launch operations, and that at SLC-4W there is safety lighting around the support building. The lighting is used when necessitated by operational safety, with a duration that varies with the type of operation. DAF stated that a total elimination of exterior lighting at SLC-4 is not possible due to safety, security, and mission critical operational requirements. They also communicated that the intensity of artificial night lighting and best management practices to reduce lighting would be addressed in a Lighting Management Plan being prepared for SLC-4.

While has DAF also acknowledged that artificial night lighting can lead to skyglow (a phenomenon well-documented in urban environments), light trespass, and glare, DAF previously communicated its position to Commission staff (prior to the August 2024 Commission hearing for CD-0003-24) that light emissions during a rocket launch are temporary, that the beaches and general landscape at VSFB are generally dark compared to other beaches and landscapes in central and southern California, and (citing the UCLA study referenced above) that no adverse effects to species in the coastal zone are expected due to artificial night lighting. Nonetheless, given the paucity of data on the effects of artificial night lighting associated with rocket launches at VSFB on sensitive species and ESHAs, DAF has made commitments to preparing lighting management plan.

Lack of Information

As discussed in [Appendix C](#), to ensure consistency with Sections 30240 of the CCMP, DAF has committed to preparing a lighting management plan for submittal to USFWS, and to providing the Commission with a copy of the approved management plan. Implementation of the lighting management plan was initially required pursuant to Condition 4 of CD-0003-24. DAF confirmed its acceptance of that condition for that project and also committed to implementing the lighting management plan as part of the current CD for 50 launches per year. The light management plan for the SpaceX launch complex, if prepared in accordance with prior commitments, including from DAF's outlined plan from September 2024 and the USFWS 2024 Biological Opinion (for SLC-4 operations), is expected to include best management practices to minimize the effects of night lighting, including light shielding, luminaire color and temperature considerations, avoidance of lights facing the beach where practicable, metrics for when lights are needed for operations, and monitoring of lighting on Surf Beach (where there

is an annual western snowy plover population) using sky-quality camera(s) to assess any observable changes in lighting during night launches. Based on DAF's communication from July 23, 2025, discussed above, two separate lighting plans would be provided for SLC-4 and SLC-6, respectively.

While the BA that DAF submitted to USFWS states that DAF, as a general conservation measure for the proposed project, would develop a lighting management plan for SLC-6 and provide a copy of the plan to USFWS, that plan was not provided as part of the CD submittal. Although it is expected that lighting management will also be addressed through DAF's Section 7 consultation and current consultation with the USFWS and the resultant Biological Opinion (BO), as of the date of this staff report, the updated BO has not yet been issued. While DAF is still communicating that they are committed to developing and implementing a Lighting Management Plan, the details and scope of this plan remain unclear at the time of the publication of this staff report. As such, the Commission does not have sufficient information about lighting management proposed to be implemented to determine if the proposed project would be consistent with the ESHA policies of the CCMP, specifically Section 30240.

Redeveloped SLC-6 Complex

Vegetation Communities at SLC-6

The proposed construction activities at SLC-6 may have adverse impacts on vegetation communities that rise to the level of ESHA because they themselves are rare or because they support rare plant populations. DAF conducted biological field surveys of SLC-6 in October and November 2023 (via meandering surveys) for areas expected to be disturbed by the proposed project. Vegetation alliances were classified and mapped following the Manual of California Vegetation, Second Edition⁵⁴. One rare vegetation community, giant wild rye grassland (*Leymus condensatus* Herbaceous Alliance), was identified at SLC-6. The other mapped vegetation communities in the project footprint include coastal sage scrub, grassland, and chaparral. CDFW California Natural Diversity Database (CNDDDB) queries identified the presence of nine rare plant species within the project area. The nine species include one Federally endangered annual species (Gaviota tarplant, *Deinandra increscens* ssp. *Villosa*), five annual species identified by the State as rare (Crisp Monardella, *Monardella undulata* ssp. *Crispa*; San Luis Obispo Monardella, *Monardella undulata* ssp. *Undulata*; Black-flowered Figwort, *Scrophularia atrata*; and Santa Ynez groundstar, *Ancistrocarphus keilii*) and three perennial species identified by the State as rare (Sand Mesa manzanita, *Arctostaphylos rudis*; La Purisima manzanita, *Arctostaphylos purissima*; Santa Barbara ceanothus, *Ceanothus impressus* var. *Impressus*) (**Table 4**).

Six of the nine species are generally limited to San Luis Obispo and Santa Barbara counties, from Avila Beach to Gaviota. The remaining three are restricted to the VSFB, Lompoc, and/or the Santa Ynez River watershed and not elsewhere within the coastal zone (**Table 4**). These rare plants are considered "narrow endemics" because they have evolved adaptations to a very limited range of environmental variables (e.g., soil

⁵⁴ Manual of California Vegetation, Second Edition online. version: <https://vegetation.cnps.org/>

type, temperature, moisture, etc.) that restrict their spatial distribution. For *Monardella undulata*, the unique environmental conditions converging at the VSFB area have resulted in three subspecies in a very narrow geographic range. DAF asserts that the rare Gaviota tarplant does not occur at SLC-6 and instead is limited to the south at Point Conception to Gaviota and at the northern part of VSFB (Lion's Head). However, CNDDDB queries identify Gaviota tarplant within the project footprint (records dated from 2011) and because the tarplant morphological analysis that DAF completed was done after the peak blooming period, it may not have been identified during surveys.

Table 4. Rare Plants Potentially in the SLC-6 Project Footprint

Plant or Vegetation Alliance	Rarity	Range
Gaviota tarplant, <i>Deinandra increscens ssp. villosa</i>	Federal ESA Endangered, State ESA Endangered, NatureServe ranking G3, S2, CA Rare Plant Rank 1B.1	In coastal zone from Dangermond Preserve to Gaviota
Crisp Monardella, <i>Monardella undulata ssp. crispa</i>	NatureServe ranking G3, S2, CA Rare Plant Rank 1B.2	In coastal zone from approximately the Pismo Beach area to Point Arguello
San Luis Obispo Monardella, <i>Monardella undulata ssp. undulata</i>	NatureServe ranking G3, S2, CA Rare Plant Rank 1B.2	In coastal zone from approximately the Pismo Beach area to Point Arguello
Black-flowered Figwort, <i>Scrophularia atrata</i>	NatureServe ranking G2, S2, CA Rare Plant Rank 1B.2	In coastal zone from Avila Beach to Santa Barbara
Sand Mesa manzanita, <i>Arctostaphylos rudis</i>	NatureServe ranking G2, S2, CA Rare Plant Rank 1B.1	In coastal zone from Point Sal to Hollister Ranch
La Purisima manzanita, <i>Arctostaphylos purissima</i>	NatureServe ranking G2, S2, CA Rare Plant Rank 1B.1	In coastal zone from Point Sal to Hollister Ranch
Santa Ynez groundstar, <i>Ancistrocarphus keilii</i>	NatureServe ranking G1, S1, CA Rare Plant Rank 1B.1	Has not been located within the coastal zone outside of VSFB. Its most likely limited to the Santa Ynez drainage, which is the coastal zone boundary SE of VSFB/north of Hollister Ranch region.
Santa Barbara ceanothus, <i>Ceanothus impressus var. impressus</i>	NatureServe ranking G3, S3, CA Rare Plant Rank 1B.2	Within the coastal zone, it appears limited to VSFB
Point Arguello Monardella, <i>Monardella undulata ssp. Arguelloensis</i>	NatureServe ranking G1, S1, CA Rare Plant Rank 1B.1	Within the coastal zone, it appears limited to VSFB

Spillover

In situations where rare, threatened, or endangered vegetation communities and vegetation communities supporting rare, threatened or endangered plants or animals, are subject to adverse effects on Federal land or outside the coastal zone, such effects can constitute effects on coastal resources under the CZMA because they threaten the viability and future existence of rare vegetation communities and populations of rare species within the coastal zone. For such vegetation communities and species, that are

easily disturbed and degraded by human activities and development, and that have extremely limited coastal ranges, *any* loss or damage – even if located outside the coastal zone – can have adverse coastal zone impacts. For example, fragmentation and clearance for development and roads can eliminate rare vegetation communities and species, facilitate the introduction of non-native plant species, and adversely impact source seed dispersal via wildlife transport between and amongst vegetation communities on VSFB and the coastal zone. Ultimately this can diminish the overall population size, genetic diversity, and viability of vegetation communities on the coast, and make the remaining communities more vulnerable to further degradation or extinction through disturbance, disease, and the introduction of non-native invasive species such as iceplant, veldt grass, and pampas grass. In summary, the historical, ongoing, and cumulative impacts to rare vegetation communities and species have already been substantial, and any further loss of rare vegetation communities and species reduce their chances of persistence over the long term.

The SLC-6 project footprint is near the center of the population ranges for several of the rare plants listed in **Table 4**. Source–sink population dynamics is a theoretical model used by population geneticists and ecologists to describe how variations in genetic diversity and habitat quality may affect the persistence or loss of populations (Avisé 1994). Any loss of genetic diversity such as that contained in source populations puts surrounding sink populations at increased vulnerability to threats such as disease, pathogens, fire, and drought. These rare plants, by virtue of their small population sizes and localized geography, have limited genetic diversity to begin with, so any loss or damage is a significant threat to its existence, including within the coastal zone.

Potential Impacts

Development, construction, and vegetation management activities at SLC-6 may reduce rare vegetation communities and rare plant habitats. Vegetation would be cleared to construct the transport road, landing zones, nitrogen line, modification to the HIF, and fuel breaks. Also, the project may require a new hangar and construction of the new hangar would require additional vegetation clearance. Recurring vegetation management will be conducted in the landing zones and fuel break for a total of approximately 16 acres. Approximately 0.3 acres of giant wild rye grassland alliance would be impacted.

Lack of Information

DAF conducted biological field surveys of SLC-6 in October and November 2023 (via meandering surveys) for areas expected to be disturbed by the proposed project. No datasheets or species lists from these surveys were provided, nor any description of the methods employed or the physical conditions at the time (e.g., line-intercept transects, quadrats, whether it was a typical or abnormal water year). No rare-plant protocol level surveys were conducted during the appropriate season, and surveys in October and November are unlikely to detect or may result in misidentification of native annual species and drought-deciduous perennials in coastal sage scrub, grassland, or chaparral. Therefore, the true extent of the vegetation alliances likely is not accurately mapped and any rare annual plants would likely not have been detected because they

may have already set seed and died or were otherwise unidentifiable. Without this information, a determination cannot be made regarding the potential presence of ESHA within proposed construction areas.

In the May 2025 Draft Environmental Impact Statement (DEIS), DAF identified several alternatives to the proposed landing pads at SLC-6. These alternatives included construction of the landing pads within the fence line of SLC-6 (as opposed to the proposed location), north of Delphy Road, Building 390, within the parking lot at SLC-6, construction of an additional landing zone at SLC-4, and other unspecified potential locations at VSFB that are currently undeveloped. Some of these alternative locations, such as within the fence line of SLC-6, could create potential operational risks and safety concerns due to the proximal location of critical structures. However, other potential alternatives are dismissed for various reasons, including because construction and operation of the landing zone at these locations could require temporary closure of Coast Road and other roads within VSFB which would temporarily block access to parts of the base. Commission staff asked⁵⁵ DAF whether these alternative landing locations could avoid or minimize impacts to coastal resources, including sensitive habitats, and if there are any measures that could be implemented to avoid or minimize potential impacts to movement along roads at VSFB from these alternative landing locations. DAF's response⁵⁶ did not address these questions from Commission staff.

Specific instances of the lack of information described above related to vegetation communities at SLC-6 are summarized below. This information is necessary to determine if ESHA is present within proposed project construction areas and to assess consistency with the ESHA policies of the CCMP, specifically Section 30240.

- Information about: (a) datasheets or species lists from the biological field surveys conducted at SLC-6; (b) description of the methods employed; (c) description of the physical conditions at the time.
- Rare-plant protocol level surveys conducted during the appropriate season.
- Clarification of the project description: If the project is proposing to refurbish the existing HIF with an annex at the south side, why do the vegetation maps show a disturbance area north of the HIF?
- Information about alternative locations for the proposed landing pads including: (a) analysis of the potential adverse impacts to ESHAs from development of landing pads at the alternative locations compared to the proposed location for the landing pads; (b) why and how much alternative landing pad locations would impact base operations, other launches, and access along Coast Road; (c) any measures that could be implemented at alternative landing pad locations that would minimize impacts to base operations.

⁵⁵ In information requests sent to DAF on June 27, 2025.

⁵⁶ Dated July 23, 2025.

Conclusion

The Commission finds that the proposed project has the potential to adversely impact ESHAs both on-base and off-base. However, as discussed above, due to a lack of sufficient information regarding the efficacy and implementation of DAF's plans to monitor the increased launch cadence's impact on ESHAs and DAF's plans to avoid, minimize, monitor and mitigate for potential adverse impacts from sonic booms. The Commission therefore objects to DAF's consistency determination, based on a lack of adequate information to determine the project's consistency with the ESHA policies of the CCMP (Sections 30240 of the Coastal Act).

E. PUBLIC ACCESS AND RECREATION

Coastal Act Section 30210 of the Coastal Act states:

In carrying out the requirement of Section 4 of Article X of the California Constitution, maximum access, which shall be conspicuously posted, and recreational opportunities shall be provided for all the people consistent with public safety needs and the need to protect public rights, rights of private property owners, and natural resource areas from overuse.

Section 30213 of the Coastal Act states (in relevant part):

Lower cost visitor and recreational facilities shall be protected, encouraged, and, where feasible, provided. Developments providing public recreational opportunities are preferred...

Section 30220 of the Coastal Act states (in relevant part):

Coastal areas suited for water-oriented recreational activities that cannot readily be provided at inland water areas shall be protected for such uses.

Section 30221 of the Coastal Act states:

Oceanfront land suitable for recreational use shall be protected for recreational use and development unless present and foreseeable future demand for public or commercial recreational activities that could be accommodated on the property is already adequately provided for in the area.

Section 30223 of the Coastal Act states:

Upland areas necessary to support coastal recreational uses shall be reserved for such uses, where feasible.

As of the date of this staff report, there have been a total of 33 SpaceX Falcon 9 rocket launches from SLC-4 in 2025. The subject CD proposes to launch at a pace equivalent to 95 Falcon 9 launches per year from either SLC-4 or SLC-6. In addition, the CD proposes up to five Falcon heavy launches per year from SLC-6. Depending on the

trajectory of these rockets, prevailing atmospheric conditions, potential debris corridors from rocket explosion or catastrophic failure, and modeled public safety risks, closure and evacuation of public areas under the rocket trajectories, as required under Federal Aviation Administration (FAA) regulations and SpaceX's launch license, could be, and has historically been necessary to protect the public from potential hazards. As described in detail in the August 8, 2024, staff report ([Appendix A](#)), past closures and evacuations have had adverse impacts on public coastal access and recreation in northern Santa Barbara County, and at Jalama Beach and the Jalama Beach County Park campground (referred, collectively, as "Jalama"), a regionally-important coastal access point, inconsistent with Chapter 3 policies of the Coastal Act; that detailed description of these past public access and recreation issues is incorporated by reference herein as though fully described in this report.

Due to the limited availability of coastal access and recreation opportunities in northern Santa Barbara County – which only includes three publicly accessible beaches in the approximately 63 miles between Gaviota State Beach and Pt. Sal – and their high levels of use and regional importance, the Commission has long been concerned about any potential adverse effects to public access at these beaches. In prior reviews of coastal and recreational access impacts from space launch activities at VSFB, adverse impacts to public coastal access and recreation have been described in terms of "beach closures." In its concurrence with the Department of the Air Force's (DAF's) Consistency Determination No. CD-049-98, the Commission found that with the addition of minimization measures (such as avoiding high use holidays and summer months), an average of eight and maximum of 14 launches per year and associated temporary beach closures would be consistent with the coastal access and recreation policies of the California Coastal Management Program (CCMP). Although this numeric limit was established in 1998 and prior to the authorization of a wide range of new space launch programs with significantly higher stated levels of launch activity, the DAF adhered to it consistently through 2021. As recently as the April 10, 2023, negative determination for SpaceX's 36 launch per year program (ND-0009-23), DAF proposed an annual limit of 12 beach closures:

Under the Proposed Action, public access to the coastline via Jalama Beach County Park, Ocean Beach County Park, and Surf Beach may be temporarily restricted during launch and landing operations. The length and frequency of temporary closures are mission dependent and determined by SLD 30 Range Safety; however, typical closures for launches from SLC-4E last between 4 to 8 hours. Launches from SLC-4E due to the Proposed Action would not cause an exceedance of 12 closures of Jalama Beach County Park per year. In the past, SLD 30 has restricted access to Ocean Beach County Park and Surf Beach for all launches from SLC-4E. Based on updated modeling and safety considerations, SLD 30 Range Safety and the Security Forces Squadron have determined closures are only required if the first stage of the Falcon 9 launch vehicle will boost back to land at SLC-4W. Thus, closures due to the Proposed Action would be infrequent (up to 12 times per year) and would not substantially diminish the protected activities, features, or attributes of Jalama Beach, Surf Beach, or Ocean Beach County Parks.

However, as the number of launches from VSFB steadily increased in 2022 and 2023 primarily due to SpaceX activities, so did the number of beach closures. Available data indicate that in 2022 a total of 13 SpaceX launches occurred, leading to 18 evacuation notifications to reservation holders and eight evacuation and closure events at Jalama; this number of launches and related beach closures in 2022 exceeded the limits evaluated in the negative determination applicable at the time (ND-0027-15). In 2023, a total of 28 SpaceX launches occurred. Between January and July 2023, these launches required 16 evacuations and closures of Jalama Beach and Jalama Road, exceeding both DAF's committed level of up to 12 closures per year under ND-0009-23 and the historic upper limit of 14 closures per year considered by the Commission in CD-049-98.

Through discussions with Santa Barbara County Parks and Recreation staff, Commission staff also came to understand that launch-related adverse impacts to public access and recreation at Jalama were not limited to the direct effect of closures and evacuations, but also encompassed frequent cancellations (up to 25%) of camping reservations in response to advanced e-mail notifications (provided by the County) of a planned launch and potential evacuation, the chilling effect on visitation of similar notices provided through the County's reservation website, and frequent road closures used to prevent day-users from entering the park during evacuations or to suppress visitation below the 400-person level that would trigger an evacuation and closure event during a launch. Additionally, due to the remote location of Jalama and long driving times for accessing the park, and the long durations (four to eight hours) of launch-related closures, campers and day-users evacuated during launches would lose significant recreational time, and in many cases would abandon their plans. Moreover, the available data indicated that, for a variety of reasons, a single scheduled launch could require multiple evacuations and closures of Jalama.

On December 15, 2023, based on the scope and magnitude of the direct and indirect adverse impacts SpaceX launches were having on coastal access and recreation, the Commission approved a resolution "re-opening" the Executive Director's prior concurrence with the 2023 negative declaration (ND-0009-23) by concluding that the DAF's ND was no longer applicable to the project as described and conducted. In response, on March 7, 2024, DAF submitted a consistency determination (CD-0003-24) reevaluating the effects on coastal access and recreation of SpaceX's 36 launch per year cadence and proposing several remedial actions. This CD was evaluated in the August 8, 2024, staff report ([Appendix A](#)), and ultimately conditionally concurred with by the Commission on August 8, 2024.

As a part of the March 2024 consistency determination, DAF reevaluated its historical, safety-based restrictions during launches at two of the affected beach areas, Ocean Beach County Park and Surf Beach, and determined that evacuations of these locations could be limited to those launches where the first stage of the Falcon 9 launch vehicle would be boosting back to land at SLC-4, which was expected to occur 12 times per year. In combination with other, existing nighttime access restrictions at these beaches, DAF anticipated that evacuations would occur up to 14 times per year, for four to eight hours each, during select launch attempts.

Most significantly, as part of the revised 36 launch per year project, DAF committed to implementing a revised launch schedule that would largely avoid launching during the day, instead launching during the night, to avoid evacuations of Jalama to the extent practicable.⁵⁷ By shifting the launch schedule to avoid daytime hours, when the number of users of Jalama Beach is greatest, DAF indicated that it would be possible to minimize the number of people within the launch hazard area (“Impact Limit Line”) and thus reduce the calculated risk factor that determines the need for evacuations. If scheduling is unable to completely avoid evacuations, DAF committed to ensuring that the total number of evacuations of Jalama within a given year would not exceed 12, consistent with previous Commission approvals for launch programs at VSFB. Additionally, to help offset the adverse impacts to access and recreation at Jalama that have occurred in recent years as a result of the SpaceX launches, DAF committed to four additional measures, to be carried out in coordination with SpaceX:

- Provide high-speed internet terminals at Jalama Beach County Park in order to improve internet coverage there;
- Fund a variable messaging sign for use by Santa Barbara County Parks and Recreation to replace the existing sign at the intersection of Highway One and Jalama Road;
- Operate a shuttle program that, in the event that an evacuation of Jalama is necessary, would evacuate campers from the park to a safe location so that their camps can remain intact. After the launch is complete the shuttles would bring campers back into the park; and
- In coordination with the Lompoc Unified School District (LUSD), fund transportation for all 3rd graders in LUSD to visit Surf Beach/Ocean Park on an annual basis.

As discussed in the August 8, 2024, staff report for CD-0003-24, implementation of these measures is expected to provide meaningful benefits for coastal public access and recreation. More reliable internet would increase the efficiency of County Parks and Recreation in managing its operations and reservation system, reduce congestion and traffic at the beach park entrance, and allow County emergency responders to communicate more effectively. The variable messaging sign at the intersection of Highway One would provide real-time campsite availability information for members of the public before they commit to the 45-minute drive to the beach park, reducing uncertainty and encouraging greater public use of Jalama. The proposed evacuation shuttle service was thought to have the potential to alleviate several issues that currently inconvenience campers when they are forced to abandon their campsites on short notice during launches; for example, the shuttle could help avoid the need to break down camping equipment and would also allow campers to return to the park as soon as possible once the evacuation order is lifted. Finally, the proposed field trip program would provide a new opportunity for coastal and marine resource education that does not currently exist for early primary (grades K – 3) students in the LUSD. The March 2024 CD stated that the proposed program would involve nine schools and more

⁵⁷ However, as discussed in Section IV.D (above), a shift toward nighttime launches could result in new effects on sensitive species and habitats from night-lighting.

than 700 third graders, and provide “structured activities ... focused on environmental stewardship and understanding our coastal resources, particularly the western Snowy Plover.”

Condition 5 of the Commission’s August 2024 conditional concurrence memorialized DAF’s proposed mitigation measures and its further commitment to submit an update on the Public Access and Recreation Enhancement efforts it is pursuing:

5. **Coastal Access and Recreation Enhancement.** Within 30 days of the Commission’s consideration of Consistency Determination No. CD-0003-24, DAF will provide, for Executive Director review and comments, an update on the Coastal Access and Recreation Enhancement efforts it is pursuing. The update will include (1) specific details and schedules for implementation of the commitments DAF has made for the evacuation shuttle, satellite internet and Highway 1 digital signage projects for Jalama Beach County Park and the Lompoc Unified School District third grade beach field trip program; (2) details of measures that SpaceX and DAF will take to ensure that the proposed launch activities will not exceed DAF’s commitment to cause more than 12 annual closures of Jalama Beach; and (3) a minimum notice period, coordinated with the Santa Barbara County Parks and Recreation Department, for any planned evacuations for Jalama Beach. DAF will consider comments provided by the Executive Director in response to the update and strive to address them when possible.

DAF submitted a Coastal Access and Recreation Enhancement Plan for the Executive Director’s review on April 29, 2025 (also included as Appendix B to the CD), providing progress updates on each of the elements contained in Condition 5. The plan indicates that, in cooperation with DAF and Santa Barbara County, SpaceX has provided increased Starlink internet coverage at Jalama through the addition of a second high power satellite dish, that the system is fully operational, and that the initial Starlink subscription would be renewed after two years. DAF and SpaceX are working with Santa Barbara County Parks & Recreation to develop the project scope and timeline for installation of a new variable message, digital welcome sign at the intersection of Jalama Road and Highway 1; DAF has committed to providing additional updates as this project progresses.

Additionally, the submitted plan indicates that DAF has coordinated with the LUSD to develop a third-grade field trip and natural resources education program that would provide for nine field trips per year (approximately 100 students per trip) to Surf Beach/Ocean Park, to be implemented over the next two school years. Subsequent email correspondence from DAF to Commission staff, dated September 17, 2024, amended the duration of the field trip program to “continue through the life of this CD.” As no end date for the 100 launch per year project is identified in the CD, the Commission assumes that these efforts would continue in perpetuity.

DAF reports that Santa Barbara County Parks & Recreation has declined SpaceX’s offer to develop complimentary shuttle service to assist overnight campers in the event

that launch-related evacuations are necessary, citing concerns that the shuttle service would simply complicate existing evacuation procedures. DAF indicates that this commitment still holds, and that SpaceX would provide the evacuation shuttle service if in the future the County determines it would help reduce access or reservation concerns.

Finally, the Plan reaffirms DAF's commitment to limiting Jalama Beach evacuations, related to all activities occurring on VSFB, to 12 per year. DAF has committed to providing at least seven days' notice of any launch requiring a closure at Jalama and to limit the duration of evacuations to the minimum necessary to assure public safety -- typically up to six hours, but not to exceed 48 hours.

Ocean Beach and Surf Beach are also important access and recreation resources that could be potentially adversely affected by launches and landings. Previous SpaceX projects at VSFB committed to limiting closures of Ocean Beach and Surf Beach to no more than 12 times per year, similar to Jalama Beach. For the proposed project, the additional five launches and landings being proposed for Falcon Heavy rockets would require an additional five closures of Ocean Beach and Surf Beach, for a total of up to 17 closures per year at these locations.

In the CD submittal, DAF describes access to Ocean Beach and Surf Beach, and the additional closures as follows:

The DAF voluntarily offers public access to Surf Beach year-round. During the western snowy plover season, 1 March through 30 September, beach access is available from 8:00 AM to 6:00 PM and restricted during evening hours from 6:00 PM to 8:00 AM. Access to the coastline from Ocean Beach Park is available via a DAF trail on federal property connecting this area to the coastal access available at nearby Surf Beach. Ocean Beach Park is open from 8:00 AM to dusk year-round. A portion of launches that boost back to land at SLC-4W and the new landing zones at SLC-6 would occur at night when these two locations are already closed. Accordingly, the Proposed Action would only restrict public access to Ocean Beach Park and Surf Beach during daytime launches with boost back to SLC-4W or SLC-6.

DAF previously committed to no more than 12 beach closures per year under ND-0009-23 and the Commission previously determined an upper limit of 14 closures per year (CD-049-98) was consistent with the Coastal Act. Considering the existing available access at Surf Beach and Ocean Beach (8:00 AM to 6:00 PM during plover nesting season and 8:00 AM to dusk year round, respectively) the potential for five Falcon Heavy launches and five additional beach closures to impact access at these locations is not significant. This is because unlike Jalama, where the public enjoys overnight camping and overnight beach activities and may need to be evacuated during the night for a launch, nighttime access at Surf Beach and Ocean Beach is mostly not available so any nighttime launches would have minimal or no impact on access and recreation at these locations.

In a letter to Commission staff dated September 17, 2024, DAF committed to implementing the protective measures agreed to for the 36 launch CD (CD-0003-24). Their Coastal Access and Recreation Enhancement Plan and the CD include the limitation on evacuations of Jalama to 12 per year and the additional public access and recreation enhancements described above.

Coastal Act Section 30213 requires that lower cost visitor and recreational facilities be protected. As described previously, SpaceX launching activities were adversely affecting access and recreation at Jalama due to excessive evacuations and closures. The modified launch program previously proposed by DAF, and incorporated into the subject CD, would result in most launches occurring at night, lowering the safety risk factors and thereby reducing the number of necessary evacuations to levels that the Commission has historically concurred with. Additionally, Coastal Act Sections 30210, 30220, 30221 and 30223 require maximum access and recreational opportunities within coastal areas. The offsets proposed by DAF as part of the subject CD will increase access and recreation at Jalama while the LUSD program will promote coastal access and recreation within the greater area of Northern Santa Barbara County. Additionally, the modified launch program with most launches occurring at night would reduce the potential for the additional five closures from Falcon Heavy launches to adversely impact access and recreation at Surf Beach and Ocean Beach.

Conclusion

Therefore, the Commission finds that, with the DAF's commitments and mitigation measures, the proposed activities would be conducted in a manner that would protect, encourage, and provide coastal access and recreation consistent with Sections 30210, 30213, 30220, 30221, and 30223 of the Coastal Act.

F. COMMERCIAL AND RECREATIONAL FISHING

Section 30234.5 of the Coastal Act states:

The economic, commercial, and recreational importance of fishing activities shall be recognized and protected.

As of the date of this staff report, there have been a total of 33 SpaceX Falcon 9 rocket launches from SLC-4 in 2025. The subject CD proposes to launch at a pace equivalent to 95 launches per year from either SLC-4 or SLC-6. In addition, the CD proposes up to five Falcon heavy launches per year from SLC-6. In the absence of impact avoidance and minimization measures, the proposed increase in launch activity would increase the risk of adverse effects to commercial and recreational fishing.

The potential for conflict between the proposed project and fishing activity arises from the possibility of safety-related restrictions or closures of fishing grounds during rocket launches and reentries. SpaceX launches from VSFb can occur along a broad range of azimuths between 140 and 325 degrees, and for any given mission, the associated maritime hazard area can encompass extensive commercial and recreational fishing

grounds⁵⁸. In the event that SpaceX launch and reentry operations pose an extreme risk to public safety over navigable waters, the United States Coast Guard (USCG) would have the authority to determine whether risk mitigating strategies would need to be implemented, including restricting vessel traffic. USCG would be responsible for issuing a Notice to Mariners (NOTMAR) that would provide vessel operators with the locations of potential hazards as well as dates and times of the hazardous conditions. Previous comments received by the Commission from local fishermen and processors raised concerns that launches from VSFB could require the closure of fishing grounds without compensation to mitigate impacts to fishing and stressed the need for increased communication between launch providers and the commercial fishing industry.

Even with the timely issuance of NOTMARs, there is still potential that the proposed increase in launch cadence could adversely impact the fishing industry. An increased number of launches will necessarily increase the frequency with which maritime hazard areas are defined and NOTMARs issued and would increase the potential for preclusion of fishing (or the perception of preclusion) from certain areas, or during key seasons, times of day or peak fishing periods. An additional concern is that a single launch can be scheduled and scrubbed multiple times before successfully launching, requiring (per federal requirements) the issuance of a new NOTMAR each time a launch is rescheduled. Multiple NOTMARs issued for a single launch could create confusion, increase the difficulty of planning fishing operations, and preclude fishermen from fishing. The Department of the Air Force (DAF) has not committed at this time to ensuring that SpaceX will time its launches to avoid the potential for restrictions or closures of the most important fishing areas or peak fishing times or periods.

In CD-0003-24, DAF stated that it worked closely with National Aeronautics and Space Administration (NASA), the Federal Aviation Administration (FAA), and SpaceX to reduce the potential for impacts to large vessels during launches, that all launches would be scheduled in advance to minimize the interruption of airspace and waterways, and that once a NOTMAR is issued, there is no requirement for vessels to alter their routes or change their navigation speeds. If vessels are within the potentially hazardous area despite the NOTMAR, a scheduled launch would be delayed or altered to avoid potential hazards to vessels. As proof of the effectiveness of its efforts, DAF has stated that no SpaceX launches have needed to be scrubbed or moved due to vessels in the hazard area since 2022.

As a part of the March 2024 CD for the 36 launch per year cadence (CD-0003-24), DAF committed to, in coordination with SpaceX, establishing a communication protocol and regular dialogue with the commercial and recreational fishing industry in this area of the coast, including with fishing associations, fish buyers and processors, harbor masters, and sport fishing companies. Prior to each scheduled launch, the chairperson of these entities would be sent an email which would include the date and time of the hazardous conditions as established in the NOTMAR, and how long the conditions would be in effect. This advance notice is intended to allow fishermen to better understand the

⁵⁸ DAF indicates that the maritime hazard area encompasses a band of up to 21 miles wide along the launch trajectory.

conditions and adjust their operations to help ensure fishermen meet their landing goals while also abiding by the NOTMAR. If these measures do not fully satisfy fishermen, DAF would engage in additional coordination prior to and on the day of scheduled launches. This additional coordination would include updated safety calculations and real-time radio communications. These commitments were memorialized in Condition 7 of the Commission's concurrence:

- 7. Commercial and Recreational Fishing Coordination Plan.** Within 30 days of the Commission's consideration of Consistency Determination No. CD-0003-24, DAF will submit a Commercial and Recreational Fishing Coordination Plan to the Executive Director for review and comments. The Plan will include the development and implementation of a communication protocol, including regular dialogue, developed in coordination with the commercial and recreational fishing industry most likely to be affected by launch and landing activities at Vandenberg Space Force Base as well as an email to local fishermen's associations that include the date and time of the surveillance area, and the vessel hazard area that is also available in the Notice to Mariners, and for how long these will be in effect. DAF shall consider comments provided by the Executive Director and strive to address them, when possible.

On April 29, 2025, DAF submitted its Commercial and Recreational Fishing Coordination Plan for the Executive Director's review (included as Appendix H of the CD). The plan incorporated the key elements outlined in Condition 7, including:

- a communications protocol including a "danger zone hotline", a sign-up system for launch notifications to mariners via email and text messages, and a real-time control center (on marine channels 6 and 16);
- a launch notification distribution list including all Harbor Masters of fishing harbors in the vicinity of VSFB;
- procedures for issuing public notices and NOTMARs;
- a commitment to hold annual town hall meetings in Santa Barbara and San Luis Obispo to provide a platform for direct communication with fishermen; and
- a commitment to measure the effectiveness of communications efforts by collecting feedback from fishermen and Harbor Masters.

In addition to collecting and considering feedback from the commercial and recreational fishing community, DAF has committed to consider, and address where possible, comments from Commission staff for improving its launch notification and communications efforts. In a response to Commission staff dated July 23, 2025, DAF committed to implementing the fishing protective measures agreed to for the 36 launch CD (CD-0003-24) in its implementation of the subject CD, including the measures outlined in the Commercial and Recreational Fishing Coordination Plan. With this plan in place, bolstered by DAF's stated commitment to receiving feedback and working to resolve conflicts as they arise, the proposed launch increases would protect commercial and recreational fishing activities. As such, the Commission finds the proposed project

consistent with the commercial and recreational fishing provisions of the Coastal Act, including Section 30234.5.

G. AIR QUALITY

Coastal Act Section 30253 states (in relevant part):

New development shall do all of the following:

[...]

(c) Be consistent with requirements imposed by an air pollution control district or the State Air Resources Board as to each particular development.

[...]

The proposed project has the potential to produce air pollution emissions through demolition and construction activities at SLC-6, launch and landing activities (including fairing recovery and roll-on roll-off) and static fire tests.

Criteria Pollutants

The exhaust from Falcon 9 and Falcon Heavy launches is fuel-rich and contains high concentrations of carbon monoxide (CO), and subsequent entrainment of ambient air results in complete conversion of CO into carbon dioxide (CO₂) and oxidation of the soot from the exhaust. The rockets would use liquid fuels consisting of rocket grade kerosene (RP-1) and liquid Oxygen and the rocket would use oxidizer-rich staged combustion engines that are expected to produce a limited amount of soot. Also, a small amount of nitrogen monoxide (NO) is formed. Emissions as a result of launches would also be from landings and recovery of the fairing and first stage (if necessary), and from ground operations, support and transport of the launch vehicle components. During demolition and construction at SLC-6, emissions would be released as a result of on-site sources including construction equipment and soil disturbance, as well as off-site sources like trucks hauling away debris and worker vehicle trips.

In the May 2025 Draft Environmental Impact Statement (DEIS) the Department of the Air Force (DAF) stated that previous air quality assessments, including the assessment for the proposed increase to 50 launches per year, were based on overly conservative assumptions for the amount of time that tugboats were operating for landings and recovery. As such, DAF adjusted the assumptions for tugboat operations to be more consistent with expected future operations, while still being conservative.

Air quality in the areas of the project as well as applicable regulatory requirements are described in the DEIS as follows:

The Proposed Action includes activities in the South Central Coast Air Basin (SCCAB) and the South Coast Air Basin (SCAB). Coastal waters within three nautical miles (nm) of the shore are under the same air quality jurisdiction as the

contiguous land areas of the SCCAB. VSFB is located within the SCCAB, which includes San Luis Obispo, Santa Barbara, and Ventura counties. The Santa Barbara County Air Pollution Control District (SBCAPCD) has jurisdiction over Santa Barbara County and the Ventura County Air Pollution Control District (VCAPCD) has jurisdiction over Ventura County. The Proposed Action would also include vessel travel to and from the Port of Long Beach in Los Angeles County. Los Angeles County is located within the SCAB and the South Coast Air Quality Management District (SCAQMD).

Santa Barbara County is in attainment⁵⁹ for all National Ambient Air Quality Standards (NAAQSs). Most of Ventura County is in serious nonattainment for the eight-hour Ozone (O₃) NAAQS including the area where the Proposed Action would take place. Los Angeles County, where portions of the action would take place, is in extreme nonattainment for the eight-hour O₃ NAAQS, maintenance for Carbon Monoxide (CO), nonattainment for Lead (Pb), nonattainment for Particulate Matter (PM)_{2.5}, and maintenance for PM₁₀. Within attainment areas, SpaceX is required to ensure air quality does not significantly deteriorate due to air emissions associated with the Proposed Action. The Proposed Action is required to demonstrate conformity, also known as General Conformity, with the approved State Implementation Plan (SIP) if the net emissions equal or exceed the de minimis emission levels in nonattainment and maintenance areas. The SIP prescribes mitigation measures and timelines necessary to bring ambient concentrations of criteria pollutants below the NAAQS

Tables 5, 6 and 7 (below) provide the expected change in net annual emissions of air pollutions per year in Santa Barbara County, Ventura County, and Los Angeles County in comparison to the PSD thresholds specific to each area.

As illustrated in **Table 5**, the proposed project is below the PSD threshold for all criteria pollutants in Santa Barbara County and therefore, no significant impacts on air quality as a result of criteria pollutant emissions from the project would occur in Santa Barbara County. Similarly, as illustrated in **Table 6**, the proposed project is below the PSD threshold for all criteria pollutants in Ventura County.

⁵⁹ If the air quality in a geographic area meets or is cleaner than the national standard, it is called an attainment area. Areas that don't meet the national standard are called nonattainment areas. <https://www.epa.gov/criteria-air-pollutants/process-determine-whether-areas-meet-naaqs-designations-process>

Table 5: Estimated Net Annual Air Pollutant Emissions from Launches, Static Fire Tests and Project Operations in Santa Barbara County

	Estimated Emissions (Tons)						
	CO	NO _x	VOC*	SO _x	PM _{2.5}	PM ₁₀	Pb
	123.2	103.57	15.71	2.13	2.98	3.09	0.01
Threshold	250	250	250	250	250	250	25
Below Threshold for all years?	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 6: Estimated Net Annual Air Pollutant Emissions from Launches, Static Fire Tests and Project Operations in Ventura County

	Estimated Emissions (Tons)						
	CO	NO _x	VOC*	SO _x	PM _{2.5}	PM ₁₀	Pb
	62.33	41.96	3.51	0.84	0.9	0.9	0.00
Threshold	250	50	50	250	250	250	25
Below Threshold for all years?	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 7: Estimated Net Annual Air Pollutant Emissions from Launches, Static Fire Tests and Project Operations in Los Angeles County

	Estimated Emissions (Tons)						
	CO	NO _x	VOC*	SO _x	PM _{2.5}	PM ₁₀	Pb
	40.26	28.58	2.54	0.78	0.72	0.72	0.00
Threshold	100	10	10	250	70	100	25
Below Threshold for all years?	Yes	No	Yes	Yes	Yes	Yes	Yes

Los Angeles County (LA County) is located within the jurisdiction of the South Coast Air Quality Management District (SCAQMD). LA County is designated as an area of extreme nonattainment for O₃, serious nonattainment for PM_{2.5}, nonattainment for Pb and a maintenance area for CO and PM₁₀. As shown in **Table 7**, the project would exceed the general conformity de minimis threshold for Nitrogen Oxides (NO_x). NO_x is

considered a primary precursor to O₃ because O₃ is created when NO_x reacts with Volatile Organic Compounds (VOCs) in the presence of sunlight⁶⁰.

In order to accommodate projects subject to general conformity requirements, general conformity budgets for NO_x and VOC emissions are established within each air quality management district (AQMD), which for LA County is the SCAQMD. As described in the DEIS for the project, the SCAQMD currently has a general conformity allowance of 31.26 tons per year (tpy) for NO_x for 2025 through 2030 and the project is not anticipated to exceed the budget. DAF anticipates receiving a letter from SCAQMD granting use of budgeted NO_x shortly. SCAQMD, SpaceX and DAF have been coordinating and developing a methodology to track annual project emissions and return any unused credits.

Greenhouse Gases

The United States Environmental Protection Agency (EPA) is the agency responsible for writing and implementing federal regulation for the protection of the environment, including implementation of measures to address climate change. The EPA pursues a number of efforts, including regulatory initiatives such as the GHG Reporting Program.

The Greenhouse Gas (GHG) Reporting Program, codified in 40 CFR, Part 98, requires mandatory reporting of GHG emissions for certain industrial operations, most of which are large emitters of GHGs (e.g., electricity generation facilities, oil refineries, and manufacturing operations). Mandatory reporting is also required for facilities capable of emitting more than 25,000 metric tons of CO₂-equivalents (MTCO_{2e}) per year from all combined stationary fuel combustion sources (e.g., boilers and stationary engines). Since the project would emit a net increase of 33,276 MTCO_{2e} per year from the prior project and a total of 45,990 MTCO_{2e}, it would appear to exceed this 25,000 MTCO_{2e} threshold and would be required to submit annual reporting of GHG emissions to EPA.

Emissions in the Upper Atmosphere

The calculation and discussion of emissions from project construction, operations, launches, landings and recoveries provided in the CD submittal and described in this staff report are limited to the lower atmosphere (troposphere). However, more recently, greater attention has been directed at emissions from rocket launches into the middle (stratosphere and mesosphere) and upper (thermosphere) atmospheres. The DEIS for the project describes this issue as follows:

An emerging area of research focuses on the potential effects of rocket launches on O₃ levels and emissions in the upper atmosphere. While some research has indicated there may be such effects, primarily from black carbon impacting the ozone layer and/or global temperatures, currently there is neither a regulatory requirement nor a generally accepted method for analyzing these impacts. The DAF examined the research that has been published on this topic to date and

⁶⁰ <https://www3.epa.gov/ttn/catc1/cica/files/fnoxdoc.pdf>

determined the necessary data and tools do not exist to accurately estimate emissions of black carbon from rockets and any associated effects.

Airspace closures associated with commercial space operations would result in additional aircraft emissions mainly from aircraft being re-routed and expending more fuel, including CO₂. These temporary increases in aircraft emissions could increase up to a maximum of 100 times per year. The amount of time that affected aircraft spend being re-routed would be short term and the number of aircraft that would be impacted per launch would not be expected to produce additional emissions that would have a notable impact on air quality. Therefore, the increases in GHGs caused by short-term airspace closures during commercial space operations under the Proposed Action is not expected to result in significant climate-related air quality impacts.

Emissions into the upper atmosphere from rocket launches have previously been presented to Commission staff and Commission staff have investigated the issue, including reviewing scientific literature. Although rocket launches do emit various pollutants into the middle and upper atmospheres, with the potential to affect both the ozone layer and global climate (Maloney et. Al 2022, Kokkinakis and Drikakis 2022, Ryan et al. 2022), there does not currently appear to be an agency with authority or a framework for overseeing and regulating these types of emissions.

Lack of Information

Despite the absence of regulation on this issue, the project should more thoroughly analyze and discuss potential upper atmospheric emissions. These emissions have the potential to exacerbate climate change caused by global warming and contribute to ocean acidification. They also have the potential to exacerbate ozone depletion which can contribute to global warming as well as directly impact terrestrial and marine species including effects to plant growth and reduced survival of phytoplankton⁶¹. These impacts in turn could cause significant adverse spillover impacts to coastal resources of California. The Coastal Act has a number of provisions that provide authority to take steps to reduce climate change and to adapt to the effects of global warming. These include the Coastal Act's public access and recreation policies (Sections 30220 and 30211), marine resource and water quality policies (Sections 30230 and 30231), the environmentally sensitive habitat area protection policy (Section 30240), and the coastal hazards policy (Section 30253(a) and (b)).

In addition to direct upper atmospheric emissions from launches, the comment letter (**Exhibit 9a**) from EPA on the DEIS states that although the project describes the lifecycle of the first stage and fairing, a similar description of the lifecycle and impacts from other rocket components, including the second stage, interstage and payload, is absent. The EPA notes that emissions from the operation and eventual burn-up upon reentry of these components is evaluated in other studies such as Ryan et al 2022. Similarly, the comment letter from EPA describes the potential environmental impacts of planned satellite burnup in the atmosphere and EPA references NASA research

⁶¹ <https://www.epa.gov/ozone-layer-protection/health-and-environmental-effects-ozone-layer-depletion>

indicating that byproducts released from satellites burning up in the atmosphere may take up to 30 years to settle in the atmosphere, at which point they could promote ozone depletion.

The letter from EPA recommends that, as part of the analysis for the proposed project, DAF should: estimate the number of satellites launched per year; describe the lifecycle and emissions from all project components; describe the different launch vehicles, fuel types and expected emissions; provide an updated overview of the science related to upper atmospheric emissions; and consider describing an adaptive management framework that balances the need for continued access to space with measures to model, measure, and monitor impacts.

Specific instances of the lack of information described above related to emissions in the upper atmosphere are summarized below. This information is necessary to assess consistency with the ESHA policies of the California Coastal Management Program (CCMP), specifically Sections 30220, 30211, 30230, 30231, 30240, 30253(a1) and (b2):

- Information on the type and quantity of emissions released into the upper atmosphere as a result of SpaceX launches.
- Information on any alternative launch vehicles or fuel types that would minimize emissions into the upper atmosphere.
- Information on how many satellites will be launched per year and what is the lifecycle and resulting atmospheric emissions from burnup upon reentry of satellites
- Information on the lifecycle and resulting atmospheric emissions from burnup upon reentry of the second stage, interstage and payload.
- Information on any adaptive management strategies that would allow for continued access to space while minimizing upper atmospheric emissions.

This uncertainty could result in significant adverse impacts to multiple types of coastal resources. In order for the Commission to thoroughly analyze potential adverse impacts to coastal resources from launch and landing activities, evaluate their consistency with Sections 30220, 30211, 30230, 30231, Section 30240, and 30253 of the CCMP, and ensure they are avoided or mitigated, the information identified above is necessary. As of the date of this staff report, DAF has not provided the information and the Commission has not been able to evaluate the extent of project-related impacts or the project's consistency with the CCMP.

Permits

Coastal Act Section 30253(c) requires that the proposed project be consistent with the requirements imposed by an air pollution control district or the State Air Resources Board as to each particular development. The project will require Authority to Construct (ATC) and Permit to Operate (PTO) permits from the SBCAPCD. The SBCAPCD has jurisdiction over stationary emission sources, including federal activities, in its air basin and California state waters; VSFB is within its jurisdictional air basin and marine vessels associated with the project will transit through SBCAPCD coastal waters. The

SBCAPCD has locally adopted air emission thresholds that are used to evaluate the significance of impacts from construction and operation of a project and applicable regulatory requirements under the District's rules and regulations. In the context of launch projects and operations, stationary source emissions include roll-on roll-off tugboat and barge operations, fuel transfer on space launch complexes and also includes air emissions from ancillary sources such as diesel generators, special equipment, and solvents to clean equipment. The SBCAPCD does not have jurisdiction over emissions from rocket liftoff, as liftoff is considered a mobile emissions source. To ensure that the proposed project will be consistent with the requirements imposed by the SBCAPCD, DAF has committed to ensuring that SpaceX will receive and comply with all of the relevant permits from the SBCAPCD prior to construction and operation of the proposed project. With the commitment to ensure that SpaceX will receive and comply with all applicable permits from the SBCAPCD prior to construction and operation of the project, DAF would be consistent with the requirements imposed by an air pollution control district and thus the project would be consistent with CCMP Section 30253(c).

As such, the project is consistent with the requirements imposed by an air pollution control district and thus the project would be consistent with CCMP Section 30253(c).

H. CULTURAL RESOURCES

Section 30244 of the Coastal Act states:

Where development would adversely impact archaeological or paleontological resources as identified by the State Historic Preservation Officer, reasonable mitigation measures shall be required.

As described in the May 2025 Draft Environmental Impact Statement (DEIS) and the CD submittal, the Department of the Air Force (DAF) engaged with the California State Historic Preservation Office (SHPO) on January 16, 2025. The Section 106 consultation considered demolition, construction, static fire, launch and boost back noise vibrations effects in the Cultural Resources Study Area for the project. The Study Area reached outside the Base boundaries to include the mainland and Northern Channel Islands (NCI). However, the noise study areas were not included in delineation of the Area of Potential Effects (APE) because the DAF concluded that those noise levels have no potential to affect cultural resources.

Background research revealed that the boundaries of two Native American archaeological sites are within the APE. The first site was tested and evaluated for National Register of Historic Places (NRHP) eligibility in 2021 and determined not eligible. The only activity proposed in the area of this site is erosion control by adding a layer of crushed shale within the existing roadbed. The second site was surveyed and investigated with shovel test pits with no artifacts being found in the APE. Similarly, the only activity proposed in the area of this site is erosion control via crushed shale.

The SHPO concurred with the DAF's finding of no historic properties affected for demolition of SLC-6 on October 16, 2024, and construction and operation on February 6, 2025. The DAF also engaged with the Santa Ynez Band of Chumash Indians (SYBCI) over potentially affected historic properties. The SYBCI responded on January 21, 2025, that the Tribe has concerns the Proposed Action would affect a perceived traditional cultural landscape on VSFB and therefore requested a site visit. The Installation Tribal Liaison Officer (ITLO) responded on January 21, 2025, requesting the Tribe schedule a site visit. As of the date of this staff report, the Tribe had not scheduled a site visit or identified any perceived potential effects. The ITLO will continue open communication with the Tribe to gather comments and address any perceived potential effects.

Consistent with the Commission's Tribal Consultation policy, Commission staff received a list of Tribes with potential cultural connections to the project area from the Native American Heritage Commission and completed outreach to those Tribes. Consultation invitations were mailed on June 20, 2025, to the Barbareño/Ventureño Band of Mission Indians, the Chumash Council of Bakersfield, the Coastal Band of the Chumash Nation, the Northern Chumash Tribal Council, the San Luis Obispo County Chumash Council, and the Santa Ynez Band of Chumash Indians. No responses or requests for consultation were received.

Commission staff previously received a request for consultation from the Coastal Band of the Chumash Nation for CD-0007-24 (increase SpaceX launches from VSFB from 36 to 50 per year) and Commission staff carried out this consultation with the Coastal Band of the Chumash Nation on Wednesday, September 25, 2024. During the consultation the Tribe expressed concerns that the force of overpressures from sonic booms could adversely impact sensitive cultural resources or exfoliate new, undiscovered cultural resources that were previously buried. This same concern was previously expressed to Commission staff during consultation as part of its review of the CD for 36 launches.

As discussed in greater detail in the August 8, 2024, staff report for CD-0003-24, the DAF's March 2023 "Identification of Historic Properties and Finding of No Effect" document, included as Appendix C to the May 2023 Supplemental Environmental Assessment (EA) prepared by DAF for 36 launches per year, reviewed previous studies that specifically analyzed the potential effects to archaeological resources from rocket engine noise and sonic boom vibrations, and concluded that there is no potential for rocket launches and boost back to adversely impact archaeological resources. Due to the sensitive nature of the archaeological resources analyzed in those studies, the reports of those studies are not public information and were referenced and discussed in the 2023 Supplemental EA and the "Identification of Historic Properties and Finding of No Effect" rather than included or directly attached. These same studies were incorporated into the cultural resources report for the proposed project.

Although that document concluded there was no potential for adverse impacts to archaeological resources, the Coastal Band of the Chumash Nation requested copies of the reports. Commission staff relayed the request from the Coastal Band of the Chumash Nation to DAF. DAF responded that the Coastal Band of Chumash Nation

can view the reports once it has an agreement with the Central Coast Information Center. Commission staff relayed this information from DAF back to the Coastal Band of Chumash Nation.

Based on these considerations, the Commission finds the proposed project consistent with the cultural and archaeological resources policy of the California Coastal Management Program (Section 30244 of the Coastal Act).

APPENDIX A – SUBSTANTIVE FILE DOCUMENTS

1. United States Space Force Consistency Determination CD-0006-25, June 2025, and associated support materials and correspondence.
2. Department of the Air Force Draft Environmental Impact Statement for Authorizing Changes to the Falcon Launch Program at Vandenberg Space Force Base, California, May 2025
3. CD-0007-24 (United States Space Force, increase Space Exploration Technologies' (SpaceX) Falcon 9 launch and landing activities at Vandenberg Space Force Base (VSFB) from 36 to 50 per year, in Santa Barbara County). Hyperlinks to: [Revised Findings Report](#), [Exhibits](#), [Correspondence](#), [Addendum](#).
4. CD-0003-24 (United States Space Force, increase Space Exploration Technologies' (SpaceX) Falcon 9 launch and landing activities at Vandenberg Space Force Base (VSFB) from six to 36 per year as well as the addition of offshore landing locations in the Pacific Ocean Vandenberg Space Force Base). Hyperlinks to: [Report](#), [Exhibits](#), [Correspondence](#), [Addendum](#), [Addendum 2](#).
5. ND-0009-23 (Department of the Air Force, Increase in frequency of space launch operations by SpaceX at Vandenberg Space Force Complex from six to 36 per year as well as the addition of offshore landing locations in the Pacific Ocean, in Santa Barbara County)
6. CD-0010-22 (Department of the Air Force, Construct a new commercial space launch facility at the former site of Space Launch Complex 5 on Vandenberg Space Force Base and carry out up to 48 rocket launches and 48 static fire engine tests per year, in Santa Barbara County)
7. ND-0027-15 (Department of the Air Force, Recurring Falcon 9 rocket launches from SLC-4E and first stage boost-back landing sat SLC-4W or an offshore barge, in Santa Barbara County)
8. ND-055-10 (Department of the Air Force, Modifications to Space Launch Complex 4 East to support Falcon 9 and Falcon 9 Heavy launch programs, in Santa Barbara County)
9. CD-049-98 (Department of the Air Force, Evolved Expendable Launch Vehicle Program, in Santa Barbara County).
10. National Marine Fisheries Service. Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to U.S. Space Force Launches and Supporting Activities at Vandenberg Space Force Base, Vandenberg, California. Dated 10 April 2024. Federal Register, Vol. 89, No. 70, pp 25163-25185.
11. Department of the Air Force. Letters of Authorization: (1) Taking Marine Mammals Incidental to Space Vehicle and Missile Launches and Aircraft Test Flights and Helicopter Operations at Vandenberg Air Force Base (VAFB), California 1 January to 9 April 2024 (2) Taking Marine Mammals Incidental to U.S. Space Force Launches and Operations at Vandenberg Space Force Base (VSFB), California 10 April to 31 December 2024.
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16. Department of Air Force, Annual Report Letter of Authorization: Taking of Marine Mammals Incidental to Space Vehicle and Missile Launches and Aircraft Test Flight and Helicopter Operations at Vandenberg Air Force Base, California 1 January to 31 December 2018, 25 February, 2019.
17. Department of Air Force, Annual Report Letter of Authorization: Taking of Marine Mammals Incidental to Space Vehicle and Missile Launches and Aircraft Test Flight and Helicopter Operations at Vandenberg Air Force Base, California 1 January to 31 December 2019, 20 February, 2020.
18. Department of Air Force, Annual Report Letter of Authorization: Taking of Marine Mammals Incidental to Space Vehicle and Missile Launches and Aircraft Test Flight and Helicopter Operations at Vandenberg Air Force Base, California 1 January to 31 December 2020, 1 March, 2021.
19. Department of Air Force, Annual Report Letter of Authorization: Taking of Marine Mammals Incidental to Space Vehicle and Missile Launches and Aircraft Test Flight and Helicopter Operations at Vandenberg Air Force Base, California 1 January to 31 December 2021, 16 February, 2022.
20. Department of Air Force, Annual Report Letter of Authorization: Taking of Marine Mammals Incidental to Space Vehicle and Missile Launches and Aircraft Test Flight and Helicopter Operations at Vandenberg Air Force Base, California 1 January to 31 December 2022, 24 February, 2023.
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APPENDIX B – PROCEDURAL ISSUES (CONTINUED)

History of Commission Review of Development Activities at VSFB

The Commission was established by voter initiative in 1972 (Proposition 20) and later made permanent by the Legislature through adoption of the California Coastal Act of 1976. Separately, the United States Congress enacted the Coastal Zone Management Act (CZMA) in 1972, to encourage coastal states to develop comprehensive Coastal Management Programs (CMP) to manage and balance competing uses of and impacts to coastal resources. Once the federal government approves a state's CMP, that state gains federal consistency review authority. California's Coastal Management Program (CCMP) was federally approved in 1977.

Following approval of the CCMP and federal consistency review authority in 1977, the Department of the Air Force (DAF) submitted the first consistency determination (CD) for development related to space launch activities at VSFB in 1982 (CD-021-82) for construction, activation, and operation of facilities for the Space Shuttle Program. The Commission concurred with the CD. Since then, DAF has submitted over 40 projects to the Commission specific to launch activities at VSFB. Throughout this history, for projects that DAF had determined were “Federal agency activities” and the Commission agreed with DAF’s determination, the Commission continued to process the submittal accordingly. However, consistent with the subject of this CD and previous SpaceX projects at VSFB, in those instances where a proposed project did not appear to be a “Federal agency activity” the Commission has disagreed with DAF on this issue and sought resolution.

One example is The Western Commercial Space Center (CC-42-94). That project included construction and operation of a commercial spaceport that would be operated by the Western Commercial Space Center and its system integration contractor, the California Commercial Spaceport, Incorporated. The spaceport would launch vehicles owned by commercial operators, government agencies, or universities and would be used to place satellites into a polar orbit or near polar orbit around the earth. Western Commercial Space Center proposed to lease an unused building at SLC-6 for its processing facility and construct a new launch facility. The project included up to 24 launches per year.

DAF determined that project constituted a “Federal agency activity” and submitted a CD to the Commission. Commission staff disagreed with DAF because the project included a substantial amount of private commercial operations federally authorized through a lease or other agreement and instead determined that reviewing the project under the CZMA provisions reserved for “Federal license or permit” actions was appropriate given the need for the project to receive federal authorization. The federal consistency regulations at 15 C.F.R. Section 930.51(a) state that:

The term “federal license or permit” means any authorization that an applicant is required by law to obtain in order to conduct activities affecting any land or water

use or natural resource of the coastal zone and that any Federal agency is empowered to issue to an applicant.

DAF and Commission staff discussed the project and issue of whether it constituted a “Federal agency activity” or a “Federal license or permit” action but were unable to reach agreement. However, both the Commission staff and DAF agreed to proceed with the substantive review of the activity so that delays would be avoided. As such, Commission staff had “agreed to disagree” and DAF submitted a CD, which the Commission reviewed under the section of CZMA established for “Federal license or permit” actions and processed as a consistency certification (CC), the appropriate document for such a review.

In addition to the history regarding whether commercial space launch activities constitute “Federal agency activities” and should be processed as CDs, throughout the history of VSFB multiple commercial space launch projects were determined to be “Federal licenses or permits” and accordingly submitted to the Commission and processed as CCs. CC-28-96 proposed up to three launches per year of the Taurus Commercial Space Vehicle from Launch Support Complex 576E, SLC-3, and the California Commercial Spaceport. CC-30-96 proposed up to ten launches per year of the Delta II Space Launch Vehicle from SLC-2. Both projects included launching of privately-owned, commercial rockets from VSFB to deliver satellites into orbit, not unlike SpaceX operations at VSFB.

Recent Commission Reviews

As discussed in the Commission’s findings in support of its August 8, 2024, conditional concurrence with DAF’s consistency determination for 36 SpaceX launches,

Commission staff previously and consistently questioned this interpretation and the Commission’s review of consistency determinations for projects submitted by DAF rather than coastal development permit applications or consistency certifications since those are the standard mechanisms by which the Commission reviews activities proposed by private entities within the coastal zone and/or affecting any coastal use or resource. In response, DAF has previously stated that “All activities taking place on federally owned (Department of Defense) land, including those that utilize private entities, are done so in a manner exercising our statutory responsibilities.” Although the Commission has a long history of reviewing and authorizing development activities carried out by private entities on federally owned land, including VSFB, through the coastal development permit application or consistency certification processes, DAF maintains that the proposed project is different due to the unique partnership arrangement it has with commercial space launch companies like SpaceX. In short, because the federal government no longer carries out space launch activities, DAF now relies on private companies such as SpaceX to send government payloads to space and to establish and maintain satellite infrastructure and networks that are available to support DAF needs and priorities. Accordingly, while the project would be operated by a private company to

serve its business objectives and would only occasionally launch materials at the behest of DAF, it would also help meet the needs of the federal government.

Although the Commission staff have consistently rejected DAF's characterization of the project as a "federal agency activity," DAF continues to maintain its position in the current consistency determination, stating:

The purpose of the Proposed Action is to increase the space launch mission capability of the U.S. Department of Defense (DOD) and National Aeronautics and Space Administration (NASA), and other federal and commercial customers and to enhance the resilience and capacity of the nation's space launch infrastructure, while promoting a robust and competitive national space industry. As directed by U.S. policy (10 United States Code [U.S.C.] Section 2273, "Policy regarding assured access to space: national security payloads"; see also the White House's 2021 Space Priorities Framework), the U.S. seeks to provide greater launch and landing capabilities and infrastructure to support national security objectives, including deploying satellites and other space assets that enable intelligence, reconnaissance, and global security operations. The U.S. aims to promote a hybrid space architecture that diversifies access to space, reduces dependency on singular systems, and ensures rapid reconstitution capabilities. The DOD, NASA, and other Federal agencies obtain access to space through the procurement of commercial launch services, rather than with Government-owned or operated launch systems. As such, commercial launch capability is critical to the national defense, American's national space objectives, and the National Space Policy of the U.S. (May 2020).

The USSF's mission to "secure our Nation's interests in, from, and to space" is enabled by Space Systems Command's largest organization, the Assured Access to Space Directorate. The Assured Access to Space Directorate procures launch services from the commercial space transportation industry at VSBF, one of only two Federal Ranges from which national security space launches can occur—and the only Federal Range on the West Coast. Space launch for the USSF, other DOD organizations, and the Intelligence Community relies on commercial space launch service providers, as DOD does not operate its own space launch vehicles. SpaceX supports, and is under contract for, the full spectrum of U.S. Government space mission requirements...

...

SpaceX has developed Starlink and Starshield, satellite constellations in low-Earth orbit that require numerous launches to develop and maintain the constellation. Starlink is a critical national capability that is directly utilized by DOD and the intelligence community, which contracts directly for satellite communications services important to the national defense and in support of U.S. interests abroad. Starlink is a services provider for the DOD under numerous contracting vehicles, including the U.S. Space Force Commercial Satellite Communications Office, the U.S. Air Force's Global Lightning program, and other programs designed to

enhance U.S. national security capability on-orbit and on the ground. Starlink services have also been directly procured by each of the U.S. military services, and by U.S. Special Operations Command. Beyond the Intelligence Community, Starlink is under contract with the Federal Emergency Management Agency, Department of State, Department of Veterans Affairs, Department of Transportation, U.S. Coast Guard (USCG), Customs and Border Patrol, U.S. Geological Survey, U.S. Forest Service, National Oceanic and Atmospheric Administration (NOAA), and many other government organizations at the state and local level...it is in the public interest to continuously enhance Starlink network capacity, particularly in furtherance of U.S. Government purposes and objectives. SpaceX's rapid launch capability and continuous deployment of Starlink satellites in orbit directly correspond to improved network performance that scales directly with network growth to meet escalating demand. Starlink launches are not incidental; each individual Starlink launch is part of a deliberate, planned effort to meet capacity needs to support the requirements or demand of specific customers, including the U.S. Government. The capability of new satellites allows SpaceX to add capacity more quickly and interconnect the Starlink constellation, to serve critical U.S. Government needs around the globe, and to launch critical communication services for aviation and maritime in the U.S. and the rest of the world's most remote locations.

SpaceX also launches payloads for the USSF's Space Development Agency as part of the Proliferated Warfighter Space Architecture, a resilient layered network of military satellites designed to quickly deliver needed national security space capabilities to the joint warfighter. In addition to missions for the DOD, SpaceX launches payloads from VSFB for U.S. Government agencies, including NASA and NOAA, and allied foreign nations, including missions that directly benefit environmental monitoring and response.

To summarize and paraphrase DAF's position, because it is a customer of – and reliant on – SpaceX's launches and satellite network, SpaceX launches are a federal agency activity. However, this does not align with how federal agency activities are defined in the Coastal Zone Management Act's regulations or the manner in which the Commission has historically implemented those regulations. While the value SpaceX provides to the U.S. Government is no doubt substantial, the simple fact remains that there is a lack of current information to support DAF's finding that SpaceX is a public federal agency or that all of its proposed launch operations are performed on behalf of a public federal agency and should therefore be regulated accordingly under the CD process of the CZMA. This appears to be a perspective already held by the federal government outside of the context of the Commission's review process since SpaceX itself is required to lease its launch complex on VSFB from DAF and to hold, in its commercial business capacity, various licenses and authorizations from federal, state and local public agencies, including but not limited to the Federal Aviation Administration (FAA), Central Coast Regional Water Board and the Santa Barbara County Air Pollution Control District to carry out launch activities. More consistent adherence to this approach therefore appears warranted, including recognition of

SpaceX launches as private company activities through the Commission's review process.

Upon further review of relevant public information, DAF's CD lacks adequate information to support its position that SpaceX's proposed project is a federal agency activity.

Although DAF has stated that it also uses SpaceX's Starlink system and SpaceX occasionally launches DOD satellites into orbit, it has not submitted its contracts with SpaceX to Commission staff or otherwise supported its position that SpaceX's operations are not a commercial enterprise and are instead a federal agency activity. Commission staff were able to find, however, that the Department of Defense (DOD) lists contracts between it and private companies on its website.⁶² Based on a search of the DOD website for contracts between Space Force and SpaceX,⁶³ the last original contract found (there have been modifications to older launch contracts after 2020) occurred in April 2025 for a nearly \$6 billion firm-fixed-price, indefinite-delivery⁶⁴ requirements contract for the National Security Space Launch Phase 3 Lane 2⁶⁵ launch service procurement, with final completion to occur by April 2033.⁶⁶ According to the DOD, the work under this contract will be performed at SpaceX's Florida and California launch and landing facilities, not just at VSBF. This contract was one of three awarded to commercial space launch operators, with the other two awardees being Blue Origin LLC (~\$2.4 billion contract) and United Launch Services LLC (~\$5.4 billion contract). Based on the contract terms and conditions in the RFP for this contract, the DOD estimates that the three contractors to provide between 20 and 90 launches over the contract term, divided among the contractors.⁶⁷ Assuming SpaceX provides around 40% of the launches consistent with its share of the total value of the three contracts, that would amount to 4-5 launches per year for the 8-year contract term, which, assuming its Florida launches are well above zero, is below 4-5% of total SpaceX annual launches from VSBF and its Florida launch facility. Additionally, to put the value of the annual contract amount into context with SpaceX's expected revenue in 2025, it amounts to less than 5% of 2025 revenue, or ~\$750 million per year over the 8-year contract term, compared to SpaceX CEO, Elon Musk's \$15.5 billion expected SpaceX revenues, as stated on his X.com social media platform.⁶⁸

⁶² <https://www.defense.gov/News/Contracts/>.

⁶³ <https://www.defense.gov/News/Contracts/StartDate/2015-05-27/EndDate/2024-05-31/?Search=%22Space+Exploration+Technologies%22>

⁶⁴

⁶⁵ Details of the National Security Space Launch Phase 3 Lane 2 Request for Proposal: <https://sam.gov/opp/340d8355d29f4f96a15670cd0d8a2d62/view>.

⁶⁶ <https://www.defense.gov/News/Contracts/Contract/Article/4146543/>

⁶⁷ United States Space Force, Space Systems Command (SSC), Assured Access to Space (AATS), Los Angeles Air Force Base, California: National Security Space Launch (NSSL) Phase 3 Lane 2 Launch Service Procurement, FA 8811-24-6-0002, Attachment 10, Addendum to FAR 52.212-04, Contract Terms and Conditions, Final RFP: 4 October 2023, Amendment 1: 7 November 2023, Amendment 2: 20 June 2024, Amendment 4: 24 October 2024.

⁶⁸ <https://x.com/elonmusk/status/1929950051415273504>.

On August 7, 2020, Space Force also entered into a much smaller \$316 million contract with SpaceX for unknown amounts of launches between fiscal year 2022 and fiscal year 2027.⁶⁹ Based on news reports, SpaceX and the Space Force entered into an agreement in October 2023 whereby SpaceX reportedly agreed to provide 10 launch missions for the Space Force between 2023 and 2026.⁷⁰ The report of the 10 launch missions did not indicate if the launches will occur at VSFB or in Florida and Commission staff could not locate the contract announcement on the DOD website to confirm the launch location, thus it is possible that some launches under this contract will occur at the Cape Canaveral Space Force Station in Florida. Again based on news reports, SpaceX and the Space Force entered into an agreement that SpaceX will provide defense related satellite internet services under its Starshield program, for one year, from September 1, 2023 to September 30, 2024; there is no indication that this contract provides Space Force with launch services from SpaceX at VSFB and Commission staff could not locate the contract announcement on the DOD website.⁷¹ The National Reconnaissance Office, which is an agency within the DOD⁷² but separate from the Space Force, has relied on SpaceX for three Falcon 9 launches from VSFB since 2020.⁷³ Thus, as shown above, based on staff's independent review of available public information, the Space Force has contracted for approximately 12 (with possibly 4-5 more per year under the April 2025 contract) known launch services reported in its contracts with SpaceX (the August 7, 2020, contract did not disclose a launch number) out of SpaceX's total of several hundred launches carried out in the United States over the past several years and which will significantly increase in the future due to the proposed 100-launch annual cadence. Therefore, unless Space Force can demonstrate with additional information that it had control over SpaceX's other launches and all future SpaceX launches at VSFB, the Commission cannot find that SpaceX is acting on behalf of the Space Force in increasing its launch cadence, and thus that the increased cadence is a federal agency activity that warrants submittal of a Consistency Determination under the CZMA.

Space Force also has not submitted information that demonstrates that it takes full responsibility and accepts liability for all of SpaceX's launch activities at VSFB as a principal in an agency relationship with SpaceX. Based on the contracts from August 7, 2020, and April 2025 the Space Force and SpaceX entered a "firm-fixed-price, indefinite delivery requirements contract for launch service procurements." The December 2020 launch services contract is also a firm-fixed price contract. The Federal Acquisition Regulations (FAR), title 48 Code of Federal Regulations, section 16.202-1⁷⁴, define a "firm-fixed-price contract" as the following, in part:

⁶⁹ <https://www.defense.gov/News/Contracts/Contract/Article/2305454/>.

⁷⁰ <https://www.cnbc.com/2023/11/01/space-force-awards-spacex-ula-with-2point5-billion-for-21-launches.html>.

⁷¹ <https://www.space.com/spacex-starshield-space-force-contract>.

⁷² https://www.nro.gov/Portals/135/Documents/10026_NRO_One_Pager_March2023.pdf?ver=DDEkGKAg5w2v3XkUAVCvFA%3d%3d

⁷³ <https://www.nro.gov/Launches/launches/#launch-list>.

⁷⁴ https://www.acquisition.gov/far/part-16#FAR_16_202.

A firm-fixed-price contract provides for a price that is not subject to any adjustment on the basis of the contractor's cost experience in performing the contract. This contract type places upon the contractor maximum risk and full responsibility for all costs and resulting profit or loss. (emphasis added)

Thus, based on the FAR provision, the firm-fixed price contract is one where the contractor assumes "maximum risk and full responsibility for all costs" which presumably includes the costs associated with failed launches. Additionally, in its Falcon Payload User's Guide, SpaceX confirms that "[a]s part of any Falcon launch service, SpaceX will: ... Secure third-party liability insurance for the launch (Note: Customer retains responsibility for satellite insurance at all times)."⁷⁵ Finally, SpaceX has a Multiple Award Schedule (MAS) listed with the U.S. General Services Administration's Federal Acquisition Service.⁷⁶ The MAS is like a services and product catalog for SpaceX customers where it offers launch and Starlink services to "US Government customers."⁷⁷ In fact, the first page of the MAS is an overview of the "Customer Information" describing SpaceX's offerings, pricing and terms for government agencies. Additionally, SpaceX has independently sought and received its own authorization from FAA for its increased launch cadence and from the Santa Barbara County Air Pollution Control District for its launch activities. As such, it appears that DAF is selectively deciding when to seek authorizations for SpaceX activities itself and when to avoid doing so. It appears that DAF is not applying a consistent standard and is instead approaching the Commission's review process differently from how other federal and local authorizations are addressed. Finally, the FAA regulations that govern the licensing and permitting process for space launches requires customers and licensees/permittees reciprocally waive and release claims against each other and assume financial responsibility for its losses as a condition of each license or permit.⁷⁸ Therefore, based on the foregoing evidence, it appears that SpaceX assumes all liability and costs associated with its launch services and is not acting as an agent for the Space Force when it launches Falcon 9 rockets from VSBF.

Unlike the present situation, DAF has not proposed that it is a federal agency activity when other major defense contractors propose projects that support DOD contracts. Boeing is one of the top five defense contractors for the DOD, amounting to over \$14 billion dollars' worth of contracts to build aircraft and other equipment for the DOD in fiscal year 2022.⁷⁹ Boeing has consistently applied as the sole applicant for various projects throughout the United States even though it builds aircraft for the DOD. Even though the federal government has substantial contracts with Boeing,⁸⁰ based on a review of Boeing projects throughout the country to expand operations, the DOD has

⁷⁵ <https://www.spacex.com/media/falcon-users-guide-2021-09.pdf>.

⁷⁶ <https://www.gsaelibrary.gsa.gov/ElibMain/contractorInfo.do?contractNumber=47QRAA21D007N&contractorName=SPACE+EXPLORATION+TECHNOLOGIES+CORP.&executeQuery=YES>.

⁷⁷ https://www.gsaadvantage.gov/ref_text/47QRAA21D007N/0Z91GP.3UZEED_47QRAA21D007N_PRICELIST20240401.PDF, page 10.

⁷⁸ Title 14 Code of Federal Regulations section 440.17.

⁷⁹ <https://about.bgov.com/top-defense-contractors/>.

⁸⁰ See, generally, <https://www.defense.gov/News/Contracts/Search/boeing/StartDate/2000-01-01/>. List of dates where the DOD entered into a contract with Boeing since 2000.

never been listed as an applicant. For example, Boeing proposed a specific plan to create four planning areas within its property in the City of Seal Beach.⁸¹ Two of the four planning areas included nearly 1,000,000 square feet of light industrial use to support its operations. In 2003, the City of Seal Beach certified an EIR and approved Boeing's proposed development to expand its light industrial facilities at its Seal Beach campus.⁸² In 2011, the Arlington County (Virginia) Board approved Boeing's application to build a new 453,000 square-foot regional headquarters facility in the County, where it houses Boeing's Defense, Space & Security business unit, which builds products subject to existing or past contracts between the DOD and Boeing.⁸³ In 2020, the City of Mesa (Arizona) approved a Boeing facility that will build advanced weapons for the DOD.⁸⁴ While this is a fraction of Boeing's projects over time throughout the country, there does not seem to be a trend where the DOD joins Boeing in its effort to expand operations even though DOD is a major contractor for Boeing products and services. There is good reason that the DOD is not the applicant for Boeing projects: the DOD contracts represent a fraction of Boeing's total global revenue (\$66.6 billion in FY 2022⁸⁵ and \$77.79 billion in FY 2023⁸⁶) such that giving the DOD authority to dictate how, when and where it decides to expand operations could severely affect its business operations outside of DOD contracts. While SpaceX is not a public company that is required to publicly report its annual revenue, it is safe to assume that based on the few launches that DOD has contracted with SpaceX, the revenue from launch contracts with Space Force are a small fraction of SpaceX's revenue from the hundreds of launches that SpaceX has performed and, thus, does not establish that it is authorized to dictate SpaceX's operations. In fact, as noted above, the annual value of the April 2025 contract with the DOD represents 4-5% of SpaceX's expected 2025 annual revenue and a far smaller percentage of SpaceX's \$400 billion valuation established by private investors, which includes Starlink's business valuation, as reported in July 2025 by several business media outlets.⁸⁷

⁸¹ <https://ceqanet.opr.ca.gov/2002031015/2>.

⁸² <https://ceqanet.opr.ca.gov/2002031015/3>.

⁸³ https://www.washingtonpost.com/local/arlington-approves-new-boeing-regional-headquarters/2011/10/19/gIQAyGOnyL_story.html.

⁸⁴ <https://azbex.com/planning-development/boeing-plans-fabrication-center-in-mesa/>;
https://www.themesatribune.com/business/boeing-s-phantom-works-opening-high-tech-facility-here/article_4607fe14-3602-11ed-884d-3fe4d783a591.html

⁸⁵ https://s2.q4cdn.com/661678649/files/doc_financials/2022/ar/boeing-2022-annual-reportvF.pdf, page 16.

⁸⁶ https://s2.q4cdn.com/661678649/files/doc_financials/2023/ar/Boeing-2023-Annual-Report.pdf, page 5

⁸⁷ <https://www.bloomberg.com/news/articles/2025-07-08/spacex-valuation-said-to-hit-around-400-billion-in-share-sale>;
<https://www.investing.com/news/company-news/spacex-reportedly-planning-insider-share-sale-at-400-billion-valuation-4136481>;
<https://techfundingnews.com/elon-musks-spacex-eyes-fresh-funding-at-a-400b-valuation-is-the-ipo-plan-on/>.

APPENDIX C – CONDITION COMPLIANCE

Following the Commission’s conditional concurrence with consistency determination CD-0003-24 for up to 36 SpaceX launches per year, the Department of the Air Force (DAF) confirmed in a letter dated September 13, 2024, that it accepted all seven of the Commission’s conditions and outlined its approach to meeting their requirements and intent. Commission staff provided feedback in response to this letter and DAF replied via letter on September 17, 2024, to expand on and clarify the scope of its commitments and efforts to satisfy the Commission’s conditional concurrence. DAF also provided, on September 13th, 16th and 25th, plans required through Conditions 4 through 7. These plans are discussed in detail in the revised findings report for the February 6, 2025, hearing ([Appendix A](#)) and are discussed further below in the context of this consistency determination (CD) submittal for a further increase in launches to 100 per year, development and use of the SLC-6 launch complex, and use of Falcon Heavy rockets.

Although Conditions 1 through 7 (provided in the August 8, 2024, staff report for CD-0003-24, available by link in [Appendix A](#)) apply to DAF’s consistency determination to increase SpaceX launches from six to 36 per year, further development and implementation of the protective measures and plans needed to satisfy those conditions is also essential to ensuring that any additional increase in launches proposed beyond 36 launches per year would be consistent with the California Coastal Management Program (CCMP). While DAF did commit (in its September 17, 2024, letter) to implementing the protective measures and plans of Conditions 1 through 7 as part of the recent project to increase the frequency of launches at SLC-4 to 50 per year (CD-0007-24), and integrated the protective measures into the project description of that earlier consistency determination, the current CD submittal for a further increase in launches to 100 per year, use of SLC-6, and use of Falcon Heavy rockets, does not include a commitment to implement all of the previously committed-to coastal resource protective measures. Specifically, the commitments to fulfill Conditions 1 through 4 from CD-0003-24 are not carried forward, while Conditions 5 through 7 are addressed in plans submitted as appendices to this new CD.

In a letter dated June 27, 2025, Commission staff requested⁸⁸ an update on these commitments and the extent to which DAF proposes to implement them. Commission staff further requested specific information related to marine mammal and other biological monitoring, multivariate statistical analyses, sonic boom assessment and minimization, and lighting management. As of the date of publication of this staff report, DAF’s only response has been to refer staff to a two-page memorandum, dated June 12, 2025, providing a general update on DAF’s “efforts related to monitoring and management plans and sonic boom analyses.” This memo is included as **Exhibit 8** but

⁸⁸ “Please provide a complete status update for each of DAF’s commitments from the seven conditions agreed to by DAF from the Commission’s conditional concurrence with CD-0003-24 (36 launches per-year cadence), including any documentation supporting those commitments (i.e. relevant plans and reports). Please also address how these commitments are proposed to be carried forward for the project proposed in this new CD submittal.”

lacks substantive or specific responses to staff's information requests. Additionally, in response to Commission staff queries about biological monitoring, DAF has indicated that it will adhere only to federal statutory requirements identified in the current United States Fish and Wildlife Service (USFWS) Biological Opinions (BOs) and the National Marine Fisheries Service 2024 Letter of Authorization (NMFS 2024 LOA). It notably does not reference the commitments it made as part of the Commission's conditional concurrence. Therefore, the Commission's analysis in this report cannot assume that DAF would follow through on the previous commitments it made in accepting Conditions 1 through 4 of CD-0003-24, as further described below.

It should be noted, however, that DAF convened an interagency working group (further described below) in October of 2024 comprised of staff from the Commission, DAF, National Marine Fisheries Service, U.S. Fish and Wildlife Service and the Federal Aviation Administration. This working group increased coordination among the agencies and their individual requirements and allowed for discussion and further development of biological monitoring programs and analysis of results. However, despite that increased coordination and discussion, Commission staff and DAF were unable to come to an agreement on the necessary monitoring requirements for multiple conditions, as described in more detail below.

Condition 1 – Enhanced Biological Monitoring Program

The revised findings report for the February 6, 2025, hearing ([Appendix A](#)) includes a discussion of what commitments to address Condition 1 (On-Base Enhanced Biological Monitoring Program) DAF made after the Commission's conditional concurrence with CD-0003-24 for an increase to 36 launches per year and how those commitments were carried forward in its subsequent CD (CD-0007-24) for a further increase to 50 launches per year. However, as mentioned above, no commitments that address Condition 1 to CD-0003-24 are included in the current CD submittal. In response to Commission staff's June 27, 2025, request to provide updates on such commitments as they apply to this CD for an increase to 100 launches per year, DAF only stated that they "will continue to adhere with all federal statutory requirements and implement and update the conservation measures of the [Integrated Natural Resources Management Plan (NRMP)] when funding is allocated" and "will only be submitting final annual reports required by the USFWS BO, NMFS LOA, and any other reports we are able to accomplish with INRMP funding to the Interagency Working Group", without referring to the other provisions it previously committed to in accepting Condition 1 of CD-0003-24. Based on this response, DAF appears to be proposing to discontinue its efforts to adhere to Condition 1 and has provided no indication that it would implement the plans it had begun developing in response to it, including the Pinniped Monitoring Plan provided in **Exhibit 11**.

DAF had previously established a process that included accepting and considering feedback from Commission staff on its various plans and efforts and, most meaningfully, convening an interagency working group that includes staff from the Commission, U.S. Fish and Wildlife Service and National Marine Fisheries Service. Since the August 8th, 2024, Commission meeting, DAF has hosted approximately six working group meetings

which allowed for some collective progress to be made on developing and refining the monitoring programs. The last working group meeting was held on April 28, 2025.

While these meetings established an opportunity for Commission staff to provide feedback and receive information about monitoring programs, they did not result in resolution of several of the significant concerns raised about the design and efficacy of the monitoring efforts DAF is developing. For example, because the monitoring plans are still being developed, they could not be implemented until long after the disturbance from increased launch activities begins. This after-the-fact assessment of impacts deviates significantly from the standard approach to environmental impact assessment and provides no opportunity to establish a baseline from which project effects can be measured. Further, it is unclear whether simply monitoring for the effects of the increased launch cadence on sensitive species and habitats will lead to effective avoidance and minimization of adverse impacts, especially without a commitment to an analysis of monitoring data, reporting, and implementation of minimization and mitigation measures to address impacts if they are identified. Additionally, it is too early to know if the monitoring programs have been designed and will be implemented in a manner sufficient to accurately identify and quantify adverse impacts if they are occurring. The rapid increase in launch frequency that has occurred over the past 18 months has the potential to preclude monitoring programs from demonstrating effectiveness or determining whether long-term or cumulative effects are occurring at lower launch cadence.

The enhanced biological monitoring included in Condition 1 was meant to enhance DAF's ability to assess if adverse effects to marine resources and environmentally sensitive habitat areas could be detected as a result of an increase to 36 launches per year (as proposed at that time). It is anticipated that conducting several years of monitoring at that cadence level, and conducting a statistical analysis, with the benefit of other historical monitoring data, would be the best way to determine the potential impacts with a substantial degree of confidence. Failure of the monitoring programs to be designed and implemented robustly brings with it a risk of "false negative" conclusions – those that determine adverse impacts are not occurring, not because they are absent, but because the monitoring is not designed and carried out with the frequency and intensity required to record them.

While DAF's prior commitments to carry out the enhanced biological monitoring from Condition 1 of CD-0003-24 are not addressed in this new CD, the state of monitoring programs for specific species currently proposed are addressed in Sections IV.C and IV.D below for coastal waters and marine resources and for environmentally sensitive habitat areas (ESHAs), respectively. Notably, DAF's CD submittal relies on adherence to the terms, conditions, and mitigation measures from the USFWS Biological Opinion (BO) as an integral part of achieving consistency with Sections 30240(a) and 30230 of the CCMP. However, this BO is still in development by USFWS and not yet available for review. As such, its terms, conditions and measures are not described or specified in the CD and there is no way of determining how effectively or adequately they may be in ensuring consistency with the CCMP's marine biological resource protection policies. Finally, the proposed marine mammal monitoring in the current CD does not appear to

include a continuation of on-base marine mammal and acoustic monitoring as required by the previous NMFS LOA (dated April 10, 2019), as required by Condition 1 of the Commission's August 2024 conditional concurrence. In establishing this condition, the Commission found that it was essential to the project's consistency with the CCMP. Without clarity from DAF about the status of this monitoring, it has not provided sufficient information to support a further finding of consistency.

Conditions 2 and 3 – Sonic Boom Minimization and Monitoring

These conditions from the Commission's August 8th conditional concurrence are both focused on sonic boom effects outside of VSFB and are interrelated. Condition 2 calls for DAF to take steps to minimize the spatial extent and magnitude of sonic booms from SpaceX launches and Condition 3 calls for the development and implementation of a biological monitoring program to evaluate sonic boom effects on coastal biological resources if those minimization measures would not result in avoidance of sonic boom effects. Given the extent of the potential effects area from sonic booms (hundreds of square miles of the coastal and marine environment), establishing and carrying out the kind of monitoring program described in Condition 3 would present a significant logistical and technical challenge. In addition, while such a program could be developed and used to ensure coastal resource protection over the long term, adverse impacts could accrue for a period of time before they are adequately recorded, recognized and responded to. Moreover, the on-going and proposed increase in the launch frequency is occurring before even a robust monitoring program could determine if long-term or cumulative effects are resulting from the 36 launch per year cadence – much less from the proposed level of 100 launches; simply put, not enough time has elapsed and not enough data have been collected to adequately evaluate the effects of even lower launch frequencies.

As such, Commission staff have encouraged DAF to instead focus on avoidance and minimization of sonic booms – and thereby their effects – through adherence to Condition 2. The revised findings report for the February 6, 2025, hearing ([Appendix A](#)) includes a discussion of what commitments to address Condition 2 and 3 DAF made after the Commission's conditional concurrence with CD-0003-24 for an increase to 36 launches per year and how those commitments were carried forward in its subsequent CD (CD-0007-24) for a further increase to 50 launches per year. However, for this CD submittal for a further expansion to 100 launches per year that also includes use of a new launch facility and the Falcon Heavy rocket, DAF is not integrating those earlier commitments related to Conditions 2 and 3 of CD-0003-24. In its July 23, 2025, response to Commission staff's inquiries about those previous commitments, DAF referenced its memo to the Working Group dated June 12, 2025 (**Exhibit 8**). While that memo describes DAF's initiation of a study to improve the understanding of the sonic boom effects off-base and briefed the Working Group on initial efforts, it does not include any detailed procedures to be implemented for minimizing adverse impacts from sonic booms related to potential marine resources and ESHA impacts.

Commission staff also requested⁸⁹ information specific to those conditions from DAF on June 27, 2025, and updates related to use of SLC-6 and Falcon Heavy rockets. In response, DAF simply stated: “This update will be provided to the Interagency Working Group in 26 August 2025 meeting”. Since the Commission has to consider this CD at its August 2025, hearing because DAF only extended the review period for the CD to August 27, 2025, the Commission will not be able to consider DAF’s update on August 26, 2025, which is after the Commission hearing.

Previous commitments were expected to be part of an evolving process that had the potential to improve over time as additional information and understanding is developed as to what the dominant contributors are for sonic boom spatial extent and magnitude (trajectory, atmospheric conditions, seasonal patterns, etc.) and how those could be adjusted in a manner that allows launches to continue but with a reduced likelihood of effects. In terms of the acoustic data field collection effort, DAF appears to be continuing to partner with researchers from BYU and CSU Bakersfield to continue the monitoring efforts initiated earlier this year. DAF shared preliminary results and engaged Commission staff in a dialogue about possible conclusions that can be drawn from these findings and how they affect previous assumptions about launch generated sonic booms. These preliminary findings appeared to demonstrate that certain launches result in less than anticipated sonic boom extent and magnitude. DAF also accepted and considered feedback from Commission staff about possible ways of augmenting or enhancing the monitoring effort and its ability to inform analyses of effects to coastal resources. However, at the last working group meeting Commission staff learned that the acoustic monitoring efforts involving BYU and CSU Bakersfield researchers have been significantly scaled back, with substantial reductions in monitoring locations and personnel. This reduction in data collection calls into question the study’s ability to consistently and thoroughly gather the necessary data to make informed decisions. To date, the Commission has no information to suggest that DAF has developed a framework for minimizing the spatial extent and magnitude of sonic booms, or that the timing or trajectories of any launches that have occurred over the last year have been modified to reduce impacts to sensitive resources.

As such, the degree to which Conditions 2 and 3 of the prior CDs would be implemented and successful in avoiding and minimizing adverse effects to coastal resources remains uncertain (this is discussed in the context of potential impacts to marine mammals and ESHAs, below in Sections IV.C and IV.D, respectively). The sonic boom data collected to date is limited both in time and geography and with a reduction in data collection efforts, the ability to verify data across a wider range of conditions and

⁸⁹ “ Please provide an update on the sonic boom assessment and minimization measures (conditions 2 and 3 of Consistency Determination No. CD-0003-24) per DAF’s prior commitments, as they apply to this CD. Please provide an assessment of the feasibility of limiting the spatial extent and severity (in terms of overpressure levels) of sonic booms caused by launches for proposed new launch location, increased cadence, and addition of Falcon Heavy vehicle. Please provide an evaluation of if the Falcon Heavy trajectories could be focused so the launches result in less potential sonic boom impacts over the [northern Channel Islands] and mainland coast (i.e. are the limitations for trajectories, such as to achieve polar orbits with less fuel, characteristically different than the Falcon 9 missions).”

locations and evaluate effects on sensitive species or habitats becomes increasingly difficult or impossible.

DAF had committed to evaluating inputs from the Working Group when considering launch times and trajectories, but there is no assurance that this engagement and consideration will lead to any meaningful modifications to launch parameters, and thus no assurance that adverse effects to sensitive coastal resources will be avoided and minimized. Meanwhile, as part of the proposed project, SpaceX launches would increase further without pausing to confirm, through effective monitoring carried out over a sufficient timeframe, if the previous launch cadence concurred with by the Commission (up to 36 launches per year) is occurring without causing adverse impacts to coastal resources. Furthermore, the new CD proposed for 100 launches per year (an approximately 180 percent increase from 36) does not appear to include any commitments to the Sonic Boom Minimization and Monitoring measures from Conditions 2 and 3 of CD-0003-24.

Condition 4 – Artificial Night Lighting

Condition 4 required submittal of a Lighting Management Plan. On September 13, 16 and 25, 2024, DAF provided a general outline and update that the plan continues to be developed and would begin to be implemented by as soon as January of 2025. However, that timeline was not achieved. While lighting management is mentioned in the current CD (e.g. In the Biological Assessment provided to USFWS, included as Appendix D of the CD), there is no lighting plan provided or described. In response to inquiries from Commission staff from June 27, 2025, about the status and scope of the plan, DAF responded with the following on July 23, 2025:

The SLC-4 lighting management plan is currently being reviewed by a lighting consultant in accordance with the USFWS BO. Their review should be complete by the end of August with a draft report of findings/recommendations to consider, the revised SLC-4 lighting management plan will be provided to the Interagency Working Group. The SLC-6 Lighting Plan will be prepared following pad design development and will be provided to the Interagency Working Group once final.

Therefore, while DAF is still communicating that they are committed to developing and implementing a Lighting Management Plan, the substance and scope of this plan remain unclear at this time and adequate information has not been provided to allow for an assessment of the adequacy of the plan to ensure consistency with the marine and terrestrial biological resource policies of the CCMP.

Conditions 5 Through 7

Conditions Five and Seven required submittal of a Coastal Access and Recreation Enhancement Plan and a Commercial and Recreational Fishing Coordination Plan, respectively. Condition Six does not require the submittal of a plan; rather, the condition requires DAF to ensure that annual payments by SpaceX are made for each pound of unrecoverable marine debris generated as a result of space launch and landing activities. Condition Six also requires DAF to provide an update on efforts to reduce the amount of marine debris released as part of launch activities. DAF submitted these

plans and documents to Commission staff on September 13, 16 and 25, 2024. DAF has included plans for Conditions Five and Seven and their implementation in its current consistency determination for 100 SpaceX launches per year.

For the Coastal Access and Recreation Enhancement Plan (provided as Appendix B to the CD), DAF shared information on how it would implement the three items specifically outlined in Condition 5, the coastal environmental education program for Lompoc Unified School District, the digital sign regarding Jalama County Beach Park camping availability at the intersection of Highway 1 and Jalama Rd., and the satellite internet service at Jalama Beach County Park. DAF also provided subsequent clarification through an email dated September 17, 2024, that the environmental education program would continue for the “life of the consistency determination” and internet service would be renewed after two years. The consistency determination does not include an identified termination date. DAF also updated Commission staff that the evacuation shuttle it had previously proposed to facilitate safety closures of Jalama Beach and campground is no longer being considered due to concerns raised by Santa Barbara County regarding logistics.

DAF also provided a copy of the Commercial and Recreational Fishing Coordination Plan (as Appendix H to the CD). Commission staff is currently completing its review and will follow up, as necessary. Finally, DAF provided a written update regarding its efforts to minimize marine debris (including a Marine Debris Plan in Appendix G of the CD). These efforts include a reduction in per-launch weather balloon use, the use of new equipment that would result in a significant reduction in plastic material, and investigation of ground-based alternatives to weather balloons. As part of its CD for the 100 launch per year cadence, DAF states that it has expanded its marine debris mitigation program to include payments to the National Marine Sanctuary Foundation⁹⁰ in addition to its payments to the UC Davis lost fishing gear removal program. Payments would be split between the two organizations, as discussed in more detail in Section IV.C for Marine Debris, below.

⁹⁰ The National Marine Sanctuary Foundation works closely with California State University Channel Islands’ Santa Rosa Island Research Station marine debris program team.

APPENDIX D – SUPPLEMENTARY INFORMATION

Cumulative VSFB Launch Activities and Engine Noise

Commission staff is aware of several other pending launch programs (see Table B-1, below), the proposed increase in SpaceX launches to 100 per year plus the addition of Falcon Heavy, and the potential construction of new launch facilities at VSFB to support further expansion of launch activities. All of these have the potential to increase the total launch activity on the base. The cumulative effects of engine noise from space launch activities are influenced by the geographic distance between launch sites, the timing of launches, the size and engine noise intensity created by different launch vehicles, and the actual number of launches that take place (as noted above, the number of actual launches has traditionally been ten percent or less of the authorized number).

Launch activities are spread out across the geography of VSFB. The geographic distance between launch facilities reduces the frequency of intense impacts on any one population of wildlife near a particular launch facility, but also spreads less intense impacts across a larger geographic space. With operation of the proposed project the highest number of contracted launches would be launched from the areas of SLC-4, the site of the currently proposed SpaceX project, and SLC-6, the site of proposed launches for the larger SpaceX rocket, the Falcon 9 Heavy. Both of these sites are located in the southern portion of VSFB. The habitats considered here would be affected by engine noise from several launch facilities. The 2023 United States Fish and Wildlife Service (USFWS) Biological Opinion for the previously proposed increase to 36 SpaceX launches annually states:

The Service understands that the proposed project would contribute to the frequency of an existing launch disturbance baseline. Over the past five years, VSFB has supported an average of 6.2 rocket launches per year with a maximum of 17 in 2022. However, other proponents have recently initiated several adjacent launch programs within the vicinity of SLC-4. Of these, those that will have noise impacts on Honda Creek, Bear Creek, and/or the Santa Ynez River of at least 100 [decibels (dB)] SPLmax include Phantom Daytona-E (SLC-8) and Minotaur (SLC-8), Phantom Daytona-E/Laguna-E (SLC-8), ULA Vulcan (SLC-3), Blue Origin New Glenn (SLC-9), and Relativity Terran 1 (SLC-11). If all these programs achieve full launch tempo by 2028, the total number of launch disturbance events over 100 dB SPLmax would be up to 169 within the action area. With the addition of the proposed project, this permitted total would raise to 217 launch disturbance events.

Not all space launch vehicles create the same amount of engine noise, however. Table B-1 below provides a summary of the engine noise produced at the launch pad by different space launch programs at VSFB.⁹¹

⁹¹ This information was provided to Commission staff by DAF in a previous consistency determination submittal (CD-0010-22)

Table B-1: Maximum Engine Noise produced at the Launch pad from space launch vehicles at VSFB

Space Launch Vehicle	Maximum Engine Noise at the Launch Pad During Launch (dB) ¹	Space Vehicle Height
Minotaur	unknown	63 feet
Firefly Alpha	120 dB ²	95 feet
ABL RS1	120 dB ²	88 feet
New Glenn (proposed)	120 dB ³	360 feet
Vulcan Centaur	120 dB ⁴	229 feet
Falcon 9	150 dB	178 feet
Falcon Heavy	150 dB	229 feet
Laguna-E (proposed)	144 dB	78.7 feet
Daytona-E (proposed)	130 dB	54.4 feet
Delta IV (discontinued)	133 dB ⁵	236 feet

¹ Decibels dB) and A-weighted decibels (dBA) reported here are for launch noise in the immediate vicinity of the launch pad unless otherwise stated

² Within 0.5 miles of launch pad

³ Within 5.6 miles of launch pad

⁴ Within 4.4 miles of launch pad

⁵ Highest recorded dB from monitored launches. Data is from NROL-49 Delta IV Heavy launch in January 2011; data recorded approximately 1.8 miles away from launch pad

As discussed in the Commission's findings for CD-0010-22, the significant discrepancy between contracted launches and actual launches at VSFB influences the cumulative effects of VSFB's launch programs. From 2017-2021, an average of 4.7 percent of the total number of contracted launches were carried out at VSFB. This means that although National Environmental Policy Act (NEPA) review and the Department of the Air Force (DAF) agreements allow a high number of launches, the actual number of launches and their resulting sound effects can be lower. DAF has previously stated that the discrepancy between permitted launches and actual launches is due to the availability and need for each specific rocket. Rockets often require updates or become unavailable for extended periods of time. Authorization for launches beyond what is required allows for DAF to shift government contracts and payloads to another rocket or provider, when necessary. Additionally, DAF previously stated:

There is variability in need for payloads to be delivered into orbit - the higher number of launches available at each site increases the flexibility of our national defense program. We also need to be primed and ready should there be an attack on our satellites/resources in orbit. We need to ensure there are enough resources available to get additional satellites into orbit to support our warfighters and defend our nation should the need arise.

Given the current situation, DAF believes that the discrepancy between allowable launches and actual launches will continue. Ultimately, DAF has determined that the Western Range can support a maximum number of 110 space launches, and a maximum number of 15 missile launches annually. These limitations are due to personnel and range safety considerations, and the maximum number of launches remains below the potential total contracted number of launches, should all proposed space launch projects move forward.

Background Information on Sonic Booms

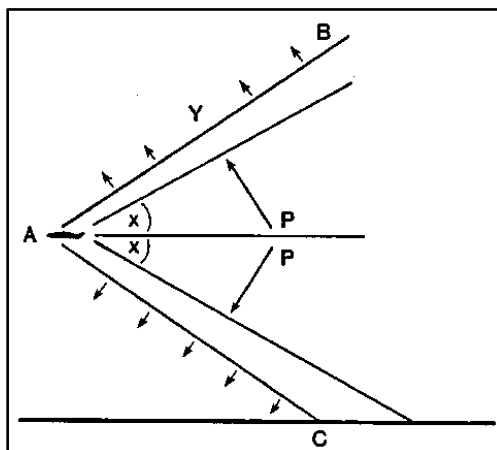
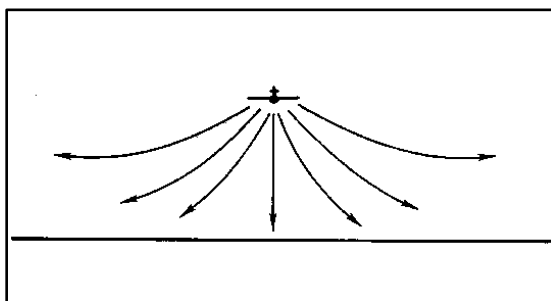
A literature synthesis of effects of aircraft noise and sonic booms on domestic animals and wildlife (Manci et al. 1998)⁹² by the U.S. Fish and Wildlife Service National Ecology Research Center provides useful background information and figures describing how sonic booms are generated by flights that exceed the speed of sound and how they propagate through the atmosphere⁹³:

During supersonic flight, the shock waves generated from forward-facing portions of an aircraft are usually regions of positive overpressure. The waves originating from rear surfaces of the aircraft are typically regions of negative overpressure, or underpressure. The pressure signature is the variation in overpressure generated by the forward- and rearward-facing surfaces of an aircraft flying at supersonic speed, creating the sonic boom... As an aircraft reaches supersonic flight, the pressure signature is propagated along a path commonly referred to as the sonic boom ray (ray AC, [in Figure B-1, below]); the pressure signature is generated at the point on the flight line from which the sonic boom ray emanates (point P, [in Figure B-1, below]).

The sonic boom rays emanating from an aircraft operating at supersonic speed initially form a cone [in Figure B-1, below]. However, due to atmospheric variations (e.g., wind and temperature gradients) the rays conform to the laws of atmospheric refraction and become horn-shaped, forming a boom conoid [in Figure B-2, below]. Because all relevant refraction properties of the atmosphere are usually not known, developing an accurate boom conoid for a given supersonic flight event is difficult.

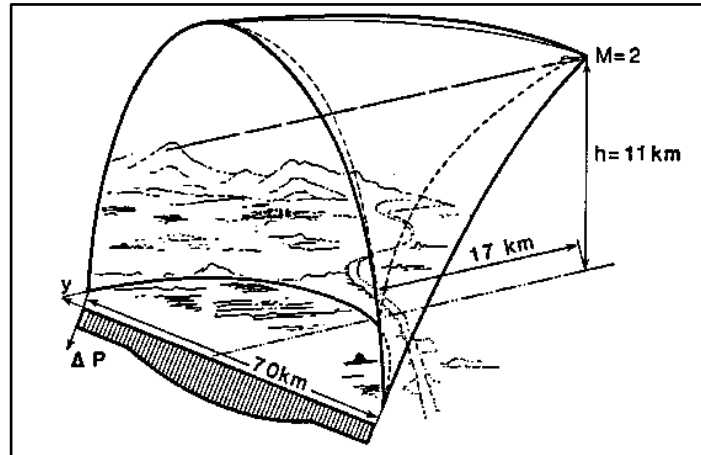
⁹² Manci, K.M., D.N. Gladwin, R. Villella, and M.G. Cavendish. 1988. Effects of aircraft noise and sonic booms on domestic animals and wildlife: a literature synthesis. U.S. Fish and Wild. Serv. National Ecology Research Center, Ft. Collins, CO. NERC-88/29. 88 pp.

⁹³ Figures B-1, B-2, and B-3, and captions in this report reproduced from Figures 4-6 of Manci (et al. 1998)

Figure B-1: Vertical section of sonic boom cone (Peterson and Gross 1972)⁹⁴**Figure B-2:** Refraction of boom rays as they pass down from an aircraft to the ground (Peterson and Gross 1972)

In the absence of winds, the increase in the speed of a sonic boom along a descending ray creates a decrease in the ray angle (Peterson and Gross 1972). For this reason, a boom ray tends to be refracted upward, away from the ground. Due to this phenomenon, angles from the vertical of two boom rays from each point on a supersonic flight path are sufficiently great that the boom rays only graze, or do not reach, the ground. The sonic boom "carpet" (the area on the ground that experiences the sonic boom) is defined by the locus of points of the boom rays that just graze the ground [(in Figure B-3 below)]. Surface areas outside these points experience no sonic boom.

⁹⁴ Peterson, A.P., and E.E. Gross, eds. 1972. Handbook of noise measurement. General Radio Company, Concord, MA

Figure B-3: Sonic boom carpet from supersonic flight (Peterson and Gross 1972)

A tail wind behind an aircraft enhances the effect of the increase in sound speed. A head wind creates the opposite effect and tends to refract the boom rays toward the ground. Also, the paths of propagation of the atmospheric pressure disturbances depend on the manner the aircraft is flown, as well as on the prevailing atmospheric conditions.

Under certain aircraft operating conditions (e.g., acceleration, dives, turns, and climbs), the sonic boom conoids generated by the aircraft may intersect one another. This effect is known as sonic boom focusing. Such focusing may also result from refraction effects caused by variations in atmospheric sound and wind speed. Focused sonic booms may be of much greater intensity than unfocused booms and are typically generated by fighter aircraft in "dogfight" maneuvers.

Regarding noise propagation, Mancini et al. (1998) also explains the following:

The propagation of aircraft noise and sonic boom from source to receiver is a function of several factors, including relative distance; atmospheric attenuation due to wind, humidity, and temperature; and intervening noise barriers (e.g., large stands of trees and buildings). The distance relationship is relatively straightforward; as acoustic energy spreads out over an increasingly larger area, the amount of sound energy per unit volume of atmosphere steadily decreases. For subsonic noise, this decrease is inversely proportional to the square of the distance between the aircraft and the receiver (i.e., a decrease in acoustic intensity of approximately 6 dB for each doubling in relative distance).

Atmospheric conditions affect noise propagation. Water vapor in the atmosphere is relatively effective at absorbing noise. Also, the higher noise frequencies are more readily absorbed. For this reason, high-frequency noise typically decreases with distance more rapidly than does either midrange or low-frequency noise. For aircraft in flight, air absorption has the greatest influence on noise propagation.

Atmospheric temperature gradients also affect aircraft noise propagation. During periods of normal temperature gradients, where air temperature steadily decreases with increasing altitude, aircraft noise is, for the most part, deflected upward, thereby producing areas of little or no noise on the ground at certain distances from the aircraft. During periods of atmospheric temperature inversion, the reverse situation is true and aircraft noise tends to be deflected downward, thus increasing ground noise level (Gladwin 1978)⁹⁵.

As described above, the propagation of sonic booms depends on several factors, including atmospheric conditions. As discussed in more detail below for sonic booms affecting off-base areas during rocket launches, these factors contribute to the complicated nature of modeling where sonic booms are expected to be experienced during a given launch.

General Information on Wildlife Responses to Noise and Sonic Booms

Marine Mammal Responses

The literature synthesis of effects of aircraft noise and sonic booms on domestic animals and wildlife (Manci et al. 1998)⁹⁶ by the U.S. Fish and Wildlife Service National Ecology Research Center provides the following general information regarding the effects of elevated and sudden noise on pinnipeds:

A number of field, laboratory, and library investigations were undertaken between 1978-1980 to assess the potential for adverse effects on biological and physical resources of the Channel Islands resulting from intense sonic booms from launches of the space shuttle (proposed for southern California) (Jehl and Cooper 1980)⁹⁷. Low-flying helicopters, humans on foot, sonic booms, and loud boat noises were the most disturbing influences to pinnipeds. "Loud" sonic booms (80-89 dBA) elicited more startle reactions in animals than "soft" booms (72-79 dBA). Duration of startle responses to loud booms was shorter than to other disturbances. Among the pinnipeds, harbor seals (*Phoca vitulina*) were most likely to startle; no serious disturbance was recorded among northern elephant seals (*Mirounga angustirostris*). Historical data indicated that the [1998] level of disturbance on San Miguel Island does not measurably affect pinniped populations. Sonic booms from the space shuttle launches may increase the disturbance level by 10%-20%. Avoiding launches during the pupping season (March-July) was recommended to minimize disturbances. During this season, launches and returns during the noon hours should be avoided to prevent exposure of pups to heat. Temporary decreases in hearing sensitivity of marine

⁹⁵ Gladwin, D.N. 1978. A*E*I*S: an airport environmental information system for Virginia. M.S. Thesis, Virginia Polytechnical Institute and State University, Blacksburg. 333 pp.

⁹⁶ Manci, K.M., D.N. Gladwin, R. Villella, and M.G. Cavendish. 1988. Effects of aircraft noise and sonic booms on domestic animals and wildlife: a literature synthesis. U.S. Fish and Wildl. Serv. National Ecology Research Center, Ft. Collins, CO. NERC-88/29. 88 pp.

⁹⁷ Jehl, J.R., and C.F. Cooper, eds. 1980. Potential effects of space shuttle booms on the biota and geology of the California Channel Islands: research reports. Center for Marine Studies, San Diego State University, San Diego, CA, Tech. Rep. 80-1. 246 pp.

mammals could occur following the few intense booms directly over the islands caused by launches of the space shuttle [...]. Jehl and Cooper (1980) recommended careful observation of behavioral effects of space shuttle booms on Channel Island marine mammals, coupled with long-term population monitoring.

On San Nicolas and San Miguel Islands in California, breeding elephant seals and sea lions were exposed to loud impulse noise created by a carbide pest control cannon to simulate actual sonic booms (Stewart 1982)⁹⁸. Distances of seals from the sound source varied from 5-100 m. Sound pressure level was 145.5 dB(A), 146.9 dB(flat), 20 uPa at 5 m from the cannon and 115.6 dB(A), 125.7 dB(flat), at 50 m from the cannon. The intensity and duration of behavioral responses of each species varied by sex, age, and season. More male elephant seals (74%) reacted with alert behavior than females (65%¹); only 26% of the nursing pups reacted. Animals returned to normal activity within a few minutes and no habituation to the sound, movement, trampling of pups, or increase in threat displays were observed. Alert reaction from human intrusion lasted longer than reactions from simulated booms. During the nonbreeding season over 70% of the sea lions left the haul-out areas and went down to the surfline after a simulated boom. During the breeding season, 60%-95% of the females were alert for about a minute after a boom; few males reacted to the noise. No trampling of pups was observed and females moved less than 1 m from their pups.

Other Wildlife Responses

The literature synthesis of effects of aircraft noise and sonic booms on domestic animals and wildlife (Manci et al. 1998) by the U.S. Fish and Wildlife Service National Ecology Research Center (which was also referenced above for its information on pinnipeds and background information on sonic booms) provides the following general information regarding the effects of elevated and sudden noise on wildlife:

Noise affects wildlife and other animals, including humans, in many ways. Janssen (1980)⁹⁹ categorized these effects as primary, secondary, or tertiary. Primary effects are direct physical auditory changes, such as eardrum rupture, temporary and permanent hearing threshold shifts, and the masking of auditory signals. Basking is the inability of an animal to hear important environmental signals. These signals include noises made by potential mates, predators, or prey. Aircraft noise could conceivably cause masking of the signals in some species and populations of wildlife. Secondary effects of aircraft noise and sonic booms on wildlife include such nonauditory effects as stress, behavioral changes, interference with mating, and detrimental changes in the ability to

⁹⁸ Stewart, B.S. 1982. Studies on the pinnipeds of the southern California Channel Islands, 1980-1981. Hubbs-Sea World Res. Inst., San Diego, CA, Tech. Rep. No. 82-136. 117 pp.

⁹⁹ Janssen, R. 1980. Future scientific activities in effects of noise on animals. Pages 632-637 in J.V. Tobias, G. Jansen, and W.D. Ward, eds. Proceedings of the Third International Congress on Noise as a Public Health Problem. Am. Speech-Language-Hearing Assoc., Rockville, MD.

obtain sufficient food, water, and cover. Tertiary effects are the direct result of both primary and secondary effects, and include population declines, destruction of important habitat (Klein 1973)¹⁰⁰, and, in extreme cases, potential species extinction (Bender 1977)¹⁰¹.

Animal species differ greatly in their response to noise of various characteristics and duration. Individual animal response to a given noise event or series of events also can vary widely, due to a variety of factors, including time of day and year, physical condition of the animal, physical environment (such as whether the animal is restrained or unrestrained), the experience of the individual animal, and whether or not other physical stressors (e.g., drought) are present.

The effects of noise on the physiology of laboratory animals have been studied more thoroughly than effects on farm animals or wildlife. Although laboratory studies cannot be directly applied to effects of noise on wildlife in their natural habitats, they do describe a range of potential effects that may possibly occur. Hearing sensitivity, susceptibility to noise-induced hearing loss, and physiological effects of noise vary among animal species. Animals appear to be more sensitive to noise disturbance than humans (Borg, 1981)¹⁰². Possible harmful effects of sound may be more related to information content of the sound--information pertaining to risky actions or masking significant information--rather than to sound itself.

A sudden or unfamiliar sound is believed to act as an alarm, activating the sympathetic nervous system. The short-term physiological stress reactions, referred to as "fight-or-flight," are similar for many vertebrate species (Holler 1978). Various stimuli can produce similar physiological effects. Different stressors have their own unique effects, however, and reactions to stress can vary between species and also among individuals of the same species. Only laboratory studies have been able to eliminate these variables and show that noise produces certain physiological effects.

The general pattern of response to stress includes activation of the neural and endocrine systems, causing changes such as increased blood pressure, available glucose, and blood levels of corticosteroids. The effect of sympathetic activation on circulation also is believed to have an effect on hearing (Holler 1978). A correlation has been shown to exist between the reaction on the peripheral circulation and the temporary threshold shift caused by noise exposure. Prolonged exposure to severe stress may exhaust an animal's resources and result in death.

¹⁰⁰ Klein, D.R. 1973. The reaction of some northern mammals to aircraft disturbance. Pages 377-383 in 11th Int. Congr. Game Biol., Sept. 3-7, 1973, Stockholm, Sweden. Natl. Swedish Environ. Prot. Board, Stockholm.

¹⁰¹ Bender, A. 1977. Noise impact on wildlife: an environmental impact assessment. Pages 155-165 in Proc. 9th Conf. Space Simulation. NASA (P-20007).

¹⁰² Borg, E. 1981. Physiological and pathogenic effects of sound. Acta Otolaryngol. Suppl. 381:7-68.

DAF provided its own literature review in a memo to Commission staff (included as Exhibit 17 of the August 8, 2024, staff report for CD-0003-24, [Appendix A](#)) on July 24, 2024, in response to a request by Commission staff for information to address concerns about potential impacts to wildlife by noise, including from sonic booms. This memo provided a further summary of findings from scientific studies that have investigated these issues and discusses, among other topics, common animal responses to noise (including startle responses and habituation), the high degree of variability in responses among different species, and the difficulty, in some cases, of separating the effects of noise from other factors. While the memo discussed the potential for habituation to loud noises to occur, stating that the “intensities and durations of the startle response decrease with the numbers and frequencies of exposures, suggesting no long-term adverse effects”, Commission staff notes that there is little evidence that wildlife can habituate to loud noise when it occurs irregularly and sporadically. A lack of information and studies on this issue should not be considered evidence of no effects. The limited studies that have been done on sonic booms specifically involved more infrequent sonic booms than are occurring under the current launch cadence.

Additionally, as discussed previously in relation to marine mammals, repeated behavioral disturbances from noise or overpressure events are disruptive to individual animals and to populations, can induce stress responses and physiological changes, increase energy expenditures, and carry a risk of injury, particularly to eggs or young. The severity of such effects is likely to be influenced by the pattern and frequency of disturbance, as well as the timing in relation to an organism’s life cycle (e.g., breeding or nesting periods). Generally, the more frequent and aperiodic the disturbance, the more substantial the risk of adverse effects. Although few studies have been carried out on the long-term effects to seabirds and other sensitive wildlife (e.g., amphibians, bats, insects) of exposure to sonic booms, engine noise or other elevated, short duration sounds, research into other sources of disturbance demonstrates that a threshold exists beyond which the animals and/or colony/aggregation will abandon the area.

APPENDIX E – ENVIRONMENTALLY SENSITIVE HABITAT AREAS BACKGROUND

The information included in this appendix consists of relevant findings from previous Commission staff reports for consistency determination (CD) nos. CD-0003-24 and CD-0007-24 specific to Environmentally Sensitive Habitat Areas (ESHAs) that could be potentially adversely impacted by SpaceX launch activities. Therefore, this appendix covers information available at the time of those reports. Any new information specific to ESHAs and SpaceX launch activities for the proposed project is addressed in Section IV.D of this staff report. As described in Section IV.D of the staff report the United States Fish and Wildlife Service (USFWS) has not issued the Biological Opinion (BO) for the proposed project.

Types of Environmentally Sensitive Habitat Areas

Western Snowy Plover Habitat

The coastal dunes and beaches of western Santa Barbara County, including within and adjacent to VSFB, provide breeding and foraging habitat for western snowy plover (plover (*Charadrius nivosus nivosus*, ‘snowy plover’), a rare, vulnerable shorebird species that has experienced historical population declines due to habitat loss and other factors. Surveys carried out by Point Blue Conservation Science, an independent avian research organization, for the Department of the Air Force (DAF) and provided to Commission staff as part of previous consistency determinations have documented western snowy plover nesting habitat on the beach approximately 2 miles northwest of the SpaceX launch and landing site within VSFB (USFWS 2023). The rarity and vulnerability of snowy plover is well established, with the species being listed as threatened under the federal Endangered Species Act since 1993 and with global and state rarity rankings of G3T3 and S3 respectively¹⁰³. They are also listed as California Species of Special Concern. The west coast-wide recovery objective for snowy plover is 3,000 birds, and the current population estimate falls over 20% below that at 2,371 birds. The USFWS notes that threats to snowy plover and their habitat include “habitat loss and degradation attributed to human disturbance, urban development, introduced beachgrass, and expanding predator populations,” indicating that snowy plover nesting habitat is easily degraded by human activities and developments (USFWS 2023). The USFWS additionally identified that active efforts to improve habitat at breeding beaches have improved snowy plover population numbers (USFWS 2023). Therefore, snowy plover habitat has been identified as ESHA by the Commission.

¹⁰³ G3 and S3 ranked species are those considered ‘vulnerable’ and at moderate risk of extinction or elimination due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors. And taxa which are subspecies receive a taxon rank (**T-rank**) in addition to the G-rank. Whereas the G-rank reflects the condition of the entire species, the T-rank reflects the global status of just the subspecies.

Snowy plovers are present throughout the coastal zone in California, both north and south of VSFB. In the winter, snowy plovers migrate to non-nesting beaches to forage (USFWS 2023). The populations of snowy plover nesting and reproducing on VSFB therefore disperse to other beaches outside the base in the winter and may use beaches in the coastal zone for nesting the following year. Thus, nesting habitat on VSFB contributes to snowy plover population growth within the coastal zone. Impacts to snowy plover nesting habitat on VSFB would affect snowy plovers in the coastal zone due to species movement during the winter season and reduced population viability.

Preventing the degradation of this nesting habitat, including the aural environment, is important for the continued population growth and recovery of snowy plover. VSFB contributes to the largest sub-population of snowy plovers from San Luis Obispo County through Ventura County. The population target established by the USFWS for snowy plover in San Luis Obispo, Santa Barbara, and Ventura Counties is 1,200 breeding adults. In 2022, the USFWS found that the population remains well below this target at 804 breeding adults (USFWS 2023). This comparatively large population is critical to maintain and grow for long-term success of the species along the west coast.

California Least Tern Habitat

Several areas of coastal strand habitat along the north VSFB coastline support nesting colonies of California least tern (*Sternula antillarum browni*), a rare, threatened migratory bird species that has been listed under the federal and California Endangered Species Acts since 1972 with global and state rarity rankings of G4T2T3Q and S2, respectively¹⁰⁴ (USFWS, 2023). They are also listed as California Fully Protected species. California least tern prefers to nest in small, scattered clusters on natural or artificial open areas near estuaries, bays, or harbors where small fish are abundant. The primary colony at VSFB for California least tern is at Purisima Point, located approximately 8 miles north of the launch facility at SLC-4. California least tern forage in the lagoon at the mouth of the Santa Ynez River and other near-shore locations at VSFB (USFWS, 2023).

Coastal habitats at VSFB support a relatively small percentage of the total number of California's total California least tern breeding population. However, the population at VSFB is significant because it is one of only three breeding colonies between Monterey and Point Conception. Also, the breeding colony at VSFB tends to be reproductively successful (USFWS, 2023). Similar to western snowy plover, since VSFB is a significant location for hosting breeding colonies of California least tern, California least tern nesting habitat is considered ESHA by the Commission. Additionally, since the populations of California least tern disperse to other areas of the coast during the winter, nesting habitat on VSFB contributes to California least tern population recovery within the coastal zone, and impacts to California least tern nesting habitat on VSFB would affect California least tern in the coastal zone due to species movement and

¹⁰⁴ A Q-rank indicates questionable taxonomy; that the distinctiveness of this entity as a taxon at the current level is questionable. Resolution of this uncertainty may result in change from a species to a subspecies or hybrid. The "Q" modifier is only used at the global level, not the state level.

reduced population viability. As such, preventing degradation of this nesting habitat is important for the continued population growth and recovery of the California least tern.

California Red-Legged Frog Habitat

Although California red-legged frog (*Rana draytonii*, CRLF) are not present in Spring Canyon directly adjacent to the SLC-4 SpaceX launch and landing complex, DAF have documented CRLF within Bear Creek and Honda Creek, located 0.75 miles and 2 miles to the south of SLC-4, respectively. The Commission's staff ecologist has identified these locations as ESHA because they provide breeding habitat, forage and refuge for CRLF.

The rarity of California red-legged frogs is widely recognized and has resulted in its designation as a federally threatened species with global and state rarity rankings of G2G3 S2S3 and listing as a California Species of Special Concern¹⁰⁵. CRLF are sensitive to disturbance and their habitat can be easily disturbed or degraded from development including direct habitat loss due to stream alteration, loss of aquatic habitat, and indirect effects of expanding urbanization affecting their dispersal and migration into new habitats, as noted in the 2023 USFWS Biological Opinion for the SpaceX proposal to launch up to 36 Falcon 9 rockets annually. CRLF is a coastal species found outside of VSFB in the coastal zone in streams along the coast and transverse ranges of California, including coastal Santa Barbara County. The populations on VSFB add to the genetic diversity and population of CRLF outside of the base, particularly because this species of frogs are known to make long-distance overland migrations (up to 1.75 miles in wet environments) to suitable breeding habitat elsewhere. The USFWS notes that coastal CRLF populations in Santa Barbara County and to the north show genetic connectivity, indicating that there is migration and gene flow between CRLF populations on VSFB and those in the coastal zone outside of the federal property (USFWS 2023). The loss of CRLF populations on VSFB would reduce genetic diversity and gene flow between frog populations, which could affect the overall population of CRLF in the coastal zone outside of the base. For rare species, maintaining genetic diversity is particularly critical in the face of climate change due to the variety of environmental stressors it can bring and the need for adaptation and new traits that will enable survival.

Pallid Bat and Western Red Bat Habitat

The pallid bat (*Antrozous pallidus*) and western red bat (*Lasiurus frantzii*) are known to be present within VSFB in proximity to the area affected by launch noise and lighting. The most consistent observations have been within the riparian habitat of Honda Creek roughly two miles south of the SpaceX launch complex. These bat species have state rarity rankings of S3 and have been designated by the California Department of Fish

¹⁰⁵ G2 and S2 ranked species are considered 'imperiled' and at high risk of extinction or elimination due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors.

and Wildlife (CDFW) as Species of Special Concern¹⁰⁶. Bats play a special role in the ecosystem due to their high metabolic needs and extensive feeding on insects.

CDFW identified pallid bats as Species of Special Concern because they have experienced a marked population decline in recent years in California. Pallid bats are not tolerant of suburban or urban development and habitat conversion has led to their decline (CDFW 1998). CDFW identified western red bats as Species of Special Concern because they face increased predation from species associated with human development (jays and opossums), and their primary habitat in riparian corridors is under consistent threat of conversion to other land uses, specifically agriculture (CDFW 1998). CDFW's findings show that the habitat of both bat species is easily disturbed or degraded by development, leading to population declines. Within California, both pallid bats and western red bats are vulnerable and at moderate risk of extinction due to a restricted range, relatively few populations or recent and widespread declines. Populations of these species (and bat populations in general) are also at risk for significant declines in California due to the recent emergence of white-nose syndrome, a disease caused by a fungal infection that frequently results in high mortality rates and the catastrophic loss of entire bat colonies (CDFW 2023). The special role of these bat species in the ecosystem and their vulnerability to population declines supports identification of their riparian corridor roosting habitats as ESHA.

Riparian habitats supporting these bat species occur both on VSFB and outside of VSFB in the coastal zone of northern Santa Barbara County. Adverse impacts to the populations on VSFB would have spillover effects to outside areas, including within the coastal zone, by reducing overall carrying capacity, resiliency, and genetic diversity of pallid bats and western red bats in Santa Barbara County.

Monarch Butterfly Habitat

Monarch butterflies (*Danaus plexippus*) are large and conspicuous, with bright orange wings surrounded by a black border and covered with black veins. Individual monarchs in temperate climates, such as western North America, undergo long-distance migration, and live for an extended period of time. In the fall, monarchs begin migrating to their respective overwintering sites. This migration can take monarchs over distances of 1,800 miles and last for over two months¹⁰⁷. Monarch populations have declined over the past twenty years due to several interrelated factors including habitat degradation and loss in breeding and overwintering sites, disease, pesticide exposure, and climate change. Recently, the western migratory population (including California) has experienced dramatic swings, including a low of less than 2,000 individuals in 2020-21, highlighting the vulnerability of the species to perturbations like habitat loss¹⁰⁸. Monarch butterflies are currently identified as a candidate species for federal listing, and the

¹⁰⁶ S3 ranked species are those considered 'vulnerable' and at moderate risk of extinction or elimination due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.

¹⁰⁷ <https://ecos.fws.gov/ecp/species/9743>

¹⁰⁸ <https://wildlife.ca.gov/Conservation/Invertebrates/Monarch-Butterfly>

USFWS found in 2020 that listing was warranted, but precluded by other higher priority listing actions.

There are multiple eucalyptus groves within VSFB that are known monarch overwintering sites. One of these areas, consisting of two distinct eucalyptus stands that support monarch overwintering aggregations, is located immediately south of SLC-4, within Spring Canyon (see Exhibit 2 of the staff report prepared for the August 8, 2024, hearing, in [Appendix A](#)). The highest number of monarchs observed in the westward and eastward stands over the past decade was 6,015 and 11,082 in 2011 and 2013 respectively. Those numbers declined to zero in subsequent years but have been slowly increasing in the westward and eastwards stands with 16,616, 10,768, and 2,235 and 30, 186, and 265 in the years spanning 2021 to 2023, respectively.

Similar to western snowy plover and California least tern, since VSFB is a location for hosting overwintering colonies of monarch butterflies, and overwintering habitat is critical for the persistence of the species, monarch butterfly habitat is considered ESHA by the Commission. Additionally, since the populations of monarch butterfly disperse to other areas of the coast, overwintering habitat on VSFB contributes to monarch butterfly populations within the coastal zone and impacts to monarch butterfly habitat on VSFB would affect monarch butterflies in the coastal zone due to species movement and reduced population viability. As such, preventing degradation of overwintering habitat adjacent to the SpaceX launch and landing site is important for the continued population growth and recovery of the monarch butterfly.

Southwestern Pond Turtle Habitat

The 2024 USFWS Biological Opinion for 50 SpaceX launches in 2024 included a new conference opinion for the southwestern pond turtle (*Actinemys pallida*), a species which was not addressed in the USFWS 2023 Biological Opinion, and found that the proposed project is likely to adversely affect but would not likely jeopardize the continued existence of this species. The southwestern pond turtle (SWPT) has a global rarity ranking of G2G3¹⁰⁹ and listed as a California Species of Special Concern. That USFWS 2024 Biological Opinion states:

Southwestern pond turtles are semi-aquatic, having both terrestrial and aquatic life history phases. Eggs are laid in upland terrestrial habitat, and hatchlings, juveniles, and adults use both terrestrial and aquatic habitat. Terrestrial environments are required for nesting, overwintering, and aestivation (warm season dormancy), basking, and movement/dispersal. Aquatic environments are required for breeding, feeding, overwintering and sheltering, basking, and movement/dispersal.

Similar to California red-legged frog, SWPT are sensitive to disturbance and their habitat can be easily disturbed or degraded from development including direct habitat loss due to stream alteration, loss of aquatic habitat, and indirect effects of expanding

¹⁰⁹ G2 ranked species are considered 'imperiled' and at high risk of extinction due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.

urbanization affecting their dispersal and migration into new habitats, as noted in the 2024 USFWS Biological Opinion. SWPT is a coastal species found in wetland and riparian habitats both within VSFB and in adjacent areas of the coastal zone, including coastal Santa Barbara, Ventura, and Los Angeles Counties. Over time, the populations on VSFB add to the genetic diversity and population of SWPT outside of the base via dispersal. For rare species, maintaining genetic diversity is particularly critical in the face of climate change due to the variety of environmental stressors it can bring and the need for adaptation and new traits that will enable survival.

Although SWPT are not known to be present in Spring Canyon directly adjacent to the SLC-4 SpaceX launch and landing complex, according to the 2024 USFWS Biological Opinion, DAF has documented SWPT on North VSFB (along San Antonio Creek, the Santa Ynez River, Shuman Creek, Lake Canyon, MOD Lake, and Punchbowl Pond) and on south VSFB (along Honda Creek and Jalama Creek). Honda Creek is located approximately 2 miles to the south of SLC-4. Jalama Creek is located just outside of VSFB but within the area of impact for engine noise from launches and sonic booms from landings. While Bear Creek (approximately 0.75 miles south of SLC-4) has not been surveyed for SWPT, it is known to support California red-legged frog, and therefore may reasonably be expected to support southwestern pond turtle breeding. In addition, the VSFB Integrated Natural Resources Management Plan notes that SWPT are found in riparian habitat such as arroyo willow shrubland and box elder forest and woodland alliances as well as Barka Slough and permanent ponds on the base.

All the rivers and creeks and associated riparian habitat on VSFB are considered ESHA by the Commission due to their rarity and sensitivity to disturbance, and because many support rare species such as SWPT. As discussed further below, the proposed SpaceX launch activities, including engine noise and sonic booms generated during launches and reentries, have the potential to adversely affect SWPT and the riparian and upland habitats on which the species relies.

Engine Noise and On-Base Sonic Booms

As described above, these species-specific sections below also provide relevant discussion from previous Commission staff reports and applies to the review of information at that time for DAF's consistency determinations for 36 and 50 Falcon 9 launches per year (and does not reflect information provided in the June 13, 2025, CD submittal, CD-0006-25, which is addressed in Section IV.D of the staff report).

Western Snowy Plover & Noise (On-Base)

As mentioned above, western snowy plover nesting habitat is located approximately 0.8 miles northwest of SLC-4 at the southern end of Surf Beach. DAF has conducted monitoring of western snowy plover nests during numerous launches at VSFB. In its consistency determination for 36 launch cadence, DAF states:

Direct observations of wintering birds were made during a Titan IV and Falcon 9 launch from SLC-4E (SRS Technologies, Inc. 2006b; Robinette and Ball 2013). The Titan IV launches resulted in sound levels of 130 [A-weighted decibels (dBA)]

Lmax. SNPL [snowy plover] did not exhibit any adverse reactions to these launches (SRS Technologies, Inc. 2006b; Robinette and Ball 2013) with the exception of one observation. During the launch of a Titan II from SLC-4W in 1998, monitoring of SNPL found the nest located closest to the launch facility had one of three eggs broken after the launch (Applegate and Schultz 1998). The cause of the damaged egg was not determined.

More recently on 12 June 2019, SNPL response was documented during a SpaceX Falcon 9 launch and first stage recovery at SLC-4. The return flight of the first stage to VSFB produced a 3.36 [pounds per square foot (psf)] sonic boom and landing engine noise of 138 [decibels (dB)] Lmax and 130 dB SEL, as measured on South Surf Beach. SNPL response to the noise impacts was documented via pre- and post-launch monitoring and video recording during the launch event. Incubating SNPL captured on video were observed to startle and either jump or hunker down in response to the sonic boom. One SNPL egg showed signs of potential damage. This egg was part of a three-egg clutch in which the other two eggs successfully hatched. It is not uncommon for one or more eggs from a successful nest to not hatch. Failure of the egg to hatch could not be conclusively tied to the launch event (Robinette and Rice 2019).

The USFWS has also reviewed the potential for launch noise to adversely impact snowy plover, and stated in their 2023 Biological Opinion:

... past monitoring results suggest that western snowy plovers exhibit some level of tolerance to high thresholds of sound pressure level and that they are nest tenacious during the breeding season (typically March 1 to September 30). However, the proposed action may result in short-term adverse effects including interruption of courtship or breeding activities, flushing from nests, interruptions in foraging, and behavioral reactions, such as head raising, body shifting, moving short distances, and flapping of wings. Startle responses during nesting may result in nest abandonment or dislodging of eggs from nest scrapes; adults may leave chicks unattended and vulnerable to elements or predation. We do not expect abandoned eggs and chicks to survive if adults do not return to the nest. Non-observable physiological responses of western snowy plover to noise disturbance may include an increased heart rate or altering of metabolism and hormone balance. These responses may cause energy expenditure, reduced feeding, habitat avoidance, reproductive losses, and bodily injury resulting in increased vulnerability to predation (Radle 2007, p. 5)...

... Considering the increase in launch cadence, the proposed project has the potential to contribute to long-term adverse effects that result from routine intermittent acute noise disturbance.

The USFWS 2023 Biological Opinion identifies the lack of information available for how plovers are expected to respond to the significant increase in annual launches, noting that:

...Referencing current best available information, the Service cannot adequately determine the anticipated impacts of the proposed project's 84 disturbance events annually on the western snowy plover population at Surf Beach. Similarly, the Service cannot adequately determine how the proposed project's 84 disturbance events would contribute to the existing launch baseline average of 6.2 events or the current permitted annual launch baseline of up to 189 events. The Service considers that although the project has the potential to significantly contribute to the collective effects of the existing launch disturbance baseline and result in long term population level effects, until the novel effects of the project activity are studied, we are unable to anticipate the magnitude of response at this time.

As part of the USFWS review for their 2023 Biological Opinion, DAF committed to augmenting the existing western snowy plover monitoring program on VSFB, which records habitat use, nesting efforts, nest fates, fledgling survival, and population size through each breeding season, with geospatial analysis of snowy plover nesting and the noise environment. Sound meters will be deployed immediately inland of South Surf Beach and at a control site to characterize the noise environment during the breeding season within the noise footprint of SpaceX launches. Geospatial analysis will be performed annually as SpaceX's launch frequency increases to assess whether patterns of nesting activity, nest fates, or fledgling success are negatively impacted by noise from SpaceX operations. If the geospatial analysis shows that a statistically significant decline in breeding effort or nest success has occurred over two consecutive years, and this decline cannot confidently be attributed to other natural or human caused factors, DAF will offset this impact by increasing predator removal efforts on VSFB to include the non-breeding season, particularly focusing on raven removal adjacent to VSFB beaches with a goal of achieving no net loss of the species. A more detailed description of this commitment is available in the 2023 Biological Opinion in Exhibit 9 of the staff report prepared for the August 8, 2024, hearing ([Appendix A](#)).

Commission staff reviewed DAF's western snowy plover monitoring program (including the annual reports provided to USFWS, as well as annual reports titled "Monitoring and Management of the Endangered California Least Tern and the Threatened Western Snowy Plover at Vandenberg Space Force Base" prepared for DAF by Point Blue Conservation Science, for the years 2018-2023) and identified outstanding concerns about the efficacy of the analysis of monitoring available and the conclusions being drawn from it. It is important to note that the requirements of monitoring for western snowy plover were revised and enhanced under the new BO issued in March of 2023. Therefore, the annual report for 2023 only included monitoring under the new requirements for approximately half of the October 2022 – September 2023 annual reporting period. Due to those changes in requirements, as well as the lower number of launches from previous years (and variability in the number of past launches conducted during plover nesting season), the 2023 annual report included a larger number of monitoring events during launches (i.e., 11 in 2023, two in 2022, one in 2019, and none in 2018, 2020, or 2021).

This lack of consistency and overall low number of monitoring events makes it difficult to draw conclusions about historical trends in impacts or how a higher launch cadence

could affect western snowy plover over time, but those BO requirements should have provided more consistency in monitoring moving forward. The annual monitoring and management reports prepared for DAF by Point Blue (Point Blue reports) contain more robust and consistent data about western snowy plover breeding and nesting at VSFB beaches; however, the data were not specifically tied to launch events. Based on the monitoring data included in the 2018-2023 Point Blue reports, there was higher level of western snowy plover nest abandonment base-wide and on south VSFB beaches (closer to SLC-4) in 2023 compared to prior years (2018-2022), corresponding to a marked increase in SpaceX launch frequency (from an average of 2.75 launches per year in 2018-2021, to 13 launches to 28 launches in 2023), but a robust statistical analysis including more historical data would be required to draw firm conclusions about these trends. While multivariate statistical analysis of changes in population trends in relation to the frequency of noise events from launches had not yet been conducted (prior to the August 2024 hearing on CD-0003-24), those data sets are considered a valuable resource to conduct such analyses.

The first of the monitoring reports provided for in the 2023 Biological Opinion was prepared for the 2023 calendar year and submitted in February 2024. A total of 24 Falcon 9 missions were performed on VSFB during the reporting period, including six boost-back landings at SLC-4W. Eleven of these 24 launches occurred during the western snowy plover nesting period. The report found no differences in incubation rates between launch events that included a sonic boom and those that didn't, but the report did identify reactions to the associated noise and noted stronger reactions to the sonic boom than the initial launch noise, mainly startle responses and hiding behavior. The report discussed how it is possible that the hiding or "hunker down" behavior could lead to damage to western snowy plover eggs. The majority of monitored eggs showed no signs of damage. However, several eggs were found either damaged or with an embryo that had stopped developing. The report couldn't attribute the damage to these eggs and the embryo from launches, but also could not conclusively discount the possibility that the launches and responses from plovers resulted in damage to the eggs. The report noted that eggs can be damaged for multiple reasons not necessarily related to launch activity, but emphasized that it will be important to continue to monitor the occurrence of damaged eggs to determine whether the occurrence of damaged eggs increases with increased launch cadence over time. Finally, the monitoring documented higher rates of snowy plover nest abandonment on south VSFB compared to north VSFB. The report was unable to determine if this higher abandonment rate was due to launch activity or other factors.

Although it is difficult to affirmatively discern an effect from one year of monitoring, the monitoring conducted thus far suggests a possible correlation between launching the Falcon 9 rockets and reactions from western snowy plovers, including startling and flushing and abandonment of nests. These first-year results of monitoring under the 2023 USFWS BO highlight the need for additional monitoring and statistical analysis in order to more fully understand how the current Falcon 9 launch cadence could be adversely impacting western snowy plover, and to predict what may happen if the frequency of launches increases further. Importantly, it may be necessary to collect multiple years of monitoring data at a given launch cadence in order to adequately

assess the effects of launch noise and sonic booms over time, while accounting for natural variability. This is consistent with the USFWS findings in the 2023 Biological Opinion that without long term population level effects analysis on the novel effects of increased launch cadence, it is difficult to accurately anticipate the magnitude of the response from western snowy plover. Additionally, landscape level monitoring and camera redundancy would provide more opportunities to detect any direct causal impacts between noise from specific launches and impacts to specific nests/eggs for which camera data was not available.

California Least Tern (LETE) & Noise (On-Base)

The known California least tern nesting site at Purisima Point is approximately 8 miles north of the SLC-4 SpaceX launch site and the roosting location at Santa Ynez River is located approximately 3.7 miles north of SLC-4. If launches and static fire tests are performed when California least tern are present at VSFB, the colony at Purisima Point would experience an engine noise of 102 decibels (dB) to 108 dB while the colony at the Santa Ynez River mouth would receive engine noise of 80 dB to 110 dB. In its consistency determination for the 36 launch cadence, DAF stated:

At VSFB, LETÉ monitoring has been conducted for five Delta II launches from SLC-2 on north VSFB. SLC-2 is 0.4 mi. (0.6 km) from the Purisima Point nesting colony. LETÉ responses to launch noise have varied. Pre- and post-launch monitoring of non-breeding LETÉ for the 7 June 2007 Delta II COSMO-1 launch and monitoring of nesting LETÉ during the 20 June 2008 Delta II OSTM and 10 June 2011 Delta II AQUARIUS launches did not document any mortality of adults, young, or eggs, or any abnormal behavior resulting from launches (MSRS 2007a, 2008b, 2011). In addition, Delta II launches from SLC-2 in 2002 and 2005, when terns were arriving at the colony, may have caused temporary or permanent emigration from the colony because there was decreased attendance following the launches (Robinette et al. 2003; Robinette & Rogan 2005). These data imply that LETÉ response to noise relates to timing with the nesting cycle. For instance, at the beginning of the nesting season when LETÉ are arriving at the breeding colony, the adults seem to be more disturbed, but once courtship and nest-tending begins, the adults are more tenacious.

On 12 June 2019, LETÉ response was documented during a SpaceX Falcon 9 launch with first stage landing at SLC-4 on VSFB. The landing produced a 2.7 psf sonic boom, as measured at the Purisima LETÉ colony. LETÉ response to the launch and boost-back landing was documented via pre- and post-launch monitoring and video recording during the launch event. LETÉ response during the launch was difficult to determine since birds flushed before sonic boom impact. All LETÉ returned to their nests minutes after the launch event. One LETÉ egg was found to be damaged. The damaged LETÉ egg was from a one egg clutch and was inspected when it was a week past hatch date. The cause of the damage to the egg was inconclusive (Robinette & Rice 2019).

The effect of increasing noise disturbances on LETÉ will be uncertain based on the scientific literature. However, none of these studies in the scientific literature are

directly comparable to the noise impacts of the Proposed Action. Launch engine noise and sonic booms are acute, non-sustained, and unpredictable. It is more similar to aircraft noise disturbances studied in the literature yet would be relatively much less frequent. Beyond the launch monitoring efforts discussed above, there are almost no studies on the effects of rocket launch on birds.

In its 2023 Biological Opinion, the USFWS found that “past monitoring results suggest that California least tern response to noise is related to timing within the nesting cycle and that launch operations that occur during the breeding season, particularly the early courtship season, may disturb nesting”. However, with DAF’s proposal to monitor and mitigate for any impacts at the local level to achieve no net loss of the species, the USFWS ultimately concluded that:

After reviewing the current status of the California least tern, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the California least tern...

As discussed above, DAF has previously conducted long-term monitoring on VSFB to assess California least tern and their response to launch activities, including noise and sonic booms. DAF has stated that its monitoring of California least tern to date has found that launch activities have not decreased California least tern populations and have only produced temporary observable changes in behavior. DAF committed to California least tern monitoring and mitigation as part of its 2023 Biological Opinion with the USFWS.

At the time of the August 2024 hearing on CD-0003-24, DAF proposed to continue to monitor the impacts of noise from the SpaceX launches to assess any potential adverse impacts on California least tern as the launch frequency increases and reaches full tempo proposed at that time (36 launches/year). If adverse effects were/are found, DAF would mitigate those effects by increasing predator management efforts on VSFB to comply with the DAF’s sections 7(a)(1) and 7(a)(2) obligations under the Endangered Species Act (ESA). Mitigation activities would align with the California Least Tern Recovery Plan (USFWS 1985b) and 5-year review (USFWS 2020) with the goal of achieving no net loss to the species.

Even with this commitment to monitoring and mitigation if adverse impacts are determined, USFWS expressed concerns about the novelty of the increase in cadence and potential impacts to California least tern compared to what has historically occurred as VSFB in its 2023 Biological Opinion:

Referencing current best available information, the Service cannot adequately determine the anticipated impacts of the proposed project’s 36 disturbance events annually on the California least tern population at Purisima Point and the Santa Ynez River lagoon. Similarly, the Service cannot adequately determine how the proposed project’s 36 disturbance events would contribute to the existing launch baseline average of 6.2 events or the current permitted annual launch baseline of

up to 47 events. The Service considers that although the project has the potential to significantly contribute to the collective effects of the existing launch disturbance baseline and result in long term population level effects, until the novel effects of the project activity are studied, we are unable to anticipate the specific response at this time.

Commission staff reviewed DAF's California least tern monitoring program (including the Point Blue reports discussed above, for the years 2018-2023) and had outstanding concerns about the efficacy of the analysis of monitoring available and the conclusions being drawn from it. As with snowy plover, the requirements of monitoring for least tern were revised and enhanced under the BO issued in March of 2023, and the 2023 annual report only included monitoring under the new requirements for approximately half of the October 2022 – September 2023 annual reporting period. Due to those changes in requirements, as well as the lower number of launches from previous years (and variability in the number of past launches conducted during least tern nesting season), the 2023 annual report included a larger number of monitoring events during launches (i.e., four in 2023, one per year in 2022, 2019, and 2018, and none in 2020 or 2021).

This lack of consistency and overall low number of monitoring events makes it difficult to draw conclusions about historical trends in impacts or how a higher launch cadence could affect California least tern, but those BO requirements should provide more consistency in monitoring moving forward. The Point Blue reports contain more robust and consistent data about least tern breeding and nesting at VSFB; however, the data are not specifically tied to launch events. Based on the data included in the 2018-2023 Point Blue reports, there appeared to be some year-to-year variability in breeding success, hatching success, and fledgling success. However, understanding potential causation behind population variation will require more years of monitoring with launches as well as using existing historical on-base (impact sites) and off-base (control sites) population data collected by Point Blue (annually since 1995) now to run multivariate statistical analyses of population trends that incorporate physical (e.g. PDO and El Nino oceanographic data, forage base, peak PSF) and biological data (e.g. population size, mating pairs, hatching success, number of fledglings, chick survival) to identify potential patterns. While such multivariate statistical analyses of historical on-base and off-base population trends have not yet been conducted, they would be a valuable source for interpreting population patterns.

The first of the annual monitoring reports was prepared for the 2023 calendar year and submitted in February 2024. A total of 24 Falcon 9 missions were performed on VSFB during the reporting period, including six boost-back landings at SLC-4W. The report found no differences in incubation rates between launch events with and without a sonic boom but did identify reactions to the associated noise and noted stronger reactions to the sonic boom than the initial launch noise, mainly startle responses and "hunkering down" behavior. The monitoring also documented California least terns flushing off of nests during both initial launch events and sonic booms. The California least terns returned to their nests within minutes after the boost-back had completed.

Although it is difficult to affirmatively discern an effect from one year of monitoring, the monitoring conducted thus far suggests that there could possibly be a correlation between launching the Falcon 9 rockets and reactions from California least terns, including startling and flushing. The results of the first year of monitoring also highlight the need for additional monitoring and statistical analysis in order to more fully understand how launching of Falcon 9 rockets could be adversely impacting California least tern. It will likely be necessary to collect multiple years of monitoring data at a given launch cadence in order to adequately assess the effects of launch noise and sonic booms over time, while accounting for natural variability. This is consistent with the USFWS findings in the 2023 Biological Opinion that without long term population level effects analysis on the novel effects of increase in launch cadence it is not possible to anticipate the magnitude of the response from California least tern. Additionally, landscape level monitoring and camera redundancy would provide more opportunities to detect any direct causal impacts between noise from specific launches and impacts to specific nests/eggs for which camera data was not available.

California Red-Legged Frog & Noise (On-Base)

All life stages of California red-legged frogs can detect noise and vibrations (DAF 2023) and are assumed to be able to perceive the engine noise produced by rockets and sonic booms produced by launches and landings. The proposed project thus has the potential to adversely affect California red-legged frog habitat in Bear Creek and Honda Creek. DAF states in the consistency determination for 36 launches:

Engine noise would likely trigger a startle response in [California red-legged frog], causing them to flee to water or attempt to hide in place. It is likely that any reaction would be dependent on the sensitivity of the individual, the behavior in which it is engaged when it experiences the noise, and the sound level (e.g., higher stimuli would be more likely to trigger a response). Regardless, the reaction is expected to be the same – the frog’s behavior would be disrupted, and it may flee to cover in a similar reaction to that of a frog reacting to a predator. As a result, there could be a temporary disruption of [California red-legged frog] behaviors including foraging, calling, and mating (during the breeding season). However, frogs tend to return to normal behavior quickly after being disturbed. [...]

There are no known studies on the impacts of launch sound on the hearing capabilities of California red-legged frogs, however Simmons et al. (2014)¹¹⁰ found hearing damage to American bullfrogs, which are in the same family as California red-legged frogs, when they were exposed to sounds greater than 150 dB. After hearing damage, the bullfrogs showed full functional recovery of their hearing within 3 to 4 days. California red-legged frogs likely have similar hearing structures and a similar resilience to sounds below 150 dB as well as an ability to recover from hearing damage.

¹¹⁰ Simmons, D. D., Lohr, R., Wotring, H., Burton, M. D., Hooper, R. A., & Baird, R. A. (2014). Recovery of otoacoustic emissions after high-level noise exposure in the American bullfrog. *The Journal of experimental biology*, 217(Pt 9), 1626–1636. <https://doi.org/10.1242/jeb.090092>

In its review of the potential project impacts to California red-legged frogs as part of the 2023 Biological Opinion, the USFWS stated that, “However, the specific acoustic thresholds for California red-legged frog are unknown and the Service does not anticipate physiological effects to California red-legged frog’s inner ears at this time due to the short duration and lower noise levels of the project’s anticipated noise disturbance events.” However, the USFWS did find that operational noise may impact frog behavior, including calling frequency, and lead to increased risk of predation due to a “freeze” response to excessive sound. Despite anticipating some local negative effects, the USFWS found overall that:

Using the available information and considering minimization measures, including potential mitigation ensuring no net loss, we expect adverse effects to the recovery of California red-legged frogs on VSFB would be low.

It is important to note that in its review of potential project impacts to California red-legged frogs, the USFWS’ March 21, 2023, Biological Opinion regularly identifies the significant change in overall launch numbers as a result of the proposed SpaceX project from 12 to 36 launches annually and how this increase represents a novel disturbance. Especially when considered in conjunction with the other active and proposed launch programs at VSFB, the potential for increased disturbance from launch-related noise is significant. The USFWS 2023 Biological Opinion noted that:

“...until the novel effects of the project activity are studied, we are unable to adequately anticipate the magnitude of any specific response at this time.

California red-legged frogs would be startled between 6 to 9 times a month as a result of the proposed project alone when considering that each launch would include a static test fire and could include a terrestrial landing. When reviewing the proposed project in addition to other active/permitted launch programs (collectively totaling 129 to 217 launch related disturbance events between the Santa Ynez River and Honda Creek; MSRS 2022b, p. 76), the Service understands that launch activities would startle California red-legged frogs in these areas frequently each month, although the Space Force has clarified that multiple launch related disturbance events would not occur on the same day (Kaisersatt, pers. comm. 2023c). The Service anticipates the potential for long-term effects from chronic stress caused by routine intermittent acute noise from the proposed project’s launch disturbance. These may include long-term population level effects including reduced reproductive success, survival, fitness, and spatial displacement. Although we do not have an estimated survivorship of displaced California red-legged frogs, this could result in injury or death to individuals as a result of increased intraspecific competition, lack of familiarity with new locations of potential breeding, feeding, and sheltering habitats, and increased risk of predation. However, it is unknown how California red-legged frogs would react to repetitive launch events of variable disturbance levels with increasing frequency. Improved monitoring information is needed to help identify thresholds that quantify what level of noise or frequency of disturbance would elicit stress hormone responses that may lead to impacts to breeding and reproduction or other negative population level effects.”

As discussed above, DAF conducted long-term monitoring on VSFB to assess the frogs and their response to launch activities, including noise and sonic booms. DAF consistently stated that past launch activities have not decreased CRLF populations or led to the abandonment of habitat areas and have only produced temporary observable changes in behavior. However, the DAF's monitoring and determinations (prior to August 2024 mainly included surveying during the much less intense launch frequencies that have occurred over the last several years and those previous determinations may not comport with the increased launch frequency being proposed and potential adverse impacts that could occur. For example, if it takes several days for individual frogs or populations to recover from a launch disturbance and another disturbance occurs before that recovery, chronic stress or habitat abandonment may occur. To address the need for better information about it an increased frequency in elevated sound levels from launches will be incompatible with the continued use of frog habitat near the proposed project site, DAF committed to monitoring and mitigation as part of its 2023 Biological Opinion with the USFWS.

In the 2023 Biological Opinion, and as part of DAF's recent Consistency Determination No. CD-0010-22 for the Phantom Space Corporation's launch complex and operation at VSFB, DAF committed to placing passive bioacoustic recorders in Honda Creek and conducting California red-legged frog surveys there as well. This monitoring program will be carried out at part of the SpaceX launch program as well and is designed to track habitat occupancy, breeding behaviors (calling), and breeding success (egg mass and tadpole density). If habitat occupancy, calling frequency, or tadpole densities decline from baseline by 15 percent or more over two years, and the decline cannot be confidently attributed to other natural or human caused factors such as drought or wildfire, DAF will mitigate for impacts to California red-legged frog breeding habitat. To offset any impacts found, DAF will create new California red-legged frog breeding habitat at a 2:1 ratio (breeding habitat enhanced: breeding habitat affected) at the San Antonio Creek Oxbow Restoration Area, an established wetland site on VSFB that is located outside of areas currently affected by launch noise over 110 dB and artificial lighting on VSFB. A detailed description of this commitment is available in the 2023 Biological Opinion in Exhibit 9 of the staff report prepared for the August 8, 2024, hearing ([Appendix A](#)).

According to the "Activities Pursuant to Biological Opinion 2017-F-0480: 2023 Activities Report" (which covered a reporting period from October 2022 through September 2023) no launches occurred during the CRLF breeding season (late November to late April) during the reporting period under the new BO requirements. Under the prior BO requirements, the only launch when bioacoustic monitoring was conducted during the CRLF breeding season for the reporting period was during the SWOT mission launch on December 16, 2022. The monitoring resulted in a finding of more breeding calls per hour on average at the Fitness Center Drainage after the launch (31.4) compared to before the launch (7.8) however the report concluded that noise from the launch did not negatively affect CRLF breeding behavior. No rationale for this conclusion was provided in the 2023 Activities Report.

In response to concerns previously raised by Commission staff regarding this instance and how effective the monitoring is if it doesn't include appropriate controls/reference populations outside the influence of launches and sonic booms, DAF responded with the following statements:

Prior to the 2023-2024 winter, bioacoustic monitoring for red-legged frogs was conducted during two launches. Concerns initially centered on the potential for sonic booms to startle frogs and deter them from breeding behavior. However, the monitoring data summarized below suggest otherwise.

During the NROL-87 mission on February 2, 2022, and the SWOT mission on December 16, 2022, monitoring was conducted in areas expected to be impacted by sonic booms, as per the 2017 Biological Opinion (BO) requirements. Notably, monitoring during the NROL-87 at locations like the drainage near the VSFB Recreation Center and lower Honda Creek did not show a reduction in the California red-legged frog (CRLF) calling frequency. In fact, call rates post-sonic boom were similar to or greater than rates before the launch.

For instance, at the Recreation Center Drainage, CRLF calls persisted through the hour of the sonic boom, with calls detected both before and after the boom. At lower Honda Creek, while no calls were noted just before the boom, several were detected soon after, indicating no disruption in calling activity.

Similarly, during the SWOT mission, although no calls were detected at Honda Creek around the time of the launch, increased calling was observed at the Recreation Center Drainage post-sonic boom. This increase, however, seemed coincidental and aligned more with natural peaks at sunrise rather than being a response to the sonic disturbances.

The USFWS has reviewed and approved the current monitoring protocols, which include extensive bioacoustic monitoring throughout the breeding season at various locations on VSFB. Discussions with the USFWS confirmed that no suitable reference sites exist outside VSFB that could replicate local environmental conditions. Monitoring efforts also include aquatic surveys for tadpoles and habitat assessments to gauge breeding success and population trends. This comprehensive approach is aimed at understanding whether breeding occurs at these sites and whether CRLF populations are stable, increasing, or declining.

However, Commission staff would note that greater call rates following a sonic boom compared to rates before a launch could indicate an impact to the species, such as an increase in energy expenditure, eardrum damage, or distress. Given the lack of monitoring data collected under the new 2023 USFWS Biological Opinion monitoring requirements, it appears that there has not been enough CRLF bioacoustic monitoring to determine that this species is not adversely impacted by launches or sonic booms, especially since modeling of sonic booms/boost backs included sound levels reaching 3 and 4 pounds per square foot (psf) in areas of known CRLF habitat. Moreover, as noted

previously in discussing the habitat of other sensitive species, multiple years of monitoring data at a given launch cadence may be necessary to adequately assess the effects of launch noise and sonic booms on CRLF over time, while accounting for natural variability. Additionally, it is Commission staff's understanding that the discussion between DAF and USFWS regarding potential reference sites existing outside VSFB that could replicate local environmental conditions is still ongoing, and Commission staff would support establishment of one if necessary.

Bats & Noise (On-Base)

The bat species found in the riparian habitats of Honda Canyon are very sensitive to sound, as they use echolocation to navigate around obstacles and hunt in the dark. A 2016 report from Caltrans notes:

In bats, damage to high frequency hearing cells would likely result in impaired echolocation. Damage to the lower frequency hearing cells would likely result in impaired capacity for passive listening. Either effect could potentially be life threatening. Failure to accurately assess the locations of trees, branches, and other obstacles in their flight path could result in fatal collisions or debilitating injury. Failure to accurately detect and determine the precise location and movement patterns of prey (both aerial and ground) would likely result in significantly diminished capture success. Similarly, failure to detect the approach of a predator could be fatal. Because bats simply do not have the luxury of extended recovery time, even temporary shifts in hearing abilities have the potential to result in negative effects on affected individuals.

DAF's integrated resources management plan states that studies on the hearing sensitivity of bat species show that they have excellent hearing in the higher frequency ranges (above 20 kHz) but are insensitive to lower frequencies where launch noise has most of its energy (e.g., highest decibel measurements). This may reduce potential impacts to bats and to continued use of their habitat, but as noted in the Caltrans report cited above, damage to lower frequency hearing cells in bats would still affect their passive listening abilities.

Previous consultations between Commission staff and staff of the California Department of Fish and Wildlife (CDFW) during the review of other space vehicle launching projects have indicated that birds and bats can experience permanent hearing loss at continuous sound exposure above 110 dB. CDFW staff recommend that continuous sounds be kept below the temporary threshold shift or temporary hearing loss threshold of 93 dB and that impulse noise should not exceed 110 dB at any point in operations measured at bat roosting locations. Bat habitat in Honda Canyon is expected to receive engine noise exceeding these thresholds, as described above. However, there is very little research on rocket engine noise and its impact on bats. Existing studies on the impacts of other types of noise on bats may not be very representative of bat response to rocket engine noise. This is because engine noise exposure is very intermittent, with long periods of quiet between launches or static fire tests, and very short periods of elevated sounds (e.g. one minute or less).

With SpaceX's existing launch schedule at SLC-4, bat habitat in Honda Creek would receive engine noise from launches and static fire tests for a total of up to 90 minutes per year. 90 minutes of engine noise across the 10,000 minutes that pass in a week means that engine noise would not be generated for a majority of the time. Finally, DAF actively monitors bat diversity and distribution on VSFB, and has found that bat species use wetland, riparian, and forest habitats, despite launch activities on-base (Heady and Frick 2013). DAF's Integrated Natural Resources Management Plan stated that:

Studies have shown that the effect of intermittent noise from aircraft overflights on small terrestrial mammal demography is likely to be small and difficult to detect, if it occurs at all (McClenaghan and Bowles 1995). Studies on the hearing sensitivity of a variety of bats (Dalland 1965; MacDonald 1984; Popper and Fay 1995) have shown that they have excellent hearing in the higher frequency ranges (above 20 kilohertz [kHz]) but are very insensitive to lower frequencies where launch noise has most of its energy. Therefore, impacts on these mammals are expected to be minimal to nonexistent.

Due to the intermittent nature of engine noise, the very short duration of engine noise relative to periods of quiet, and DAF's existing monitoring demonstrating that bats have used habitat on VSFB despite engine noise and launches, DAF concluded that significant degradation of bat habitat in Honda Canyon from launch-related noise is unlikely, despite exceeding CDFW's sound exposure level recommendations for other types of projects.

Although prior monitoring has not demonstrated adverse impacts to or degradation of bat habitat on VSFB, an average of only 9.7 rocket and missile launches per year occurred from 2015-2021, during the course of that monitoring. In contrast, SpaceX has been carrying out a greater frequency of launch activities resulting in a commensurate increase in elevated noise episodes and the potential for disruptions to bat habitat.

Monarch Butterfly & Noise and Other Launch Activities (On-Base)

As described above, there are two monarch aggregations sites located in the eucalyptus tree stands in Spring Canyon immediately adjacent to SLC-4, which could be impacted by noise and other launch activities. A deluge of water is flooded onto the launch pad following ignition of SpaceX Falcon 9 rockets to absorb or deflect the high levels of acoustic energy that are released as the rocket lifts off and to avoid damage to the vehicle and payload (see Exhibit 6 of the staff report prepared for the August 8, 2024, hearing, in [Appendix A](#)). The exhaust cloud is comprised of combusted fuel and water that largely consists of steam. The steam cloud generally billows out directly south of the launch pad but may move in different directions under various atmospheric conditions. For example, offshore winds could push the steam cloud toward the monarch aggregations resulting in adverse impacts such as physical damage to either stand trees or the monarchs themselves as well as initiation of flight responses causing the butterflies to use up necessary energy stores.

Another source of disturbance is the sonic booms or boost backs when the rocket's first stage returns to SLC-4. Noise modeling provided to Commission staff by DAF and included as Exhibit 5 of the staff report prepared for the August 8, 2024, hearing ([Appendix A](#)) indicates that the two monarch aggregations would be within the level 5 psf zone which is the highest noise level zone. Monarch butterflies are known to overwinter in two eucalyptus stands in the eucalyptus grove ESHA located approximately 300 feet south of SLC-4W (see Exhibit 2 of the staff report prepared for the August 8, 2024, hearing, in [Appendix A](#)). This area could experience engine noises in excess of 130 dB during launch and landing, and also experience sonic booms with a peak overpressure of at least 4 psf. In addition, the proximity of this grove to the launch and landing complex and the susceptibility of eucalyptus to fire raises concerns about its long-term viability and exposure to fire risk as the number of launch and landing events and proportional risk of accidents increases. How the monarchs would react to this level of noise is not fully known and therefore should be monitored.

DAF noted that in some instances, monarch clusters at Spring Canyon have been photographed remotely during multiple daytime and nighttime launches from SLC-4, as well as during a daytime boost back to SLC-4. Based on DAF's review of photos of monarch clusters taken minutes before and after launches and landings, DAF has stated that monarchs had no reaction to launches, landings, or sonic booms, but they note that this research is ongoing. Additionally, in response to questions from Commission staff about what monitoring of monarch butterfly on VSFB has occurred, the methods used and any conclusions from monitoring, DAF provided the following response:

SLD 30 has conducted annual overwintering counts of monarch butterflies at VSFB since 1997. These counts follow the established protocol of the Western Monarch Thanksgiving Count. In January 2018 we added a second annual count following the standardized protocol of the Western Monarch New Year's Count, which we have conducted annually ever since. Annual population counts at VSFB correlate to broader population trends across the west; i.e. when the western monarch population is high, so are the counts at VSFB, and vice versa. Low numbers at VSFB and Spring Canyon from 2018-2020 reflect the region-wide western monarch population crash during those years. Population counts also reflect changing habitat suitability at individual overwintering sites, especially impacts of severe drought on eucalyptus trees (e.g. overwintering sites comprised of drought-stressed eucalyptus trees which have lost canopy cover now have smaller overwintering populations than pre-drought). Population fluctuations over time follow region-wide variation and/or have been attributed to changes in habitat quality. We have found no evidence that any population changes are related to launch cadence. Our team will continue to monitor and work with species experts on this topic.

Since providing this information regarding annual overwintering counts of monarch butterflies at VSFB, DAF also shared historical data, but did not provide a detailed analysis of what this data shows for the monarch aggregation sites within the noise footprint of launches and landings at SLC-4. Any monarch monitoring and statistical

analyses should include two or more monarch aggregation reference sites outside the influence of the launches and sonic booms that would be surveyed at similar times to the impact site for comparison.

Southwestern Pond Turtle and Noise

The USFWS 2024 Biological Opinion analyzed potential impacts to southwestern pond turtle (SWPT) habitat from various impacts associated with the proposed project, including firebreak maintenance activities, lighting, flame duct use and associated vegetation maintenance, water extraction, engine noise and sonic boom overpressures from launches and on-base landings. The USFWS 2024 Biological Opinion required DAF to implement long-term monitoring of annual population and distribution trends associated with SWPT populations within Jalama Creek, Honda Creek, Bear Creek, and the Santa Ynez River, and to develop a monitoring plan that adequately addresses potential short- and long-term project effects that may result from sensory pollutants.

This plan included establishing baseline data and defining threshold criteria for mitigation. If SWPT mitigation threshold criteria are met, the DAF would implement mitigation actions, including: (a) creating new SWPT at a 2:1 ratio at the San Antonio Creek Oxbow Restoration Area, an established wetland mitigation site on VSFB; (b) conducting additional restoration in the “expansion area” adjacent to the existing restoration area (where restoration has already been conducted in support of other projects), including creating deep water aquatic habitat, suitable for SWPT, with adjacent riparian woodland that simulates naturally occurring high-flow channels; (c) and ensuring that actions taken within this area will include certain site preparation methods. In addition to this monitoring and mitigation, USFWS required DAF to conduct vegetation removal clearance surveys and monitoring. Some of these requirements are associated with the monitoring and mitigation measures USFWS required for potential impacts to California red legged frog, as well. The USFWS 2024 Biological Opinion stated:

Based on the available information and minimization measures, including potential mitigation ensuring no net loss, we expect adverse effects to the recovery of southwestern pond turtles would be low. Although adverse effects are likely to occur as a result of the proposed action, we do not anticipate they will diminish the VSFB population’s contribution to the recovery of the southwestern pond turtles at this time.

Overarching ESHA Considerations for On-Base Noise from CD-0003-24

As mentioned above, this section also provides relevant discussion initially provided in Section IV.D of the staff report for the August 8, 2024, hearing ([Appendix A](#)) and applies to the review at that time for DAF’s consistency determination for 36 Falcon 9 launches per year (and does not reflect information provided in the June 13, 2025, CD submittal, CD-0006-25).

DAF’s position was that its long-standing monitoring of sensitive species and their responses to space launch vehicle engine noise has documented only temporary

observable changes in wildlife behavior as a result of launch activities and has not shown changes in habitat occupancy or population numbers. However, these monitoring results – which have informed DAF’s effects determinations to date – reflect only the lower launch frequencies that have occurred over the last several years and may not be predictive of the potential for adverse effects under the increased launch frequencies now being proposed. The proposed monitoring provided as part of the SpaceX project (prior to the August 2024 hearing), and other projects like Phantom, would include monitoring of California red-legged frog habitat, snowy plover nesting sites, California least tern nesting sites, bat habitat, and monarch aggregation sites, for adverse impacts from launch activities. Although the focus of this monitoring would be on the SpaceX project, the monitoring design would also capture adverse impacts to these species and their habitats from other launch activities at VSFB.

A significant concern with the proposed project and the associated monitoring for these sensitive species was the significant and rapid increase in cadence, compared to the number of historic launches at VSFB. There simply had not been sufficient monitoring at the current cadence or a lesser one above the historic average to adequately assess how these species may, or may not, be reacting to launches, and the extent to which their habitats are being disrupted. This issue is reflected in the findings of the 2023 monitoring report for western snowy plover and California least tern. 2023 monitoring suggests that there could possibly be a correlation between launching the Falcon 9 rockets and reactions from these two species, including startling, flushing, damage to eggs, and abandonment of nests. Under a higher launch cadence, more frequent behavioral responses of this sort could conceivably lead to lower nesting success and, over time, population level impacts. These effects on species would be indicative of increasingly severe disruption of their habitats. Sustained monitoring at the current launch cadences is needed to determine if impacts are occurring. This is consistent with the USFWS findings in the 2023 Biological Opinion that without long term population level effects analysis on the novel effects of increased launch cadence, it is difficult to accurately anticipate the magnitude of the response from these species, and thus the level of disruption to ESHAs.

The monitoring also lacked any kind of rigorous statistical analysis of the changes in populations trends using the historic data that DAF has been collecting for decades. Annual monitoring reports should incorporate comprehensive statistical analysis by looking at physical (oceanographic conditions, climate, storms, beach width, etc.), biological (population size, population location, behavior, etc.), temporal (frequency and time between launch events for species to recover, seasonal timing of launches and sensitive times of the year such as nesting), and anthropogenic factors (launches), to more accurately evaluate the likely causes of population trends. DAF had addressed the lack of statistical analysis of historical data, saying:

Historic monitoring of sensitive species was launch specific. Population level monitoring is now being conducted to determine any additional effects to population and distribution trends of sensitive species as a result of the increase in launch cadence. Species-specific monitoring measures are included in the

Consistency Determination submitted to the Commission on March 7, 2024. The established methods and scale of this monitoring are robust enough to detect changes in populations and breeding behaviors, and these methods will remain consistent regardless of the number of launches.

Regarding this, DAF had also noted:

The geospatial analysis for plover and tern populations is being developed and will employ multivariate statistical analysis, leveraging an adequate and robust historical dataset. Conversely, there is insufficient historical data to conduct a similar statistical analysis for red-legged frogs or other species. Nonetheless, SLD 30 has collaborated with the USFWS to establish baseline population estimates for the action area, along with thresholds for changes in those populations that would trigger mitigation measures.

However, this dominant focus on wildlife populations does not necessarily align with the requirements in the Coastal Act for sensitive habitats to be protected from disturbance and degradation. In other words, a population may continue to persist while also losing or abandoning important habitat areas as a result of degradation or consistent disturbance.

Another issue that has come to light following the review of the additional annual wildlife monitoring reports provided by DAF over the past month is that there are weaknesses in the design of the various monitoring programs and their implementation. For example, the monitoring programs for western snowy plover and California least tern did not include any control observations. As such, it was not possible to understand how an observed behavior recorded during a launch may differ from more normal behavior outside of launches. Also, the western snowy plover report compared the number of nests and their fates for beaches in south VSFB versus beaches in north VSFB. The report states that this comparison is provided because the beaches in north VSFB are a non-impact area. However, a significant portion of the north VSFB beach area, as identified in Figure 1.1 of the monitoring report, were within the same level 2 psf sonic boom footprint for Falcon 9 launches from SLC-4 as the south VSFB beaches. Therefore, it is unclear why the report considers north VSFB as a non-impact area and how it can function as a comparison to south VSFB beaches during launches.

In addition, numerous monitoring reports acknowledged equipment issues that significantly limited the data that was collected or resulted in the loss of extensive datasets. For example, batteries on monitoring devices failed at critical times, hard drives were compromised and cameras were dislodged or unable to work effectively under the windy and foggy conditions common to Vandenberg and surrounding areas. These issues would need to be resolved for VSFB's wildlife monitoring programs to function effectively and be capable of capturing potential impacts from the project to wildlife and habitat areas.

If adverse impacts are observed, the method of mitigation proposed to be implemented by DAF in response also raised questions. Species specific mitigation was proposed for

those species that may be adversely affected by the increased Falcon 9 launch cadence. For western snowy plover and California least tern, mitigation proposed by DAF would involve increasing predator control efforts in the non-breeding season. At the time, the DAF funded three full-time staff to perform predator control efforts on VSFB during the breeding season. The DAF proposed at the time to add one full-time staff to continue these activities through the non-breeding season. These activities would include trapping, shooting, and tracking known predators of snowy plover with particular focus on raven and crow removal at and adjacent to VSFB beaches. The DAF would report predator removal efforts and success within an annual report.

Although it is foreseeable that implementing predator controls may benefit western snowy plover and California least tern to some degree, it isn't clear from the mitigation plan how predator controls relate directly to the types of responses being exhibited by western snowy plover and California least tern during an increased number of launches. For example, it is possible that if the birds are consistently flushing in response to launches they could be depleting their energy reserves. Birds that engage in repeated short flights were found to expend significantly more energy than under "non-flying" controls which equated to a flight expenditure multiple times their basal metabolic rate¹¹¹. The project doesn't clearly explain or demonstrate how predator controls would mitigate for depleted energy reserves.

As described in the 2023 annual monitoring report, in addition to responses from western snowy plover and California least tern, the monitoring recorded responses from predators. Specifically, predators were observed moving away from launch noise. The report concluded it is possible that consistent launches may be impacting predators in the vicinity. However, DAF has stated:

Predators are not being driven out of the project area by launches. For example, the raven population on VSFB continues to increase, which accounts for the largest predation rate on the snowy plover. If these mitigation measures are not successful in achieving no net loss to species abundance and distribution, consultation with the Commission would be re-initiated.

If the launches were in fact causing predators to move out of the area, then it would mean there are fewer predators in the area of western snowy plover and California least tern nesting areas. The mitigation program from DAF for western snowy plover and California least tern specifically proposed predator control efforts during the breeding season. If, in further monitoring, predators are found to be reacting to the launches and moving out of the area, then the proposed mitigation may be ineffective or provide limited value, alternative mitigation to quantifiably offset adverse impacts to western snowy plover and California least tern may be necessary.

Overarching ESHA Considerations for On-Base Noise from CD-0007-24

This section provides a description 2024 USFWS BO requirements initially described in Sections IV.A and IV.D of the revised findings report for the February 6, 2025, hearing

¹¹¹ <https://pubmed.ncbi.nlm.nih.gov/10769218/>

(see [Appendix A](#)) and applies to the review of information at that time for DAF's consistency determination for 50 Falcon 9 launches per year (and does not reflect information provided in the June 13, 2025, CD submittal, CD-0006-25).

DAF previously completed a formal consultation with the U.S. Fish and Wildlife Service (USFWS) for federally listed species protected under the federal Endangered Species Act that may be affected by rocket launch activities at VSFB. The March 21, 2023, Biological Opinion issued by the USFWS evaluating SpaceX's 36 launch per year cadence found that the proposed project "may affect but is not likely to adversely affect" marbled murrelet, southern sea otter, California condor, unarmored threespine stickleback and tidewater goby. The USFWS further found that the project was likely to adversely affect, but would not likely jeopardize, the continued existence of California red-legged frog, western snowy plover and California least tern. The USFWS made these determinations due to the protection and mitigation measures that DAF has agreed to implement. However, at the time the 2023 Biological Opinion was developed, the USFWS had not been provided with information on sonic booms occurring outside of VSFB and the Northern Channel Islands, and thus the 2023 Biological Opinion did not analyze how sonic booms extending into Santa Barbara, Ventura, and Western Los Angeles Counties might affect federally listed species.

USFWS subsequently issued a new Biological Opinion, dated August 28, 2024 (the 2024 USFWS Biological Opinion), to include up to 16 additional launches between October 1 and December 31, 2024. The USFWS 2024 Biological Opinion states that, cumulatively, SpaceX would not exceed 50 launches on VSFB in 2024. This new USFWS 2024 Biological Opinion does include analysis for the geographical extent of off-base sonic booms from launches over the mainland areas of Santa Barbara, Ventura, and Western Los Angeles Counties (for the term through the end of 2024). It also includes analysis for species in the impact area of the expanded sonic boom footprint associated with on-base landings with higher peak overpressures (in comparison to the USFWS 2023 Biological Opinion).

The new USFWS 2024 Biological Opinion found that an additional 16 launches through the end of 2024 "may affect but is not likely to adversely affect" marbled murrelet (*Brachyramphus marmoratus*), southern sea otter (*Enhydra lutris nereis*), California condor (*Gymnogyps californianus*), unarmored threespine stickleback (*Gasterosteus aculeatus williamsoni*) and tidewater goby (*Eucyclogobius newberryi*). In addition, USFWS analyzed the expanded impact areas and DAF's requested informal conference on the proposed Western spadefoot (*Spea hammondi*, which is under review for potential listing under the Endangered Species Act). With the additional analysis, the USFWS 2024 Biological Opinion found that the proposed project also "may affect but is not likely to adversely affect" California gnatcatcher (*Poliophtila californica californica*), California tiger salamander (*Ambystoma californiense*), arroyo toad (*Anaxyrus californicus*), light-footed Ridgway's rail (*Rallus obsoletus levipes*), and Western spadefoot (*Spea hammondi*).

The USFWS also found that the proposed project (at the time) was likely to adversely affect but would not likely jeopardize the continued existence of California red-legged

frog (*Rana draytonii*) and western snowy plover (*Charadrius aves*). The USFWS also provided a conference opinion for the southwestern pond turtle (*Actinemys pallida*), which is currently proposed as threatened and under federal review for listing under the Endangered Species Act. In addition, the USFWS 2024 Biological Opinion found that the proposed project (at the time) was likely to adversely affect but would not likely jeopardize the continued existence of southwestern pond turtle. The USFWS 2024 Biological Opinion does not address potential impacts to California least tern (*Sterna antillarum browni*) (which the USFWS 2023 Biological Opinion did) because the period it covers (from October through the end of 2024) is outside of the species breeding season and it is not present within the action area at that time. While that period is also outside of the known breeding season for western snowy plover, VSFB is an important overwintering location for the species and as such western snowy plover is considered in the USFWS 2024 Biological Opinion.

The USFWS made the respective determinations for the species mentioned above due to the protection and mitigation measures that DAF had agreed to implement. Those protection and mitigation measures are provided in the USFWS 2024 Biological Opinion (Exhibit 9 of the revised findings report for the February 6, 2025, hearing (see [Appendix A](#)). Several of these enhanced measures are intended to comport with the enhanced on-base biological monitoring and analysis measures in Condition One from the Commission's conditional concurrence with CD-0003-24.

Although the 2024 Biological Opinion applies only until December 31, 2024, USFWS staff have confirmed that it can be extended to ensure that protective measures included in the opinion can continue into 2025 and beyond. However, since western snowy plovers would not be breeding during the period covered in the 2024 Biological Opinion and California least terns would not be within the impact area at all during the period in the 2024 Biological Opinion, in order to process an extension, the opinion would need to be amended to include an analysis of breeding western snowy plover and California least terns.

The requirements of the 2024 USFWS Biological Opinion included the establishment and evaluation of off-base reference site populations of western snowy plover, California least tern, and California red-legged frog, that can be used as a basis of comparison for on-base monitoring results. The USFWS 2024 Biological Opinion also included new terms and conditions to implement its reasonable and prudent measures (for minimizing the impacts of the incidental take of southwestern pond turtle, California red-legged frog, and western snowy plover), which enhanced some of the monitoring, analysis, and reporting, requirements from the 2023 Biological Opinion. These included updates and specificity regarding species surveys and monitoring, monitoring for experienced noise and sonic boom levels on-base and off-base, vibration monitoring, monitoring to determine potential auditory harm to western snowy plover, multivariate statistical analyses of potential changes in populations trends, long-term monitoring plan and mitigation plan updates, and reporting requirements. The 2023 and 2024 USFWS Biological Opinions also required landscape-level camera monitoring for western snowy plover and California least tern.

**COASTAL ZONE MANAGEMENT ACT
CONSISTENCY DETERMINATION FOR
SpaceX Falcon Launch Program at
Vandenberg Space Force Base, California**

June 2025

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ACRONYMS AND ABBREVIATIONS

ac.	acres	LNM	Local Notice to Mariners
ac-ft	acre-feet	LOA	Letter of Authorization
APE	Area of Potential Effects	m	meter(s)
BCI	Bat Conservation International	MMPA	Marine Mammal Protection Act
BMPs	Best Management Practices	MOL	Manned Orbiting Laboratory
BNM	Broadcast Notice to Mariners	MSIB	Marine Safety Informational Bulletin
BO	Biological Opinion	MSRS	ManTech SRS Technologies, Inc.
CARB	California Air Resources Board	NA	Not Applicable
C.F.R.	Code of Federal Regulations	NCI	Northern Channel Islands
CCA	California Coastal Act	ND	Negative Determination
CCC	California Coastal Commission	NE	No Effect
CCMP	California Coastal Management Plan	NL	Not Listed under the ESA
CCSFS	Cape Canaveral Space Force Station	NLAA	May affect, not likely to adversely affect
CD	Consistency Determination	NMFS	National Marine Fisheries Service
CDFW	California Department of Fish and Wildlife	NOAA	National Oceanic and Atmospheric Administration
CNDDDB	California Natural Diversity Database	NOTAM	Notices to Airmen
CRLF	California red-legged frog	NOTMAR	Local Notices to Mariners
CTS	California tiger salamander	NRHP	National Register of Historic Places
CZMA	Coastal Zone Management Act	NSSL	National Security Space Launch
DAPTF	Declining Amphibian Populations Task Force	OCA	other marine carnivores
dB	decibel(s)	psf	pounds per square foot
dBA	A-weighted decibel(s)	PTS	permanent threshold shift
DOD	Department of Defense	RIRA	light-footed Ridgway's rail
E	East	RNA	Regulated Navigation Area
EPMs	Environmental Protection Measures	RORO	roll-on-roll-off
ESA	Endangered Species Act	RWQCB	California Regional Water Quality Control Board
FAA	Federal Aviation Administration	SBCAPCD	Santa Barbara County Air Pollution Control District
ft	foot or feet	SECDEF	Secretary of Defense
Ft ²	square feet	SEL	sound exposure level
ITLO	Installation Tribal Liaison Officer	SLC	Space Launch Complex
km	kilometer(s)	SLD 30	Space Launch Delta 30
KSC	Kennedy Space Center	SMI	San Miguel Island
LAA	Limited Access Area	SMR	State Marine Reserve
lbs	pounds	SNPL	western snowy plover
LC	Launch Complex	SPCC	Spill Prevention, Contingency, and Countermeasures
LEO	low-earth orbit	SWFT	southwestern willow flycatcher
LETE	California least tern		
Lmax	maximum sound level		

SWPT	southwestern pond turtle
TTS	temporary threshold shift
TWG	tidewater goby
U.S.	United States
USACE	United States Army Corp of Engineers
U.S.C.	United States Code
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service
USSF	United States Space Force
VSFB	Vandenberg Space Force Base
W	West

1 INTRODUCTION

Space Launch Delta 30 (SLD 30) of the Department of the Air Force (DAF), United States (U.S.) Space Force (USSF) submits this Consistency Determination (CD) for the California Coastal Commission's (CCC) review. The Proposed Action would implement Space Exploration Technologies Corp.'s (SpaceX) increased Falcon 9 launch cadence at Space Launch Complex (SLC) 4 and reconfigure SLC-6 to support Falcon 9 and Falcon Heavy operations, including building two new landing pads adjacent to SLC-6. The DAF would authorize SpaceX to increase annual launch cadence to a combined total of up to 100 launches per year total between SLC-4 and SLC-6, maintain 12 first stage landings per year at SLC-4, and perform up to 12 landings at SLC-6.

The purpose of the Proposed Action is to increase the space launch mission capability of the U.S. Department of Defense (DOD) and National Aeronautics and Space Administration (NASA), and other federal and commercial customers and to enhance the resilience and capacity of the nation's space launch infrastructure, while promoting a robust and competitive national space industry. As directed by U.S. policy (10 United States Code [U.S.C.] Section 2273, "Policy regarding assured access to space: national security payloads"; see also the White House's 2021 Space Priorities Framework¹), the U.S. seeks to provide greater launch and landing capabilities and infrastructure to support national security objectives, including deploying satellites and other space assets that enable intelligence, reconnaissance, and global security operations. The U.S. aims to promote a hybrid space architecture that diversifies access to space, reduces dependency on singular systems, and ensures rapid reconstitution capabilities. The DOD, NASA, and other Federal agencies obtain access to space through the procurement of commercial launch services, rather than with Government-owned or operated launch systems. As such, commercial launch capability is critical to the national defense, American's national space objectives, and the National Space Policy of the U.S. (May 2020).

The USSF's mission to "secure our Nation's interests in, from, and to space" is enabled by Space Systems Command's largest organization, the Assured Access to Space Directorate. The Assured Access to Space Directorate procures launch services from the commercial space transportation industry at VSBF, one of only two Federal Ranges from which national security space launches can occur—and the only Federal Range on the West Coast. Space launch for the USSF, other DOD organizations, and the Intelligence Community relies on commercial space launch service providers, as DOD does not operate its own space launch vehicles. SpaceX supports, and is under contract for, the full spectrum of U.S. Government space mission requirements.

The Proposed Action fulfills Congress's grant of authority to the Secretary of Defense (SECDEF), pursuant to 10 U.S.C. § 2276(a), *Commercial Space Launch Cooperation*, that SECDEF is permitted to take action to:

- "(1) maximize the use of the capacity of the space transportation infrastructure of the [DOD] by the private sector in the U.S.;
- (2) maximize the effectiveness and efficiency of the space transportation infrastructure of the [DOD];
- (3) reduce the cost of services provided by the [DOD] related to space transportation infrastructure at launch support facilities and space recovery support facilities;

¹<https://www.state.gov/wp-content/uploads/2023/05/Space-Framework-Clean-2-May-2023-Final-Updated-Accessible-5.25.2023.pdf>

- (4) encourage commercial space activities by enabling investment by covered entities in the space transportation infrastructure of the [DOD]; and
- (5) foster cooperation between the [DOD] and covered entities.”

The Proposed Action also fulfills the 2020 National Space Policy of the U.S. (U.S. Government 2020) to reduce space transportation costs, ensure continued exploration and development, and make space use more accessible. By increasing launch capacity at Vandenberg Space Force Base (VSFB), the Proposed Action also fulfills the 2020 National Space Policy’s goals of promoting a “robust commercial space industry and strengthen U.S. leadership as the country of choice for conducting commercial space activities” (U.S. Government 2020). The Proposed Action ensures that U.S. space launch capability is not reduced or limited and that the U.S. remains the world leader in space launch technology. The Proposed Action also supports SLD 30’s vision to become the “world’s most innovative space launch and landing team.”

Several decades ago, the U.S. Government transitioned away from its historical approach of U.S. Government-developed and -operated rockets to the use of commercial space launch vehicles, procured as a commercial service. Doing so has provided tremendous reduction in costs to U.S. taxpayers, significantly increased space launch vehicle reliability, and promoted innovative new technologies like rocket reusability. Lower launch costs are a direct value to the taxpayer and allow the DOD to field space systems more efficiently to counter increased adversary space threats and enhance U.S. space-based services to U.S. and allied warfighters. Cost benefits are realized through competitive commercial launch pricing, which is created in part by efficient commercial launch operations. The viability and health of commercial launch services providers—enabled through a regular flight rate—is critical to the U.S. Government. Through competitive acquisition of launch in the National Security Space Launch Program’s Phase 2 procurement, the USSF saved \$7 billion in taxpayer funds.² SpaceX has dramatically reduced the cost of access to space through the re-use of first stage rocket boosters and payload fairings. SpaceX is currently the only launch operator worldwide recovering, refurbishing, and reusing first-stage boosters and fairings—which means that SpaceX launch operations do not routinely expend rocket boosters or fairings into the ocean following launch. Launch system recovery and reuse has provided the U.S. Government the ability to rapidly launch and utilize new space systems architecture, such as satellite constellations in low-Earth orbit, quickly fielding new national security capability on orbit at substantially reduced cost.

SpaceX has developed Starlink and Starshield, satellite constellations in low-Earth orbit that require numerous launches to develop and maintain the constellation. Starlink is a critical national capability that is directly utilized by DOD and the intelligence community, which contracts directly for satellite communications services important to the national defense and in support of U.S. interests abroad. Starlink is a services provider for the DOD under numerous contracting vehicles, including the U.S. Space Force Commercial Satellite Communications Office, the U.S. Air Force’s Global Lightning program³, and other programs designed to enhance U.S. national security capability on-orbit and on the ground. Starlink services have also been directly procured by each of the U.S. military services, and by U.S. Special Operations Command. Beyond the Intelligence Community, Starlink is under contract with the Federal Emergency Management Agency, Department of State, Department of Veterans Affairs, Department of

² <https://www.af.mil/News/Article-Display/Article/2305576/space-force-awards-national-security-space-launchphase-2-launch-service-contra/>

³ <https://www.airandspaceforces.com/global-lightning-satcom-project-expanding-to-ac-130-kc-135/>

Transportation, U.S. Coast Guard (USCG), Customs and Border Patrol, U.S. Geological Survey, U.S. Forest Service, National Oceanic and Atmospheric Administration (NOAA), and many other government organizations at the state and local level. These agencies include emergency management personnel who are actively using Starlink to facilitate emergency response and recovery efforts. At any given point in time, Starlink can be activated and deployed globally to respond to various crises. With respect to these contracts and customer commitments, it is in the public interest to continuously enhance Starlink network capacity, particularly in furtherance of U.S. Government purposes and objectives. SpaceX's rapid launch capability and continuous deployment of Starlink satellites in orbit directly correspond to improved network performance that scales directly with network growth to meet escalating demand. Starlink launches are not incidental; each individual Starlink launch is part of a deliberate, planned effort to meet capacity needs to support the requirements or demand of specific customers, including the U.S. Government. The capability of new satellites allows SpaceX to add capacity more quickly and interconnect the Starlink constellation, to serve critical U.S. Government needs around the globe, and to launch critical communication services for aviation and maritime in the U.S. and the rest of the world's most remote locations.

SpaceX also launches payloads for the USSF's Space Development Agency as part of the Proliferated Warfighter Space Architecture, a resilient layered network of military satellites designed to quickly deliver needed national security space capabilities to the joint warfighter. In addition to missions for the DOD, SpaceX launches payloads from VSBF for U.S. Government agencies, including NASA and NOAA, and allied foreign nations, including missions that directly benefit environmental monitoring and response.

On 5 May 2023, the Executive Director of the CCC concurred with a Negative Determination (ND; ND-0009-23) to increase the Falcon 9 launch cadence at SLC-4 to 36 launches per year, the number of SLC-4 first stage landings per year remained at 12, which CCC had reviewed in prior consultations. In the months following the Executive Director's concurrence, CCC staff assessed that public coastal access was being affected to a greater extent than the DAF previously analyzed in the ND. On 15 December 2023, the Commissioners voted to approve a resolution authorizing the Executive Director to prepare and send a letter to DAF proposing remedial actions to resolve the change. The resolution was to have the DAF prepare a CD for the 36-launch cadence increase due to the staff assessment. The CCC review of the CD for 36 launches resulted in a conditional concurrence on 14 August 2024, which the CCC and DAF continued to negotiate through 17 September 2024. Since these negotiations, SLD 30 has implemented some measures addressing the CCC's conditional concurrence. Additionally, there has been a substantial reduction in the number of closures of Jalama Beach County Park despite launch rates increasing. In 2024, there were only four (4) closures of Jalama Beach County Park despite 46 Falcon 9 launches. Few campsite reservations (< 1 %) have been cancelled because of the contingency closure emails (pers comm L. Semenza, 2023).

The DAF submitted another CD in July 2024 (CD-0007-24) to increase the number of Falcon 9 launches to 50 annually. The DAF agreed to continue the measures agreed to in response to the CCC's conditional concurrence with the 36-launch CD during the proposed 50-launch program. However, the DAF has determined that it had been consistent with the California Coastal Management Program (CCMP) policies before the proposed measures were agreed to be implemented.

Based on DAF's commitment to continue implementation of the measures negotiated in response to the previous conditional concurrence for the 36 launches, CCC staff recommended concurrence with CD-0007-24. But at its 10 October 2024 meeting, the CCC objected. On 1 November 2024, the DAF notified the CCC that it was proceeding with the increased number of launches, which CZMA regulations allow

when the federal agency determines its activity is consistent with the enforceable policies of a state's coastal management program. See 15 Code of Federal Regulations [C.F.R.], § 930.43. At its 6 February 2025 meeting, the CCC voted to adopt the staff's revised findings in support of the Commission's action on 10 October 2024, objecting to the 50-launch CD.

The DAF previously received concurrence from the CCC for actions at SLC-6, including CD-018-82 and CD-021-82 for improvements to SLC-6 to support the Space Shuttle program; CD-003-88 for space launch vehicle modifications, CD-028-90 for conversion of SLC-6 for the Titan IV/Centaur launch programs; CD-049-98 for addition of the Evolved Expendable Launch Vehicle program to SLC-6, and ND-102-03 for Atlas V Launch Operations.

1.1 AUTHORITY

The DAF submits this CD in compliance with the NOAA Federal Consistency Regulations (15 C.F.R. Part 930). The DAF prepared this CD per Section 307(c)(1)(A) of the Coastal Zone Management Act (CZMA; 16 U.S.C. 1456(c)(1)(A)), as amended, 15 C.F.R. Part 930, and the federally approved CCMP pursuant to the California Coastal Act (CCA) (California Public Resources Code, Division 20).

1.2 DETERMINATION

The Proposed Action would primarily be located within the boundary of VSFB which is owned by the United States of America and under the administrative control of the DAF. Although the CZMA excludes federal lands from the definition of coastal zone, actions that may affect the state's coastal zone off VSFB property must be consistent to the maximum extent practicable with the relevant enforceable policies of the CCMP. Based on review of the Proposed Action's compliance with the CZMA, the DAF has determined that the Proposed Action is consistent with the CCMP, pursuant to the requirements of the CZMA.

1.3 CONSULTATIONS WITH OTHER RESOURCE AGENCIES AND TRIBAL ENTITIES

The DAF completed Section 7 consultation with the National Marine Fisheries Service (NMFS) on 17 April 2024. The existing SLD 30 Letter of Authorization (LOA) issued by NMFS for Level B harassment of marine mammals incidental to launch activities covers the Proposed Action (NMFS 2024b). The DAF reinitiated Section 7 consultation with the United States Fish and Wildlife Service (USFWS) on 9 April 2025. USFWS is expected to issue a biological opinion by August 2025. The DAF engaged with the California State Historic Preservation Office (SHPO) on 16 January 2025. The Section 106 consultation considered demolition, construction, static fire, launch and boost back noise vibrations effects in the Cultural Resources Study Area for the project. The Study Area reached outside the Base boundaries to include the mainland and Northern Channel Islands (NCI). However, the noise study areas were not included in delineation of the Area of Potential Effects (APE) because the DAF concluded that those noise levels have no potential to affect cultural resources. The SHPO concurred with the DAF's finding of no historic properties affected for demolition of SLC-6 on 16 October 2024 and construction and operation on 6 February 2025. The DAF also engaged with the Santa Ynez Band of Chumash Indians (SYBCI) over potentially affected historic properties. The SYBCI responded on 21 January 2025 that the Tribe has concerns the Proposed Action would affect a perceived traditional cultural landscape on VSFB and therefore requested a site visit. The Installation Tribal Liaison Officer (ITLO) responded on 21 January 2025, requesting the Tribe schedule a site visit. As of 12 June 2025, the Tribe had not scheduled a site visit or identified any perceived potential effects. The ITLO will continue open communication with the Tribe to gather comments and address any perceived potential effects.

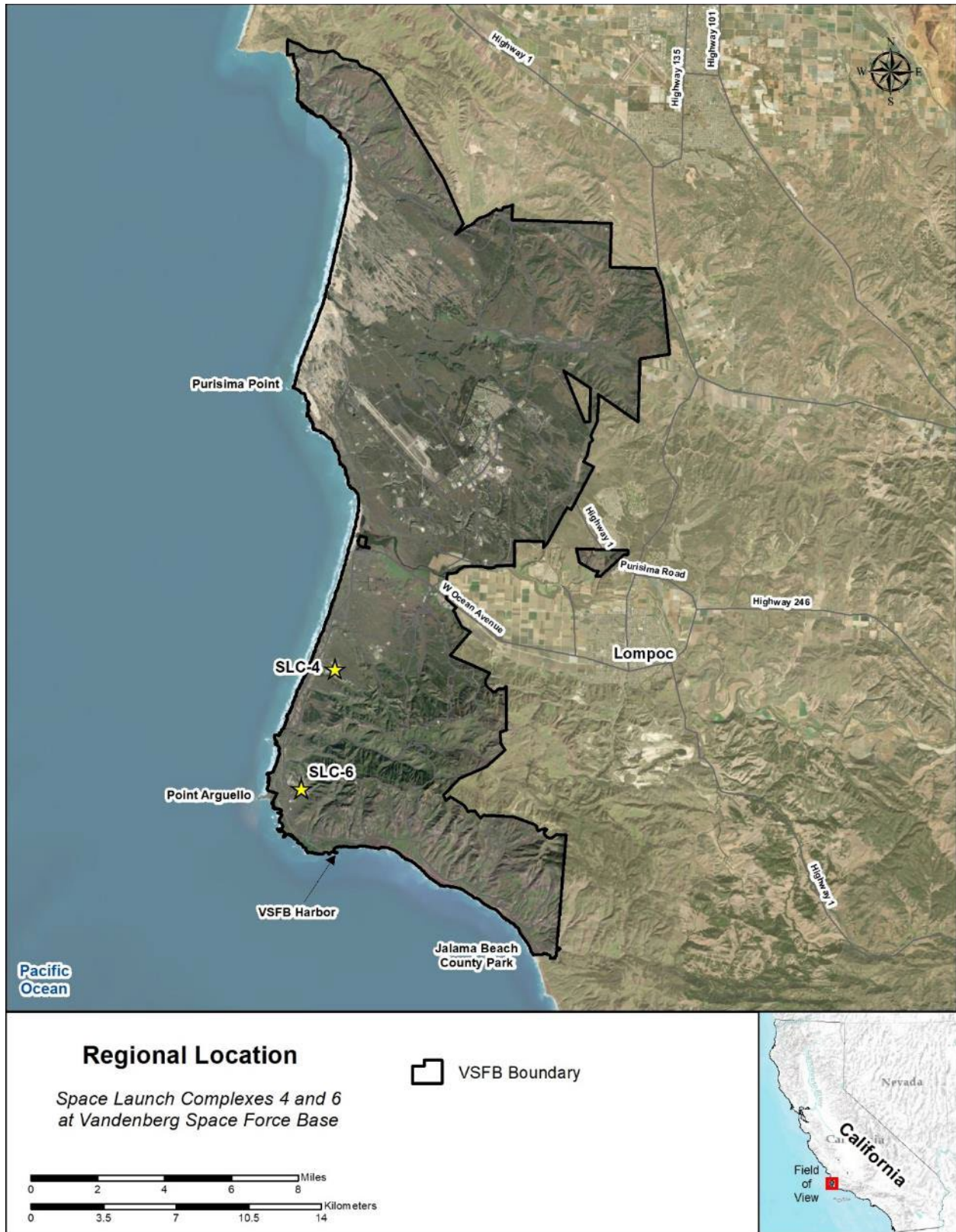


Figure 1.3-1. Regional Location of Proposed Action Area

2 DESCRIPTION OF PROPOSED ACTION

2.1 PROPOSED ACTION

The Proposed Action is to increase the annual Falcon launch cadence at VSFB through launch and landing operations at SLC-4 and SLC-6, including modification of SLC-6 for Falcon 9 and Falcon Heavy launch vehicles to support future U.S. Government and commercial launch service needs. The DAF would authorize an increase in Falcon 9 launches from SLC-4. No modification of SLC-4 is proposed. The DAF would also authorize SpaceX to modify SLC-6 to support Falcon 9 and Falcon Heavy launches. Falcon Heavy would only launch from SLC-6. The overall launch cadence for Falcon 9 and Falcon Heavy at both SLCs, combined, would increase from 50 to up to 100 launches per year. Following each launch, the first stage(s) would land either downrange on a droneship in the recovery area or at SLC-4 or SLC-6 landing zones. As approved in prior environmental documents, no more than 12 first stage landings would occur at SLC-4 per year. The DAF would authorize SpaceX to construct landing zones adjacent to SLC-6 to support landing operations at SLC-6, as described below.

Falcon Heavy is a heavy-lift vehicle with the ability to lift approximately 141,000 pounds (lbs) into low Earth orbit. Merlin engines are used on both stages of Falcon Heavy. The center core of the Falcon Heavy is equivalent to a single Falcon 9 rocket and the two side boosters are essentially the same design as a Falcon 9 first stage booster; thus, Falcon Heavy uses the same type of propellants as Falcon 9. Additionally, Falcon Heavy uses the same second stage as Falcon 9. A comparison of Falcon 9 and Falcon Heavy is shown in Figure 2.1-1.



Figure 2.1-1. Falcon 9 and Falcon Heavy launch vehicles

2.1.1 LAUNCH AND LANDING ACTIVITIES

Launch operations would continue to be conducted in the same way as described in past CCC consistency proceedings and environmental documents. One to 3 days before each launch, SpaceX may perform an engine static fire test, which lasts a few seconds. The need to conduct a static fire test depends on the mission, but there would be no more than 50 static fire events across the program per year. Due to weather conditions, orbital mechanics (i.e., destination orbit, inclination, eccentricity, and altitude), airspace considerations, and range availability, launch operations would occur day or night, at any time during the year. Launches could occur from both launch pads on the same day. Following each launch, the first stage(s) or rocket boosters would land either downrange on a droneship or at landing zones at SLC-4 or SLC-6. Mission objectives may occasionally require expending first stage(s), or booster, within the

recovery area in the Pacific Ocean (Figure 2.1-2). If expended, the first stage(s) would break up upon atmospheric re-entry, and there would be no residual propellant or explosion upon impact with the Pacific Ocean. The first stage remnants would sink to the bottom of the ocean. The downrange recovery area is outside of the state coastal zone (Figure 2.1-2).

An average of 4.2 weather balloons were released prior to each launch in 2024 to measure wind speed, which is consistent with weather balloon releases anticipated for the Proposed Action. Weather balloons are commonly launched by the National Weather Service (typically twice daily per station) and other entities to collect atmospheric data; therefore, the number of balloons released under the Proposed Action would be a small fraction of those launched on the west coast of the U.S. each year. These data are used to create wind profiles that help determine if it is safe to launch and land the vehicle. A radiosonde, the size of a half-gallon milk carton, is attached to the weather balloon to measure and transmit atmospheric data to the launch operator. The latex balloon rises to approximately 20-30 kilometers (km) above Earth's surface and bursts. The radiosonde and shredded balloon pieces fall back to Earth where they may land in state waters, and are not recovered. The radiosonde does not have a parachute and is expected to sink to the Pacific Ocean floor.

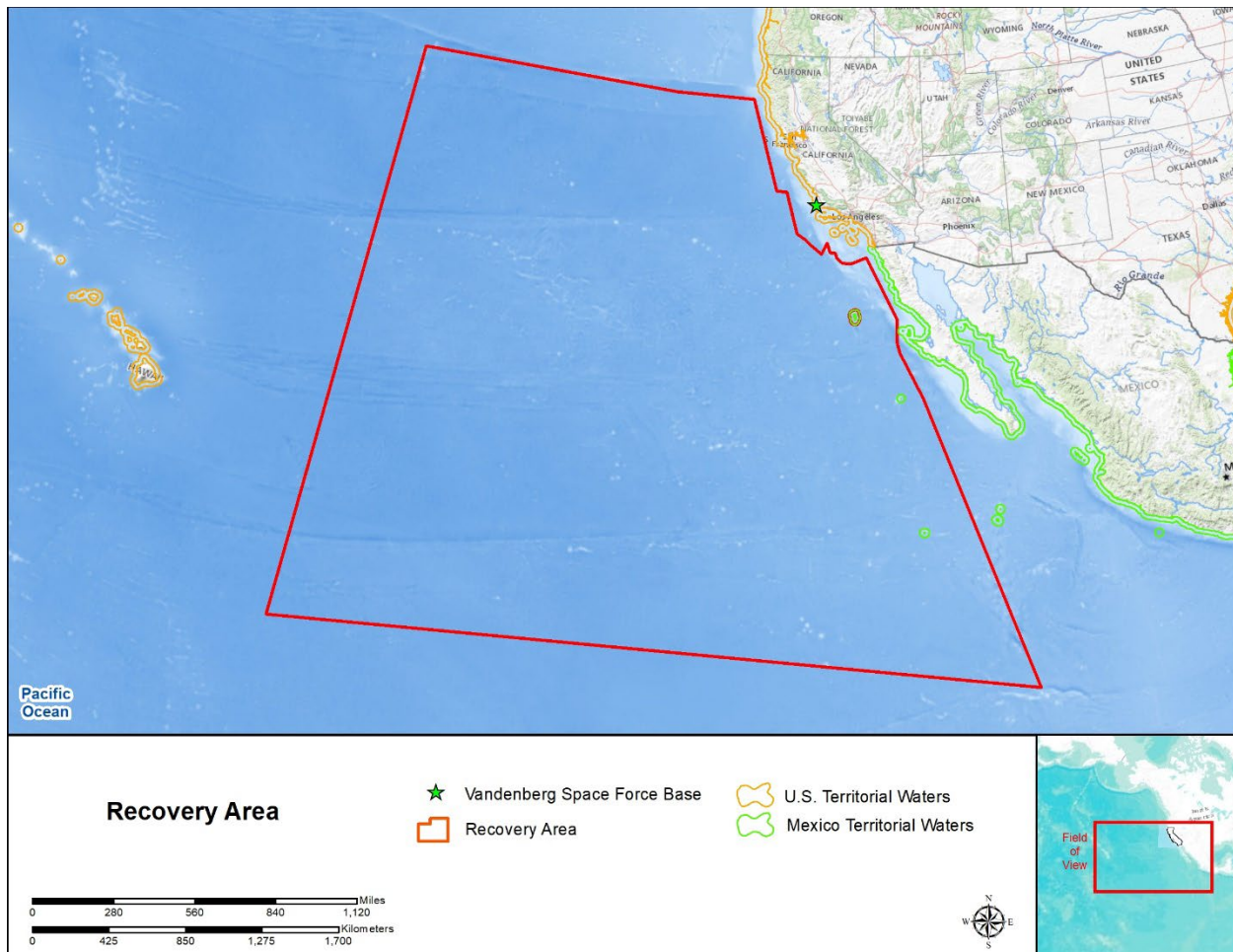


Figure 2.1-2. Recovery area

The DAF proposes to increase the Falcon launch cadence at VSF from 50 to up to 100 launches per year. SpaceX has continued to improve its turn-around time between launches, which has provided more

opportunity for launches at SLC-4. The introduction of SLC-6 provides additional capacity for Falcon launches, including Falcon Heavy. The Falcon Heavy would be launched up to 5 times per year from SLC-6. SpaceX could launch Falcon 9 from either SLC-4 or SLC-6 and the breakdown of the cadence at each pad would be determined by the manifest and the Western Range operations. An example scenario of the breakdown in cadence and estimated launch schedule is included in Table 2.1-1. Launch trajectories from SLC-4 would remain within the previously analyzed azimuth range of 140 to 325 degrees. Launch trajectories from SLC-6 would also fall within this range.

Table 2.1-1. Estimated future Falcon launch frequency

Year	SLC-4	SLC-6		Total
	Falcon 9	Falcon 9	Falcon Heavy	
2025	70	-	-	70
2026	70	11	1	82
2027	70	25	5	100
2028	70	25	5	100

SpaceX would perform a boost-back and landing of the first stage(s) and would land first stage boosters launched from SLC-4E at SLC-4W or downrange on a droneship in the recovery areas depicted in Figure 2.1-2. Launches from SLC-6 would land at a new proposed landing zone south of SLC-6 or downrange on a droneship. SpaceX would continue to land up to 12 first stages at SLC-4 each year. In addition, up to 12 missions each year would utilize the proposed landing zones at SLC-6, including five Falcon Heavy missions per year, where the two side boosters would land simultaneously at SLC-6. The Falcon Heavy center core first stage booster is typically expended each launch but may land on an offshore droneship. Estimated missions with first stage booster landings are included in Table 2.1-2. Including potential Falcon 9 expendable missions, up to 10 launches per year may include expendable first stages that would be deposited anywhere within the recovery area depicted in Figure 2.1-2.

Table 2.1-2. Launches with first stage/boosters to VSF

Year	SLC-4	SLC-6	Total
2025	12	-	12
2026	12	12	24
2027	12	12	24
2028	12	12	24

SpaceX would continue to utilize approximately 70,000 gallons of water per launch at SLC-4 in the flame bucket and as deluge to suppress noise and vibrations. Under the Proposed Action, Falcon Heavy would use up to approximately 1.5 million gallons of water per launch and Falcon 9 would use up to approximately 200,000 gallons per launch for deluge and the flame bucket at SLC-6. More water is required at SLC-6 because the existing flame bucket is substantially larger than at SLC-4, thus requiring more water to achieve the same operational objectives in reducing vibration below the vehicle. In addition, a maximum of 1.37 million gallons (4.20 acre-feet [ac-ft]) per year would be required to support the personnel and operational activities at SLC-4, a maximum of 1.19 million gallons (3.64 ac-ft) per year to support personnel at Buildings 398 and 520, and 1.10 million gallons (3.36 ac-ft) per year would be required to support the personnel and operational activities at SLC-6. Therefore, at maximum cadence, the Proposed Action would use up to 21.1 million gallons (65.6 ac-ft) of water per year, which would be

approximately 2.3 percent of the total annual water usage on VSFB. VSFB primarily relies on State Water, which is sourced from precipitation and groundwater, primarily from snowmelt in the Sierra Nevada Mountains. During drought years, if insufficient amounts of State Water is allocated, then VSFB will use groundwater from the San Antonio Groundwater Basin. Further discussion on this is found in Section 3.2.4 Water Supply section.

2.1.2 PAYLOAD FAIRING RECOVERY OPERATIONS

The Falcon 9 and Falcon Heavy vehicle payload systems include a fairing cover that protects payloads (e.g. satellites). The fairing consists of two halves which separate, allowing the deployment of the payload at the desired orbit. Each fairing half contains a parachute system for recovery, which includes one drogue parachute and one parafoil. Following fairing re-entry, the parachute deploys at a high altitude (approximately 50,000 ft) to begin the initial slowdown and to extract the parafoil. Following successful parafoil deployment, the parachute cuts away. The parachute system slows the descent of the fairing to enable a soft splashdown, so that the fairing remains intact. Parachutes, parafoils, and their assemblies are made of Kevlar and nylon, and sink quickly as they become waterlogged. The parachute canopy is approximately 110 square feet (ft²), and the fairing parafoils are approximately 3,000 ft².

Fairing recovery would occur in the recovery area shown in Figure 2.1-2. A salvage ship stationed near the anticipated splashdown site, but no closer than 12 nautical miles offshore, would attempt to recover the fairing and parafoil. However, in a worst-case scenario where no parachutes or parafoils are recovered, up to 200 parachutes and 200 parafoils would land in the ocean annually, within federal or international waters outside of the state coastal zone. SpaceX would attempt to recover all parafoils, but it is possible that some of the parafoils would not be recovered due to sea or weather conditions at the time of recovery. SpaceX recovered approximately 66% of parafoils on the west coast in 2024 and 80% in 2023. The lower recovery rate in 2024 was due to adverse ocean surface conditions, such as high winds or rough seas which make recovery operations more difficult. The recovery team would attempt to recover the parachute assembly if they can get a visual fix on the splashdown location. Because the parachute assembly is deployed at a high altitude, it is difficult to locate. In addition, based on the size of the assembly and the density of the material, the parachute assembly would be saturated and begin to sink. This would make recovering the parachute assembly difficult and unlikely. As a result, SpaceX has experienced limited success in recovering the parachutes but will continue to attempt to make a recovery and improve the success rate. In 2024 approximately 99% of fairings were recovered and approximately 35% of parachutes. If not recovered, parachutes would promptly sink within minutes of landing, outside of the state coastal zone.

2.1.3 VEHICLE REFURBISHMENT

SpaceX would continue to process vehicles at existing SpaceX facilities such as Building 398. Operations include refurbishing the recovered first stage and fairing for reuse in future missions. Up to 110 boosters and 100 fairings would be refurbished each year. Solvents such as isopropyl alcohol, isopar, and Simple Green would be used during these operations, as well as for launch pad operations, facility maintenance, and system flushing. System flushing includes the purging of residual waste from the vehicle to maintain system health and avoid contamination. Remaining hazardous waste would be contained in drums and disposed of or recycled in accordance with applicable federal, state, and local regulations.

2.1.4 HARBOR OPERATIONS

SpaceX would continue to transport first stage boosters and fairings from the Port of Long Beach to the VSFB harbor via a “roll-on-roll-off” (RORO) barge. The first stage would be transferred from the dronship to SpaceX’s self-propelled modular transporter (SPMT) that is positioned on a small, low draft barge. The barge with the first stage would then be pulled by a tugboat from the Port of Long Beach to the VSFB harbor, where it would be unloaded and driven over the road to Building 398 for refurbishment. The Proposed Action would include increasing from 50 RORO events per year to up to 100 RORO events per year, which return the first stage boosters along with the fairings. Each harbor operation lasts for approximately four hours, or one tide window. Harbor operations could occur at any time of day, as they are dependent on the tide windows. The Proposed Action does not include additional dredging outside the quantity and depth specified by SLD 30’s existing permit from the U.S. Army Corps of Engineers (USACE).

2.1.5 SLC-6 MODIFICATIONS

SpaceX would modify SLC-6 to support Falcon 9 and Falcon Heavy launches. Construction would take 18 months and would start in late 2025, depending on acquisition of the lease by SpaceX. Major construction and demolition (C&D) activities would occur during approximately the first 12 months of construction. The remaining construction time would primarily involve construction and activation of infrastructure, such as fluid systems. Four existing structures would be demolished (mobile service tower, mobile assembly shelter, fixed umbilical tower, and lift and pit crown (Figure 2.1-3). Mechanical shears would be used to cut the building sections into manageable sizes. Cranes would be utilized in order to assist with any heavy lifts of the structure. Explosives would be used to remove the Mobile Service Tower, during which four approximately 50-pound explosive charges would be detonated simultaneously. This would cause a short impulsive sound, similar to those experienced during first stage landing events at SLC-4, but over a much smaller area (Figure 2.1-4). An excavator with a thumb attachment would be used to move the manageable pieces to a dump truck that would haul out the material. The excavators and backhoes used for demolition would be track mounted. Any staging or temporary storage of materials would occur in the areas that have been previously disturbed. Demolition work would occur during daylight hours. The duration of demolition activities may last up to 6 months.

Construction would generally occur in previously disturbed areas and on existing impervious surfaces, but some earthwork is anticipated which would be identified during the design phase of the project. SpaceX would construct commodity storage tanks (gas, rocket propellant, and liquid oxygen storage), a vehicle erector, water tower(s), ground supporting equipment, and a transport road with rail system from the horizontal integration facility (HIF) to the launch pad (Figure 2.1-3). Where practicable, existing infrastructure would be modified. This could include liquid oxygen storage, launch pad apron, access road, and fence line. The existing flame trench would be retained and converted to a unidirectional water-cooled flame diverter, and a deluge/acoustic suppression system would be installed. A water reclamation system may be used that could pump residual deluge water back into the water storage tanks. Work would generally occur in previously disturbed areas and on existing impervious surfaces, but some earthwork is anticipated. A hangar would be required for vehicle processing. SpaceX would add five emergency generators for standby power at SLC-6. Construction may occur at any time of the day or night.

Under the Proposed Action, the DAF would authorize SpaceX to modify the HIF to support launch operations at SLC-6. The HIF is an existing hangar owned by ULA north of SLC-6 that was previously used

for pre-flight processing of Delta IV (Figure 2.1-3). The DAF currently leases the land where the HIF is located to ULA. Modifications would include interior work and construction of an annex on the south side of the building. SpaceX would construct rails from the hangar to the launch pad to transport Falcon.

Approximately 143,000 square feet (ft²) of commodity storage would be required. This includes storage tanks for liquid oxygen, rocket propellant-1, water, nitrogen, helium, and other launch commodities and may be a combination of new tanks and repurposing existing tanks at SLC-6. A 200-ft water tower would be constructed on the east side of the launch complex near the site of the former water tower. Firebreaks would be incorporated as appropriate into the site design and final site layout is subject to SLD 30 review and approval. A conceptual site plan is shown in Figure 2.1-3.

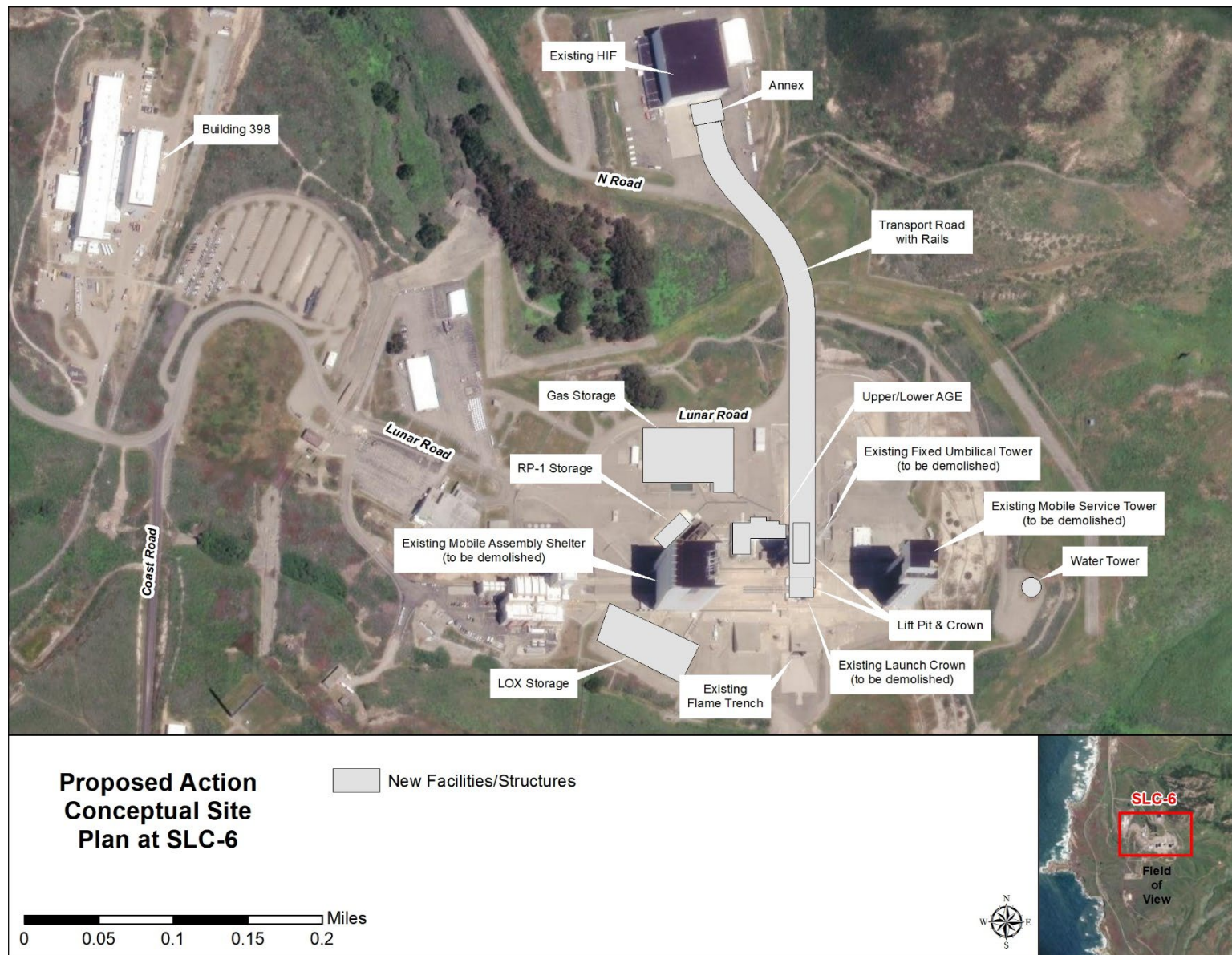


Figure 2.1-3. Conceptual site plan

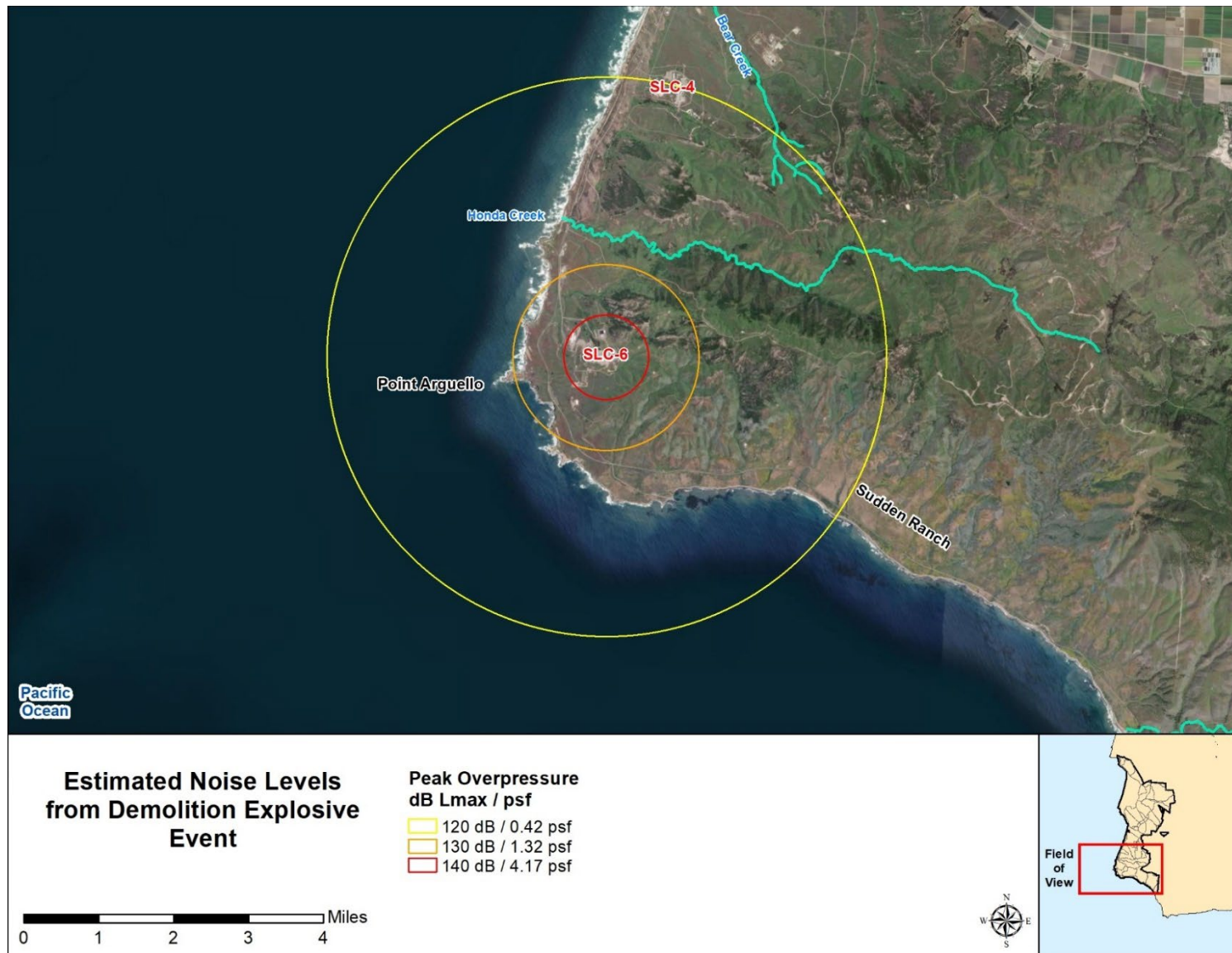


Figure 2.1-4. Estimated impulsive noise levels from explosives used during demolition

2.1.5.1 Landing Zones

SpaceX would construct two landing zones approximately 850 ft south of SLC-6 to support landing of first stage Falcon boosters launching from SLC-6. Each landing zone would be made up of a concrete pad surrounded by a gravel apron as follows and depicted in Figure 2.1-5:

- **Two Landing Zones:**
 - 280 ft diameter concrete pad each
 - 60 ft gravel apron surrounding each pad
 - Total diameter of each landing zone: 400 ft
- **Two Landing Pad Pedestals:**
 - 30 ft by 30 ft each
 - Approximately 15 ft tall each

SpaceX would construct a new nitrogen gas line from SLC-6 to a fluids bay at the landing zones. The fluids bay is used to send nitrogen to different systems of the booster after landing. A 30-ft by 30-ft pedestal, which is approximately 15-ft tall, would be constructed at each landing pad. The first stage booster is lifted onto the pedestal during post-flight processing to remove the landing legs prior to transport. Crane storage, a cleared area to lay down cranes when not in operation, is proposed on the western site boundary. Each landing zone would have a connection to the existing road to support booster transport. Approximately 16 acres (ac.) would be cleared to construct the landing zones and approximately seven ac. would be impervious upon completion of construction. A conceptual layout of the landing zones is shown in Figure 2.1-5.

2.1.5.2 Firebreak

A new firebreak is proposed south of the landing zones. Cypress Ridge Road and N Road would also be improved to ensure suitable access for fire defense. These improvements are anticipated to be within the existing roadway footprints. The proposed firebreak is approximately 50 ft wide, shown in Figure 2.1-6, and would connect to the existing firebreak for SLC-8. Cypress Ridge Road, an existing fire access road, would be improved within its existing footprint to protect against potential erosion. Vegetation maintenance would occur within the vegetation maintenance area depicted in Figure 2.1-6.

2.1.5.3 Alternative 1 – New Hangar at SLC-6

Under Alternative 1, the DAF would implement the Proposed Action as described above, but rather than modifying the existing HIF, the DAF would authorize SpaceX to construct a new approximately 62,000 ft² hangar north of the launch pad to support Falcon 9 and Falcon Heavy integration and processing, shown in Figure 2.1-7. Approximately 40,000 cubic yards of fill would be required and would be sourced locally (on VSFB as well as the local region around VSFB). Approximately 244,000 ft² of additional impervious area would be added to construct this alternative. Existing stormwater infrastructure is expected to be adequate to support this additional impervious area but would be confirmed during final design of the site. SpaceX would construct a road and rail system from the hangar to the launch pad to transport Falcon. The SLC-6 fence would be relocated and vehicular access from Luner Road to N Road would be removed. The existing HIF would remain.

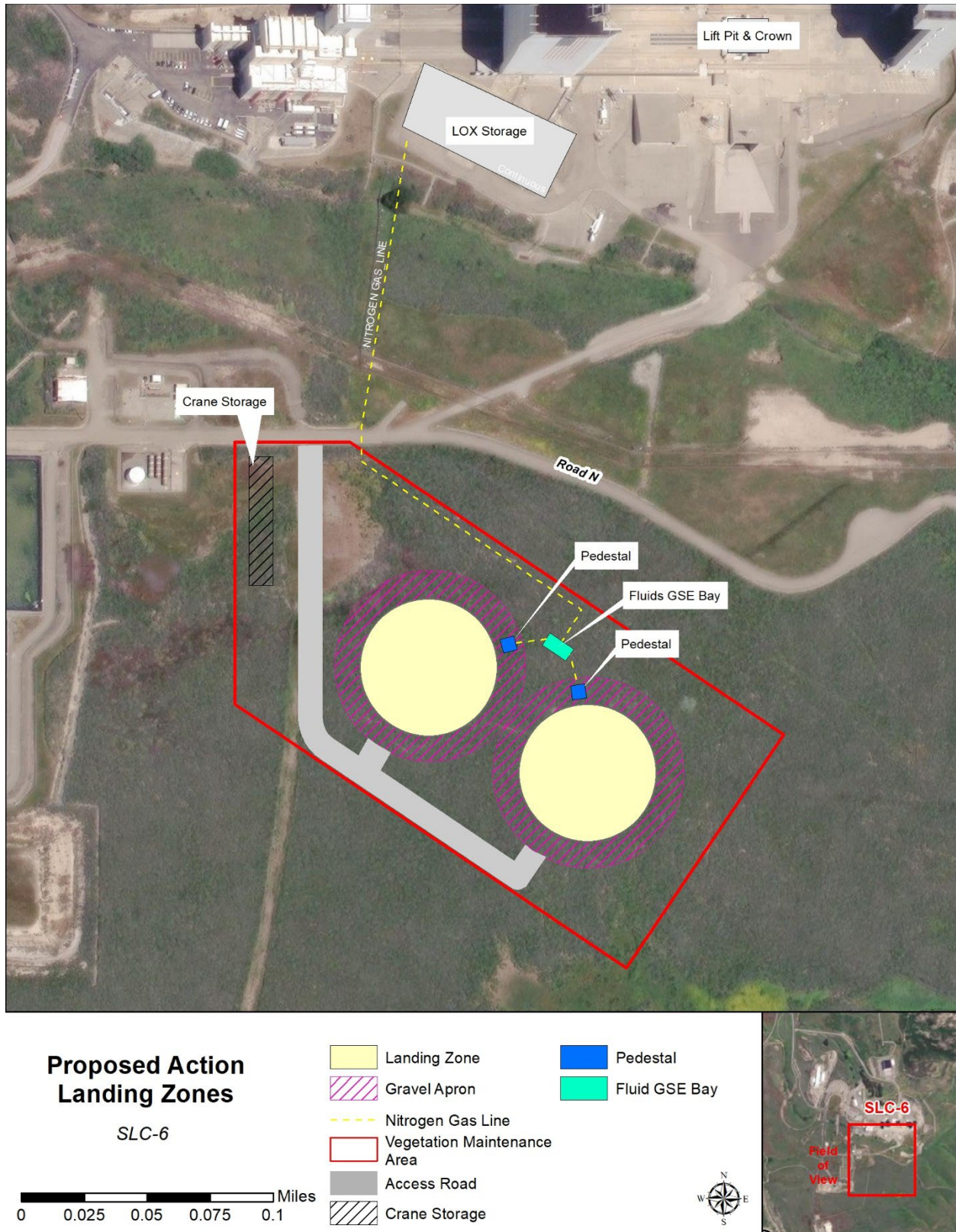


Figure 2.1-5. Proposed Landing Zones

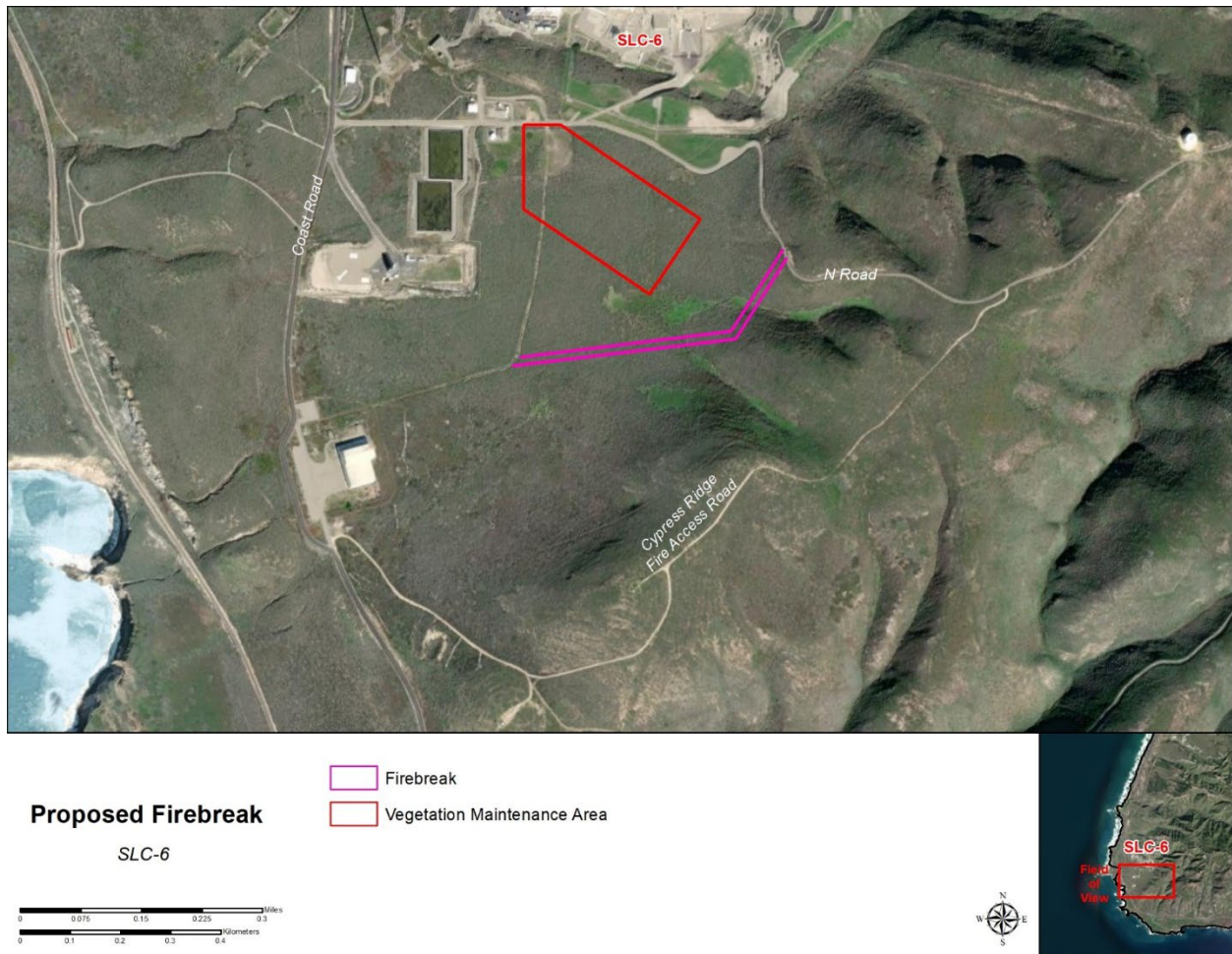


Figure 2.1-6. Proposed Firebreak

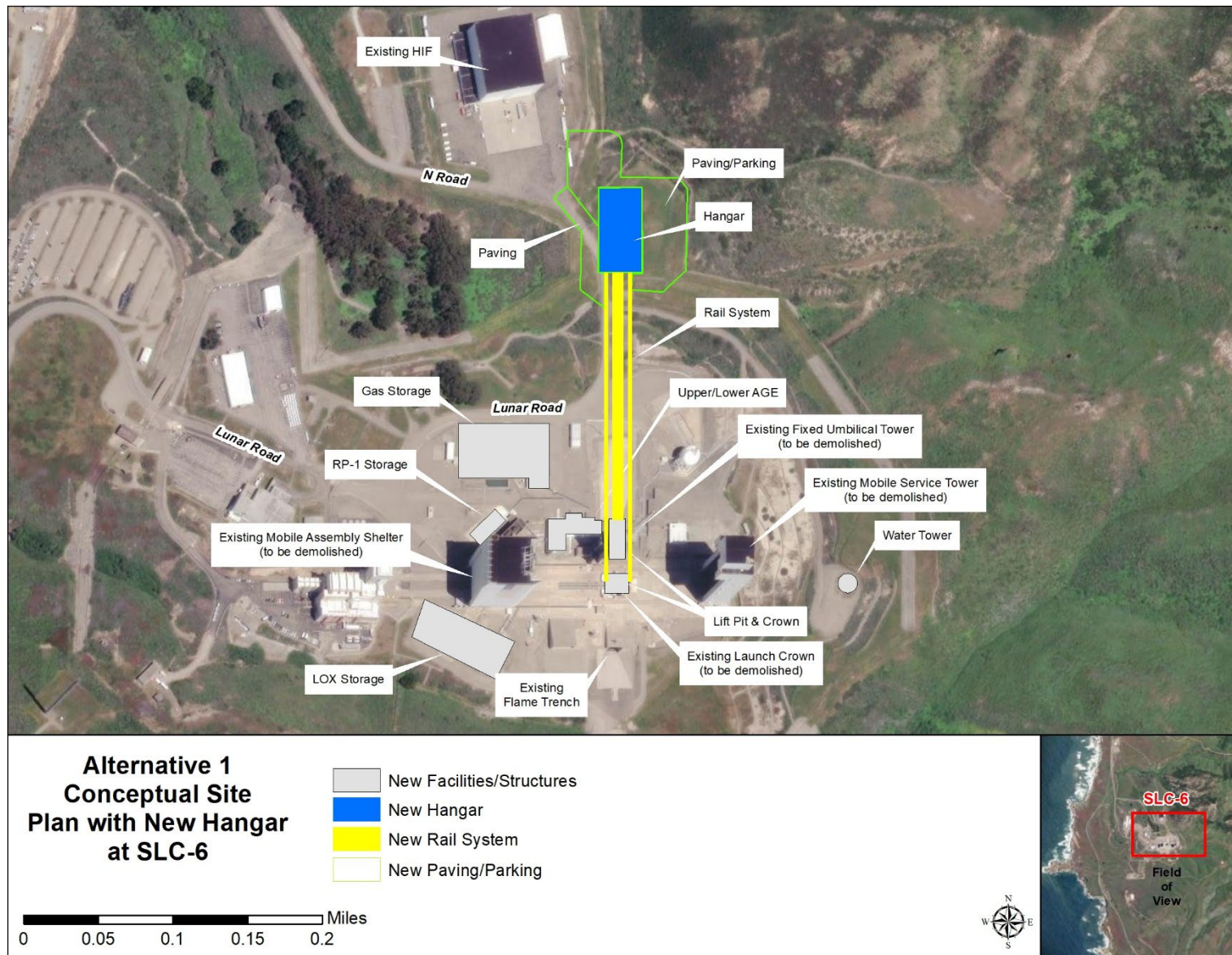


Figure 2.1-7. New Hangar at SLC-6

2.2 CONSISTENCY ANALYSIS/ANALYSIS OF EFFECTS

The effects test is a procedure where the project proponent determines whether the proposed activities comply with the federal consistency requirements of Section 307 of the CZMA (16 U.S.C. Section 1456) and its implementing regulations (15 C.F.R. Part 930). As defined in Section 304 of the CZMA, the term “coastal zone” does not include “lands the use of which is by law subject solely to the discretion of or which is held in trust by the Federal Government.” However, when proposed activities may have an effect on the land, water, or natural resources of a state coastal zone off such federal property, as per the CZMA the DAF undertakes federal actions in a manner consistent to the maximum extent practicable with the relevant policies of the approved CCMP through the federal consistency process under the CZMA⁴.

The DAF analyzed the effects of the Proposed Action by looking at reasonably foreseeable direct and indirect effects on any coastal use or resource identified for protection, preservation, restoration and/or enhancement in the approved CCMP. The DAF has determined that the relevant CCMP policies in analyzing such potential effects include the following: Article 2 – Public Access (Section 30210, 30213, and 30214); Article 3 – Recreation (Section 30220); Article 4 – Marine Environment (Section 30230, 30231, 30232, 30234, and 30234.5); Article 5 – Land Resources (Section 30240). Sections and Articles of the CCMP that are addressed below are not relevant to the Proposed Action.

Prior to evaluating whether the Proposed Action is consistent with the relevant policies, the federal agency must first examine whether the Proposed Action would have a reasonably foreseeable effect on state coastal zone uses or resources. Thus, the elements of the Proposed Action must first be examined to determine whether they have reasonably foreseeable effects before determining whether the federal agency activity is consistent with the relevant policies. State coastal zone resources include both resources permanently located in the state coastal zone (e.g., benthic organisms) and mobile resources (e.g., marine mammals and sea turtles) that typically move into and out of the state coastal zone as part of a natural cycle.

The effects test evaluates the relative location of the Proposed Action to the state coastal zone and the potential effects of stressors on state coastal zone resources. The DAF conducted the effects test and determined there may be reasonably foreseeable effects to state coastal uses and resources. The effects test for the Proposed Action is based on the locations of the proposed activities relative to the state coastal zone and the potential effects of stressors on state coastal zone resources.

⁴ The DAF is using the term “relevant policies” with respect to its use and application of the state approved “enforceable policies” to conduct the required consistency review and analysis. The CZMA does not waive federal sovereign immunity and, therefore, does not give states authority to exert control over or regulate the federal government. See 16 U.S.C. 1453(6a) and 15 C.F.R. 923.84. The DAF is only required to comply with the federal consistency process which includes analyzing whether the activities are consistent with the approved policies and providing the state the opportunity to review the DAF’s determination.

3 POLICIES OF THE CALIFORNIA COASTAL MANAGEMENT PROGRAM

The DAF reviewed the CCMP to identify the policies relevant to the Proposed Action according to Division 20 of the California Public Resources Code, approved as part of the coastal program. Section 3.1 identifies the CCMP policies that are not relevant to the Proposed Action. Section 3.2 provides an analysis of the CCMP policies that are relevant to the Proposed Action.

3.1 POLICIES OF THE CALIFORNIA COASTAL MANAGEMENT PROGRAM THAT ARE NOT RELEVANT TO THE PROPOSED ACTION

The CCMP policies not applicable to the Proposed Action are provided in Table 3.1-1 below.

Table 3.1-1. Policies of the CCMP That Are Not Relevant to the Proposed Action

Article	Section	State Policy	Explanation of Non-Applicability
Article 2: Public Access	30211	Development not to interfere with access	The Proposed Action does not include any construction or ground disturbance, therefore would not interfere with the public's right of access to the sea.
	30212	New development projects	The Proposed Action does not include any new development that would block or impede public access.
	30212.5	Public facilities; distribution	The Proposed Action does not include any public facilities.
Article 3: Recreation	30221	Oceanfront land; protection for recreational use and development	The Proposed Action does not include any development of oceanfront land that would reduce available areas for public use.
	30222	Private lands; priority of development purposes	The Proposed Action does not include any development of private lands within the Action Area.
	30222.5	Oceanfront lands; aquaculture facilities; priority	The Proposed Action does not affect coastal zone lands suitable for aquaculture.
	30223	Upland areas	The Proposed Action does not affect the availability of upland areas necessary to support coastal recreational uses.
	30224	Recreational boating use; encouragement; facilities	The Proposed Action does not include the development of any recreational boating facilities.
Article 4: Marine Environment	30233	Diking, filling, or dredging; continued movement of sediment and nutrients	The Proposed Action does not include any diking, filling, or dredging activities.
	30235	Construction altering natural shoreline	The Proposed Action does not include construction or ground disturbance

Article	Section	State Policy	Explanation of Non-Applicability
			that would alter natural shorelines processes.
	30236	Water supply and flood control	The Proposed Action does not alter any rivers or streams.
	30237	Repealed	
Article 5: Land Resources	30241	Prime agricultural land; maintenance in agricultural production	The Proposed Action does not include construction or ground disturbance that would impact prime agricultural lands.
	30241.5	Agricultural lands; determination of viability of uses; economic feasibility evaluation	The Proposed Action does not include construction or ground disturbance that would impact agricultural lands.
	30242	Lands suitable for agricultural use; conversion	The Proposed Action does not include construction or ground disturbance that would impact agricultural lands.
	30243	Productivity of soils and timberlands; conversion	The Proposed Action does not include construction or ground disturbance that would impact timberlands.
	30244	Archaeological or paleontological resources	Noise levels under the Proposed Action have no potential to affect cultural resources in the state coastal zone.
Article 6: Development	30250	Development location; existing developed areas	This policy only applies to actions that require permitting, which cannot be enforced against the DAF.
	30252	Maintenance and enhancement of public areas	The Proposed Action does not include any new development that would require maintenance or enhanced public access to the coast.
	30253	New Development	The proposed federal agency activity involves no off-base development nor any development affecting or impacting the state coastal zone.
	30254	Public works facilities	The Proposed Action does not include any new or expanded public works facilities.
	30254.5	Terms or conditions on sewage treatment plant development; prohibition	The Proposed Action does not include the development of a sewage treatment plant.
	30255	Priority of coastal-dependent developments	The Proposed Action does not include any development within the coastal zone.
Article 7: Industrial Development	30260	Location or expansion	The Proposed Action does not include the development of coastal-dependent industrial facilities.

Article	Section	State Policy	Explanation of Non-Applicability
	30261	Tanker facilities; use and design	The Proposed Action does not include the use of existing or new tanker facilities.
	30262	Oil and gas development	The Proposed Action does not include any oil and gas development.
	30263	Refineries or petrochemical facilities	The Proposed Action does not include new or expanded refineries or petrochemical facilities.
	30264	Thermal electric generating plants	The Proposed Action does not include new or expanded thermal electric generating plants.
	30265	Legislative findings and declarations; offshore oil transport	This section explains the legislative findings applicable to offshore oil transportation, and does not constitute a separate public access policy.
	30265.5	Governor or designee; co-ordination of activities concerning offshore oil transport and refining; duties	The Proposed Action does not include activities concerning offshore oil transport and refining.
Article 8: Sea Level Rise	30270	Sea level rise	The Proposed Action does not include activities at risk of sea level rise.

3.2 POLICIES OF THE CALIFORNIA COASTAL MANAGEMENT PROGRAM THAT ARE RELEVANT TO THE PROPOSED ACTION

The CCMP policies that are relevant to the Proposed Action are policies where one or more of the Proposed Action components could affect a coastal use or resource identified by the policy. The CCMP policies that are relevant to the Proposed Action are provided in Table 3.2-1.

Table 3.2-1. Policies of the CCMP That Are Relevant to the Proposed Action

Article	Section	State Policy
Article 2: Public Access	30210	Access; recreational opportunities; posting
	30213	Lower cost visitor and recreational facilities; encouragement and provision; overnight room rentals
	30214	Implementation of public access policies; legislative intent
Article 3: Recreation	30220	Protection of certain water-oriented activities
Article 4: Marine Environment	30230	Marine resources; maintenance
	30231	Biological productivity; water quality
	30232	Oil and hazardous substance spills
	30234	Commercial fishing and recreation boating facilities
	30234.5	Economic, commercial, and recreational importance of fishing
Article 5: Land Resources	30240	Environmentally sensitive habitat areas; adjacent developments
Article 6: Development	30251	Scenic and visual qualities

3.2.1 ARTICLE 2: PUBLIC ACCESS

Policies

CCA Section 30210 – “Access; recreational opportunities; posting” states:

In carrying out the requirement of Section 4 of Article X of the California Constitution, maximum access, which shall be conspicuously posted, and recreational opportunities shall be provided for all the people consistent with public safety needs and the need to protect public rights, rights of private property owners, and natural resource areas from overuse.

CCA Section 30213 – “Lower cost visitor and recreational facilities; encouragement and provision; overnight room rentals” states:

Lower cost visitor and recreational facilities shall be protected, encouraged, and, where feasible, provided. Developments providing public recreational opportunities are preferred. The commission shall not: (1) require that overnight room rentals be fixed at an amount certain for any privately owned and operated hotel, motel, or other similar visitor-serving facility located on either public or private lands; or (2) establish or approve any method for the identification of low or moderate income persons for the purpose of determining eligibility for overnight room rentals in any such facilities.

CCA Section 30214 – “Implementation of public access policies; legislative intent” states

(a) The public access policies of this article shall be implemented in a manner that takes into account the need to regulate the time, place, and manner of public access depending on the facts and circumstances in each case including, but not limited to, the following: (1) Topographic and geologic site characteristics. (2) The capacity of the site to sustain use and at what level of intensity. (3) The appropriateness of limiting public access to the right to pass and repass depending on such factors as the fragility of the natural resources in the area and the proximity of the access area to adjacent residential uses. (4) The need to provide for the management of access areas so as to protect the privacy of adjacent property owners and to protect the aesthetic values of the area by providing for the collection of litter.

(b) It is the intent of the Legislature that the public access policies of this article be carried out in a reasonable manner that considers the equities and that balances the rights of the individual property owner with the public's constitutional right of access pursuant to Section 4 of Article X of the California Constitution. Nothing in this section or any amendment thereto shall be construed as a limitation on the rights guaranteed to the public under Section 4 of Article X of the California Constitution.

(c) In carrying out the public access policies of this article, the commission and any other responsible public agency shall consider and encourage the utilization of innovative access management techniques, including, but not limited to, agreements with private organizations which would minimize management costs and encourage the use of volunteer programs.

Consistency Review

The DAF controls access to VSFB and on-Base recreation areas. Thus, they are not included in the state coastal zone. The public access beaches that may have reasonably foreseeable effects from the Proposed

Action are Jalama Beach County Park, Surf Beach (federal property)⁵, and County of Santa Barbara (County) Ocean Beach Park. Of these, Jalama Beach County Park is the only one with overnight accommodations, including 107 campsites and seven equipped cabins.

All beaches in the vicinity of VSFB have been subject to access restriction agreements between the DAF, the State of California, and Santa Barbara County since 1979. Under the agreements, the County Parks Department and the County Sheriff currently close the parks upon request from the DAF for the safety of park visitors pursuant to statutory and regulatory requirements. These agreements outline procedures to evacuate and close Jalama Beach County Park, Ocean Beach Park, Surf Beach, and Point Sal Road (which is the access to Point Sal State Beach), in the event of certain launch activities that have been determined by SLD 30 Range Safety to have certain human health and safety risks pursuant to such statutory and regulatory requirements. These evacuations are communicated at least 72 hours prior to evacuation and can be implemented a maximum of 48 hours per the agreement. Point Sal Road is not anticipated to be evacuated due to SpaceX launches.

Historically, the DAF has restricted access to Ocean Beach Park and Surf Beach for all launches from SLC-4E for public safety reasons under the agreements without restrictions on number of evacuations. Based on updated modeling and safety considerations, and in accordance with statutory and regulatory requirements, SLD 30 Range Safety and the Security Forces Squadron have determined evacuations are only required if the first stage of the Falcon 9 launch vehicle will boost back to land at SLC-4W. This DAF action has resulted in a net-benefit to public access in northern Santa Barbara County by reducing the previous public access restrictions of prior launches. The same determination would apply to launches and landings at the new proposed landing zone at SLC-6. Surf Beach and Ocean Beach Park would only be closed during SLC-4 and SLC-6 landing events up to 17 times per year (only Falcon Heavy landings at SLC-6 are anticipated to result in closures of Surf Beach and Ocean Beach Park).

The DAF voluntarily offers public access to Surf Beach year-round. During the western snowy plover season, 1 March through 30 September, beach access is available from 8:00 AM to 6:00 PM and restricted during evening hours from 6:00 PM to 8:00 AM. Access to the coastline from Ocean Beach Park is available via a DAF trail on federal property connecting this area to the coastal access available at nearby Surf Beach. Ocean Beach Park is open from 8:00 AM to dusk year-round. A portion of launches that boost back to land at SLC-4W and the new landing zones at SLC-6 would occur at night when these two locations are already closed. Accordingly, the Proposed Action would only restrict public access to Ocean Beach Park and Surf Beach during daytime launches with boost back to SLC-4W or SLC-6. For this analysis, DAF assumes that Surf Beach and Ocean Beach Park could be evacuated up to 17 times per year, including from scrubbed launches, for approximately four to eight hours each launch attempt.

If evacuation is under consideration, SLD 30 Range Safety notifies the County of Santa Barbara. The County then sends a contingency evacuation email (Appendix A) to reservation holders warning them that there may be a need to evacuate the park for the launch and providing them with the opportunity to cancel the reservation. In August 2023, the DAF and the County of Santa Barbara implemented improved messaging protocols to warn the public of potential evacuations at Jalama Beach County Park by implementing a Contingency Evacuation Email (Appendix A) that reduced reservation cancellations. Santa Barbara County Parks and Recreation stated that after implementation of the new notification procedures, cancellations

⁵ DAF is not legally required to provide access to Surf Beach. DAF has voluntarily allowed public access subject to compliance with its rules, including preservation and protection of nesting of threatened and endangered species such as the western snowy plover.

have become rarer, typically zero to one per launch (L. Semenza, County of Santa Barbara, pers. comm.). The DAF and SpaceX have also minimized impacts of launches that may close Jalama Beach by shifting launch times. This is discussed in more detail in the following paragraphs.

When an evacuation of Jalama Beach County Park is under consideration, Santa Barbara County reports the projected number of campers for day of launch, two to three days prior to the launch date. SLD 30 Range Safety compares the report to the maximum allowable number of people that would exceed the public safety criteria established by the FAA under Title 14 of the C.F.R. or the applicable range requirements for missions that are not FAA-licensed, such as Space Systems Command Manual 91-710. If this number is exceeded, they will confirm the evacuation. If the population is less, the evacuation notice is rescinded. When an evacuation is confirmed, park staff request that all campers and day users leave the park. In addition, the Santa Barbara County Sheriff places roadblocks at the intersection of Highway 1 and Jalama Road to prevent the public from entering the affected area.

SpaceX flies a variety of trajectories from VSFB to support a wide range of missions, thus increasing to 100 launches per year does not mean that all 100 launches would use a trajectory that would impact Jalama Beach County Park. In 2024 there were only four evacuations of Jalama Beach County Park despite 46 launches of Falcon 9. One of these evacuations was rescinded and thus the park was not closed during launch but was included in this count. Additionally, as launch vehicles become more reliable (e.g. a proven record of flight), impact limit lines decrease. The CCC has historically considered and analyzed the number of temporary evacuations of beaches in northern Santa Barbara County associated with launch activities and determined that a total of 14 evacuations per year is consistent with the public access and recreation policies of the CCMP (CD-049-98). A launch attempt that could evacuate Jalama Beach County Park could be scrubbed due to weather, an issue with the vehicle, or another reason after an evacuation order has been issued. While some impacts to Jalama Beach County Park are unavoidable due to mission requirements, evacuations would not be issued for more than 12 launches, which is less than the 14 CCC previously determined was consistent (CD-049-98).

As previously stated, to reduce the potential for evacuations, DAF directed a shift of launch times and trajectories that would typically close the park to times when fewer people are normally present. Jalama Beach County Park Staff provide the number of people in the park in the hours leading up to launch, after which SLD 30 Range Safety determines if the Critical Environmental Concern risk assessment remains at or below the acceptable level. If population levels exceed acceptable risk criteria, the launch would be delayed to the following day and population levels reassessed to ensure total evacuations of Jalama Beach County Park do not exceed 12 per year. This delay process is known as “scrubbing.” There were four closures of Jalama Beach County Park in 2024 using these procedures. While there is a financial impact to launching at less-optimal times, the DAF will maintain these procedures when practicable to protect public access to Jalama Beach County Park. DAF and SpaceX evaluated a ‘dog leg’ trajectory to avoid impacting Jalama Beach County Park. However, this trajectory would result in a significant performance impact to the vehicle due to the maneuver reducing the total mass (i.e. limit payloads) able to be placed into orbit, thus requiring more launches to place the same amount of mass into orbit. Additionally, this could preclude certain missions from launching due to the mass of the payload.

DAF recognized that potential evacuation notices can deter public access, through cancellation of scheduled reservations and/or fewer people making daily trips to Jalama Beach County Park. DAF will continue to coordinate with Santa Barbara County Parks and Recreation to better inform the public of potential evacuations. To offset impacts to recreational access to the coast at Jalama Beach County Park due to past unaccounted for impacts and for potential impacts to future launch operations, DAF and

SpaceX have worked together to implement the following measures, which are also included in SLD 30's Coastal Access and Recreation Enhancement Plan (Appendix B):

- SpaceX donated high-speed Starlink terminals to provide public internet coverage at Jalama Beach County Park. Cellular phone service in the area is limited, thus providing reliable internet coverage can benefit emergency responders and provide overnight campers with reliable connectivity and current information. Santa Barbara County Parks and Recreation stated the Starlink terminals at the park gate enhance public access, as limited cellular phone service can cause congestion and/or delays with the online reservation system during the check in process at the controlled entrance as users enter the park (L. Semenza, County of Santa Barbara, pers. comm.). This internet access also makes the park's check in process much faster.
- SpaceX funded a variable messaging sign for use by Santa Barbara County Parks and Recreation to replace the existing sign at the intersection of Highway 1 and Jalama Road, enabling the County to inform the public if there is availability prior to driving down Jalama Road to the park.
- When launches may result in evacuations of Jalama Beach County Park, they may be shifted to nighttime when population levels are lower to avoid evacuations or closures. Jalama Beach County Park Staff provide the number of people in the park in the hours leading up to launch, after which SLD 30 Range Safety determines if the population level remains at or below the acceptable level for flight safety. Under the agreement between the DAF and Santa Barbara County, SLD 30 must provide notice of a launch at least 7 days prior to the closure, and the closure is not to exceed 48 hours to cover the primary and back up day for the launch event. These evacuations would be infrequent and would only last as long as necessary to assure the public are safe during a launch (approximately up to six hours). A notification of receipt procedure has been developed between SLD 30 Range Safety and Santa Barbara County Parks Department to ensure the request for the beach closure has been received and acknowledged to ensure timelines for notification to the country have been adhered to.
- The SLD, 2nd Range Operations Squadron maintains the current launch schedule for all activities occurring on VSFB. If a Jalama Beach evacuation is necessary, the operation in question is annotated and added to a calendar year running tally to ensure SLD 30 does not exceed the 12 annual closures agreed to with Santa Barbara County. As described above, if the number of evacuations would exceed 12, the launch would be scrubbed (i.e. delayed) rather than require evacuation.
- The DAF and Santa Barbara County would continue to utilize improved messaging protocols to warn the public of potential evacuations at Jalama Beach County Park.

Santa Barbara County also indicated that a point of frustration for the public is not knowing whether Jalama Beach County Park or the campground is full or closed until they drive the length of Jalama Road (14 miles and approximately 30 minutes) and are forced to turn back. Adding the variable message sign at Highway 1 that can be updated using the Starlink internet connection allows real-time updates to be made by park staff, reducing frustration and unnecessary lost time and fuel from driving from Highway 1 to Jalama Beach County Park.

Through the implementation of offsets discussed above, the Proposed Action would not diminish beach access, nor the features or attributes of Jalama Beach County Park any more than in previous years and has resulted in significantly fewer evacuations since 2023 at this park. The DAF and SpaceX will also implement the Lompoc Unified School District field trip program to Surf Beach whenever practicable and consistent with DAF missions, as described in Appendix B.

A summary of the executed offset measures and results would be included in DAF's annual report to the CCC.

Consistency Review Conclusion

Based upon the analysis, review, and existing measures, the Proposed Action would remain consistent with Sections 30210, 30213, and 30214 of the CCA.

3.2.2 ARTICLE 3: RECREATION

Policies

CCA Section 30220 – "Protection of certain water-oriented activities" states:

Coastal areas suited for water-oriented recreational activities that cannot readily be provided at inland water areas shall be protected for such uses.

Consistency Review

Recreational and commercial vessels transit and operate offshore of VSFB; however, impacts to offshore activities are unlikely other than temporary Limited Access Area (LAA) or Regulated Navigation Area (RNA) areas established during launch activities in accordance with statutory and regulatory requirements for public safety purposes. Temporary LAA and RNA for security and safety would not limit public access to adjacent areas. LAA and RNAs would only be restricted for vessel activities for the duration of the launch activity and coordinated between SLD 30 Range Safety and USCG. The USCG would issue a Notices to Mariners (NOTMAR) that defines a Hazardous Operation Area (i.e., LAA and RNA) for launch events. The temporary LAA or RNA would be lifted as soon as the USCG determines it is safe to do so. Temporary closures of these areas for security and safety do not limit public access to or use of adjacent areas. Areas would be closed for the duration of the activity and reopened at the completion of the activity. A more detailed discussion of NOTMARs and maritime closures is included in Section 3.2.5.

Consistency Review Conclusion

Due to the short-term duration of the activities (100 total launches from SLC-4 and SLC-6 annually), broadcasting of NOTMARs, and the expansive offshore area that would still be available to the public, accessibility impacts associated with water-oriented recreational activities would remain negligible. Therefore, the Proposed Action would be consistent Section 30220 of the CCA.

3.2.3 ARTICLE 4: MARINE ENVIRONMENT (MARINE RESOURCES)

Policies

CCA Section 30230 – "Marine resources; maintenance" states:

Marine resources shall be maintained, enhanced, and where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.

Consistency Review

As shown in Table 3.2-2, this CD evaluates the potential impacts to five marine species that occur in the marine environment off the VSFB coastline. One is federally listed as threatened under the Endangered Species Act (ESA) and four species are protected as defined under the Marine Mammal Protection Act

(MMPA). The DAF determined these species may be potentially affected by the Proposed Action from noise impacts during operation.

Table 3.2-2. Determination of Potential Impacts to Marine Mammals

Species	Status	ESA Effects Determination	MMPA Determination
Southern sea otter (<i>Enhydra lutris nereis</i>)	FT	LAA	NE
Steller sea lion - Eastern U.S. Stock (<i>Eumetopias jubatus</i>)	MMPA	NA	Level B
Northern elephant seal – California Breeding Stock (<i>Mirounga angustirostris</i>)	MMPA	NA	Level B
Pacific harbor seal – California Stock (<i>Phoca vitulina richardii</i>)	MMPA	NA	Level B
California sea lion – U.S. Stock (<i>Zalophus californianus</i>)	MMPA	NA	Level B

Notes: FE = Federally Endangered Species; FT = Federally Threatened Species; LAA = may affect, likely to adversely affect; MMPA = Marine Mammal Protection Act, NA = not applicable; NE = no effect; ESA = Endangered Species Act, MMPA = Marine Mammal Protection Act

There are also up to 5 sea turtle species, 7 mysticetes (baleen whales), and 22 odontocetes (toothed cetaceans) that may be found within the region of influence. Sea turtles and cetaceans spend their entire lives in the water and spend most of their time (>90% for most species) entirely submerged below the surface. Additionally, when at the surface, sea turtle and cetacean bodies are almost entirely below the water's surface, with only the blowhole or head exposed for breathing. This minimizes exposure to in-air noise, both natural and anthropogenic, essentially 100% of the time because their ears are nearly always below the water's surface. As a result, in-air noise caused by sonic boom and engine noise would not affect sea turtle or cetacean species. Therefore, they were not considered further in the Environmental Assessment and are not considered further in this CD.

Southern Sea Otter (*Enhydra lutris nereis*)

Direct Impacts. No ground disturbing activities or vegetation management activities would occur within southern sea otter habitat; therefore, these actions will have no effect on the southern sea otter.

Noise and Visual Impacts. See Appendix C, Figures C.0-58 through C.0-62. Historically, at least one southern sea otter was consistently observed at Purisima Point; however, southern sea otters are currently only occasionally observed along the coast between Purisima Point and Point Arguello transiting through the area between suitable habitat to the north and south. Beginning at the VSF harbor and continuing south along Sudden Flats, the inshore habitat supports expansive kelp beds and a relatively high density of southern sea otters. The estimated Falcon rocket engine noise (produced by RNoise) and sonic boom (produced by PCBoom) exposures at these areas are presented in Table 3.2-3 and Table 3.2-4.

Table 3.2-3. Estimated maximum Falcon rocket engine noise levels (dB Lmax) at southern sea otter localities

Location	Falcon 9 at SLC-4			Falcon 9 at SLC-6			Falcon Heavy at SLC-6		
	Static Fire	Landing	Launch	Static Fire	Landing	Launch	Static Fire	Landing	Launch
Nearest Coastline	122	130	140	130	120	130	130	110	135
VSFB Harbor	108	108	116	120	119	125	128	118	129
Sudden Ranch	108	108	116	120	119	125	128	118	129

Table 3.2-4. Estimated maximum Falcon sonic boom levels (psf) during launches and landings at southern sea otter localities

Location	Falcon 9 at SLC-4		Falcon 9 at SLC-6		Falcon Heavy at SLC-6	
	Launch	Landing	Launch	Landing	Launch	Landing
Nearest Coastline	-	7-8	-	10	-	10
VSFB Harbor	-	3.5-4	-	5-8	-	5-8
Sudden Ranch	-	2-3	-	3	-	3

Sonic boom modeling is performed for each SpaceX mission. Table 3.2-4 presents sonic boom levels predicted from the model produced for the Falcon 9 Bandwagon-2 mission in December 2024, which had a relatively large geographic impact area and relatively higher levels predicted than for other missions and therefore represents a potential worst-case scenario (see Appendix D). The mission-specific model results for landing events that have required southern sea otter monitoring have predicted sonic booms ranging from 2 to 6 psf at a Sudden Ranch monitoring location for Falcon 9 landing events at SLC-4. Measured sonic boom levels at the monitoring location for these missions have averaged 2.72 psf (n=16) and ranged from 0.71 to 5.57 psf. Sonic booms haven't been measured at the coastline nearest to SLC-4. However, all but 8 of 50 sonic boom measurements during Falcon 9 first stage landing events at SLC-4W were within the range of predicted psf levels (see Appendix D for more details). Therefore, the sonic boom levels in Table 3.2-4, which represents a potential worst-case scenario, and the potential variation in boom model results presented in Appendix D, should be representative of the levels that would impact these areas.

The single explosive event during demolition activities at SLC-6, as discussed in Section 2.1.5, would result in substantially lower impulsive noise impacts at these locations compared to sonic booms created during landing events (see Figure 2.1-4).

Exceptionally little sound is transmitted between the air-water interface; thus, in-air sound would not have an adverse effect on submerged animals (Godin 2008). In addition, according to Ghaul & Reichmuth (2014), "Under water, hearing sensitivity [of sea otters] was significantly reduced when compared to sea lions and other pinniped species, demonstrating that sea otter hearing is primarily adapted to receive airborne sounds." This study suggested that sea otters are less efficient than other marine carnivores at extracting noise from ambient noise (Ghaul & Reichmuth 2014). Therefore, the potential impact of underwater noise caused by in-air sound would be discountable.

Otters in the nearshore environment of south VSFB that are not submerged during a launch or return landing may experience non-impulsive noise from rocket engines during liftoff and impulsive noise from a sonic boom during first stage landings. Specific noise exposure thresholds for temporary and permanent hearing damage in sea otters have not been established. However, similarities in the biology and hearing sensitivity between otariid pinnipeds (eared seals) and sea otters make otariid thresholds a suitable proxy for sea otters (Ghaul & Reichmuth 2014; Southall et al. 2019). NMFS has established noise exposure

thresholds for in-air impulsive noise for temporary threshold shift [TTS] in hearing sensitivity and for permanent threshold shifts [PTS] in hearing sensitivity for otariid and phocid (earless) pinnipeds (NMFS 2021) based on species' audiograms and the results of studies measuring threshold shifts and behavioral responses (Table 3.2-5). NMFS has not established thresholds for PTS or TTS due to in-air non-impulsive noise for pinnipeds; however, Southall et al. (2019) estimated the lower limit for TTS as a result of in-air non-impulsive noise for otariids and "other marine carnivores" (OCA) is 157 dB M-weighted Sound Exposure Level (SEL), and the lower limit for PTS is 177 dB M-weighted SEL (Table 3.2-6). M-weighting is adjusted for the hearing sensitivity of otariids and OCA per Southall et al. 2019. Applying M-weighted thresholds to unweighted exposure levels is a conservative approach to determining if thresholds are exceeded (i.e., unweighted dB would be greater than the same levels with an M-weighted filter applied and therefore overestimate an individual's perceived noise exposure).

Table 3.2-5. In-air impulsive noise thresholds for TTS and PTS in otariid pinnipeds in peak decibels and equivalent pounds per square foot.

TTS (unweighted; re 20 μPa)	PTS (unweighted; re 20 μPa)
170 dB $L_{\max}$ (132.1 psf)	176 dB $L_{\max}$ (263.6 psf)

Source: NMFS 2021

$L_{\max}$ = maximum sound pressure level; dB = decibels; dB re 20 μ Pa = decibels related to 20 micropascals

Table 3.2-6. In-air non-impulsive noise thresholds for TTS and PTS in otariid pinnipeds.

TTS (M-weighted*; re 20 μPa)	PTS (M-unweighted; re 20 μPa)
157 dB SEL	177 dB SEL

Source: Southall et al. 2019

SEL = sound exposure level; dB = decibels; dB re 20 μ Pa = decibels related to 20 micropascals

* M-weighted is based on a filter applying otariid hearing sensitivity presented in Southall et al. 2019.

The DAF applied these thresholds, modeling results, and ground measurements as the best available science to estimate the effects of in-air impulsive and non-impulsive noise exposures to otters presented herein. PCBoom estimated that the loudest potential sonic booms (impulsive noise) may occur during double booster landings at SLC-6. The levels predicted at the nearest coastline location, where transiting otters are rarely observed 0.6 mi from the proposed landing zones, would be up to approximately 10.0 psf. The highest level measured during a Falcon Heavy double booster landing at the Kennedy Space Center during the Falcon Heavy Arabsat 6A mission on 11 April 2019 was 7.7 psf at 0.3 mi from the landing pads (National Academies of Sciences, Engineering, and Medicine 2020). Both the maximum sonic boom level estimated by PCBoom and measured at 0.3 mi during the Falcon Heavy Arabsat 6A mission are an order of magnitude less than the TTS-onset threshold for in-air impulsive noise (132 psf; Table 3.2-5). The landing zone at SLC-4 is a similar distance (0.6 mi) from coastline where transiting otters are rarely observed and much further (5.5 mi) from areas where otters are regularly observed near the Boat Dock. Therefore, no otters would be exposed to impulsive noise levels that would cause TTS or PTS as a result of Falcon 9 launches from SLC-4 or SLC-6 or Falcon Heavy launches from SLC-6.

Models for rocket engine noise do not currently produce M-weighted estimates of noise metrics to directly compare to the in-air non-impulsive thresholds presented in Table 3.2-5 developed by Southall et al. 2019. However, unweighted measurements of SEL were collected during the Falcon Heavy Arabsat 6A mission at varying distances from the launch pad and, as noted above, comparing M-weighted thresholds to unweighted received levels is a conservative approach in determining if thresholds would be exceeded. During the Falcon Heavy Arabsat 6A launch, the nearest recording station to the launch pad, 0.3 mi, measured 152 dB unweighted SEL, less than the 157 dB M-weighted SEL threshold (Table 3.2-6; National Academies of Sciences, Engineering, and Medicine 2020). The nearest coastline to the launch pad where transiting otters are rarely observed is 0.9 mi from SLC-6, and the nearest location where otters are routinely observed is near the Boat Dock at 2.2 mi from SLC-6. During the Arabsat 6A launch, one recording station was 2.0 mi from the launch pad and measured 141.9 dB unweighted SEL, substantially below the threshold of 157 dB M-weighted SEL. The Falcon 9, with only one first stage compared to the equivalent of three first stages on the Falcon Heavy, is a quieter vehicle. Therefore, no otters would be exposed to in-air non-impulsive noise that would cause TTS or PTS as a result of Falcon 9 from SLC-4 or SLC-6 or Falcon Heavy launches from SLC-6.

Extensive launch monitoring has been conducted for sea otters on both north and south VSFB, with pre- and post-launch counts and observations conducted at rafting sites immediately south of Purisima Point for numerous Delta II launches from SLC-2 and one Taurus launch from Launch Facility-576E and at the rafting sites near Sudden Flats for two Delta IV launches from SLC-6. Monitoring has also been conducted for Falcon 9 launch operations from SLC-4 with no abnormal behavior, mortality, or injury of effects on the population has ever been documented for sea otter because of launch-related disturbance. Additionally, otters were monitored during four Falcon 9 launches from SLC-4 during 2023 and 4 launches with SLC-4 landings during 2024. For each of these missions, southern sea otter totals during post-launch counts were either similar to pre-launch counts or were lower because of factors other than the sonic boom that impacted the south VSFB rafting sites. None of the sonic booms produced during any of the first stage landings had discernible impacts on overall southern sea otter numbers at the monitoring sites (MSRS 2024a).

Launches and landings and accompanying noise and visual disturbance would be expected to only result in minor behavioral disturbances. This has been confirmed by monitoring and recording groups of otters during two Falcon 9 missions which included first stage landing at SLC-4: Transporter 11 and OneWeb-4. During the Transporter 11 mission during the day on 16 August 2024, otters reacted to the launch by alerting and diving and had a similar reaction during the landing and sonic boom with all otters observed to have resettled at approximately 30 minutes after the launch (MSRS 2024b). During the OneWeb-4 mission during the night of 19 October 2024, all otters reacted to the launch by diving, which corresponded to peak visual disturbance and launch noise, but had no reaction to the sonic boom during landing. All otters had resettled within approximately 9 minutes of the launch (MSRS 2024c).

If disturbed, otters typically dive under the water and therefore minimize potential noise exposure. Landing noise follows launch by approximately 5 to 7 minutes and typically occurs slightly before the sonic boom impacts land. Therefore, any individuals that flee into water as a result of launch disturbance would reduce their likelihood of being exposed to the landing engine noise and sonic boom due to the attenuation of sound in water. As a result, there would not be an opportunity for chronic noise exposure in otters. However, sea otters are the smallest marine mammal and lack some of the thermoregulatory adaptations that are seen in cetaceans and pinnipeds, which results in elevated thermal energetic costs for sea otters (Costa & Kooyman 1984; Yeates et al. 2007). As a result, if resting otters are disrupted

frequently, there may be energetic consequences that could affect fitness and survival of individuals. Yeates et al. (2007) found that mean metabolic rate for single dives (non-foraging dives), typically lasting 1 to 3 minutes, were only 1.3 times as great as resting metabolic rate in the southern sea otter. Most of the reactions documented during the Transporter 11 and OneWeb-4 missions were short dives; however, some individuals swam for approximately nine minutes in addition to diving. Swimming is approximately 2 times as great as resting metabolic rate (Yeates et al. 2007). Using the metabolic rates, activity budget, and energetic costs for southern sea otter reported in Yeates et al. (2007), the energetic cost of an otter disturbed from rest and swimming for 10 minutes was estimated to be an increase of approximately one percent in energetic cost over one day (Table 3.2-7). There would only be approximately two launch events per week, not all otters were observed to react to this degree (most resumed normal behavior within 2 to 3 minutes), the effect on energetic expenditure would be negligible.

Table 3.2-7. Activity budget and energetic expenditure for “normal” and “disturbed” southern sea otter, adapted from Yeates et al. 2007

Behavior	Proportion of 24-hr day normal	Minutes day ⁻¹ normal	Proportion of 24-hr day disturbed	Minutes day ⁻¹ disturbed	MJ day ⁻¹ kg ⁻¹ normal	MJ day ⁻¹ kg ⁻¹ disturbed	Total MJ day ⁻¹ normal	Total MJ day ⁻¹ disturbed
Resting	0.402	579	0.395	569	0.156	0.154	4.33	4.27
Feeding	0.363	522	0.363	522	0.224	0.224	6.22	6.22
Grooming	0.091	131	0.091	131	0.077	0.077	2.21	2.21
Swimming	0.085	122	0.092	132	0.072	0.078	1.94	2.16
Other	0.073	105	0.073	105	0.051	0.051	1.39	1.39
MJ = megajoule, kg = kilogram						Total MJ	16.09	16.25

(Note: values in red reflect assumed changes in energetic expenditure due to a 10-minute disturbance from resting to swimming. Total MJ per day calculated assuming a mean body mass of adult male sea otters is 27.7 kg)

For a lactating female southern sea otter with a large post-molt pup, an average swimming metabolic rate (0.49 KJ/min/kg) and average resting rate (0.27 KJ/min/kg) were used after applying a correction factor of 51.8% (Thometz et al. 2016). The resulting adjusted rates for lactating females were 0.744 KJ/min/kg for swimming and 0.41 KJ/min/kg for resting. The same approach was applied as above for male southern sea otter to estimate the metabolic cost of a 10 minute disruption in rest caused by a rocket launch, with the assumption that lactating females behaviors were spent in the same proportions to male behaviors throughout a day. The energetic cost of a lactating female southern sea otter disturbed from rest and swimming for 10 minutes was estimated to be an increase of less than 1% in energetic cost over one day (0.07 MJ increase). Following an approach used in Barrett et al. (2025) the additional feeding requirements needed to meet this cost was evaluated by converting MJ to kilocalories (kcal) using a conversion factor of 1 MJ = 239 kcal (Oftedal et al. 2007); therefore, the total additional caloric intake to meet this cost is 17 kcal (Table 3.2-8). Oftedal et al. (2007) provided estimates of caloric values of various prey. A female otter foraging on purple urchin (*Strongylocentrotus purpuratus*; 0.393 kcal/gram; average mass 14.43 gram), which are a relatively low value, low mass prey present in the waters off of sudden ranch, approximately 3 extra urchins would need to be consumed to meet the cost of disturbance. As noted above, there would only be approximately two launch events per week and not all southern sea otters are expected to react to this degree. Therefore, the effect of the disturbance on energetic expenditure would be negligible.

Table 3.2-8. Activity budget and energetic expenditure for “normal” and “disturbed” lactating female southern sea otter, adapted from Yeates et al. 2007. (Note: values in red reflect assumed changes in energetic expenditure due to a 10-minute disturbance from resting to swimming. Total MJ per day calculated assuming a mean body mass of a lactating female sea otters is 21.3 kg)

Behavior	Proportion of 24-hr day normal	Minutes day ⁻¹ normal	Proportion of 24-hr day disturbed	Minutes day ⁻¹ disturbed	MJ day ⁻¹ kg ⁻¹ normal	MJ day ⁻¹ kg ⁻¹ disturbed	Total MJ day ⁻¹ normal	Total MJ day ⁻¹ disturbed
Resting	0.402	579	0.395	569	0.237	0.233	5.05	4.97
Feeding	0.363	522	0.363	522	0.388	0.388	8.27	8.27
Grooming	0.091	131	0.091	131	0.097	0.097	2.08	2.08
Swimming	0.085	122	0.092	132	0.091	0.098	1.93	2.09
Other	0.073	105	0.073	105	0.078	0.078	1.66	1.66
Total MJ							19.00	19.07

MJ = megajoule, kg = kilogram

The lack of any demonstrated impact from launches on populations off the coast of Sudden Ranch is likely because there is little overlap in the hearing sensitivity of otters (primarily 2 to 22 kHz) and launch engine noise, which is primarily below 250 Hz, with moderate energy to 2 kHz range, and little energy above 2 kHz. While a 2-psf sonic boom is approximately equivalent to 135 dB L_{max}, most of that acoustic energy from the sonic boom is not heard by sea otters. Most of the acoustic energy in a sonic boom is less than 250 Hz, well below the region of best sensitivity of the sea otter (2–22.6 kHz). While the sea otter would likely hear the sonic boom, it would only be responding to acoustic energy that is above 250 Hz and perceived sound levels would be much less than 135 dB L_{max}. Additionally, if disturbed, otters typically dive under the water and therefore minimize potential noise exposure. Landing engine noise follows launch by approximately 5 to 7 minutes and typically occurs slightly before the sonic boom impacts land. Therefore, any individuals that flee into water as a result of launch disturbance would reduce their likelihood of being exposed to the landing engine noise and sonic boom due to the attenuation of sound in water. As a result, there would not be an opportunity for chronic noise exposure in otters.

Finally, otters have also been shown to quickly acclimate to disturbances from boats, people, and harassment devices (air horns). Davis et al. (1988) conducted a study of northern sea otter's reactions to various underwater and in-air acoustic stimuli. The purpose of the study was to identify a means to move sea otters away from a location in the event of an oil spill. Anthropogenic sound sources used in this behavioral response study included truck air horns and an acoustic harassment device (10 to 20 kHz at 190 dB L_{max}) designed to keep dolphins and pinnipeds from being caught in fishing nets. The authors found that the sea otters often remained undisturbed and quickly became tolerant of the various sounds. When a fleeing response occurred as a result of the harassing sound, sea otters generally moved only a short distance (328 to 656 ft) before resuming normal activity (Davis et al. 1988).

Curland (1997) also found that southern sea otter may acclimate to disturbance. The author compared otter behavior in areas with and without human-related disturbance (e.g., kayaks, boats, divers, planes, sonic booms, and military testing at Fort Ord) near Monterey, California. Otters spent more time traveling in areas with disturbance compared to those without disturbance; however, there was no significant difference in the amount of time spent resting, foraging, grooming, and interacting, suggesting that the otters were becoming acclimated to regular disturbances from a variety of sources (Curland 1997). Extensive launch monitoring of sea otters on VSFB has shown that disturbance from rockets is not a

primary driver of sea otter behavior or use of the habitat along Sudden Flats and has not had any apparent long-term consequences on populations, potentially indicating that this population has acclimated to launch activities. Therefore, any effects as a result of noise (launch, landing, and sonic boom) or visual disturbance are expected to be limited to minor behavioral disruption with no permanent effects. Observations at VSFB have shown no abnormal behavior, mortality, or injury of otters during launch activities and noise studies have shown southern sea otters adapt to sound exposure.

Conclusion. The DAF has determined that the Proposed Action may affect, and is likely to adversely affect, the southern sea otter. DAF will implement all measures issued in USFWS's final biological opinion (BO), expected to be issued in August, to minimize any potential adverse effects. With this determination and intent to implement USFWS BO measures, the Proposed Action would have an no permanent adverse effects on southern sea otter.

Marine Mammals Protected under the MMPA

Under the MMPA, NMFS issued a Final Rule for taking marine mammals incidental to VSFB launches (NMFS 2024a), and a LOA (NMFS 2024b; Appendix E). The LOA authorizes launches and other operations on VSFB to unintentionally take, in the form of Level B harassment, marine mammals up to a certain number annually and over a 5 year period. The Proposed Action would not exceed these take thresholds. The DAF is required to comply with the LOA listed conditions and address NMFS concerns regarding marine mammals at VSFB. Under the current LOA, semi-monthly surveys (two surveys per month) must be conducted to monitor the abundance, distribution, and status of pinnipeds at VSFB. In addition, marine mammal monitoring and acoustic measurements must be conducted at the NCI if the sonic boom model indicates that pressures from a boom will reach or exceed 7 psf from 1 January through 28 February, 5 psf from 1 March through 31. July, or 7 psf from 1 August through 30 September. No monitoring is required on NCI from 1 October through 31 December.

Direct Impacts. No ground disturbing activities or vegetation management activities would occur within the habitat of marine mammals; therefore, these actions would not exceed Level B harassment to marine mammals, as authorized by NMFS, including during harbor operations.

Noise Impacts. Noise and visual disturbance can cause variable levels of disturbance to pinnipeds that may be hauled out within the areas of exposure, depending on the species exposed and the noise levels. NMFS has previously determined that the only potential stressors associated with the specified activities that could cause harassment of marine mammals (i.e. rocket engine noise, sonic booms) only have the potential to result in harassment of marine mammals that are hauled out of the water (NMFS 2024a).

Pinnipeds at haulouts along the mainland coastline at VSFB, southeastern Santa Barbara, Ventura, northwestern Los Angeles Counties, and on the NCI would be disrupted by noise and visual disturbance associated with up to 100 Falcon launches and up to 24 landing events per year. The DAF has monitored pinnipeds at haulouts on VSFB and the NCI to characterize the effects of noise and visual disturbance during many launches over the past two decades and determined that there are generally no substantial behavioral disruptions or anything more than temporary affects to the numbers of pinnipeds hauled out on VSFB and the NCI. Reactions between species are different. For example, Pacific harbor seals and California sea lions tend to be more sensitive to disturbance than northern elephant seals. Normal behavior and numbers of hauled out pinnipeds typically return to normal within two to four hours or less (often within minutes) after a launch event. During Monitoring required by NMFS, no observations of injury or mortality to pinnipeds have been attributed to past launches.

The DAF assessed acoustic impacts on marine mammals to analyze potential acoustic impacts for pinniped haulouts in southeastern Santa Barbara, Ventura, and northwestern Los Angeles Counties to determine if the increased impact is covered by the estimated take totals in the LOA (NMFS 2024b; Appendix E). Full details of this analysis are provided in Appendix E. Below is a summary of the findings.

Two harbor seal haulouts were identified on the mainland in the geographic noise footprint, the Carpinteria Harbor Seal Rookery and the Point Mugu Lagoon haulout. The DAF applied NMFS thresholds as the best available science to estimate level of take resulting from in-air non-impulsive (rocket engine noise) noise and impulsive (sonic boom) for harbor seals at these haulouts. During missions with easterly trajectories, the received engine noise levels (non-impulsive noise) would be substantially less than the NMFS threshold for behavioral disturbance for harbor seals. Additionally, acoustic monitoring in Ventura County for 11 SpaceX missions with easterly trajectories has not detected engine noise above ambient noise levels. Therefore, engine noise is substantially below NMFS thresholds for behavioral disruption of harbor seals and thus no takes are anticipated at either the Carpinteria Harbor Seal Rookery or the Point Mugu Lagoon haulout as a result of rocket engine noise.

To analyze the potential for take of pinnipeds at the Carpinteria Harbor Seal Rookery and the Point Mugu Lagoon haulout due to sonic boom (impulsive noise) created during launches, numerous sonic boom model outputs representing an array of potential atmospheric conditions were compared to harbor seal haulout locations (See Appendix E). Approximately 39 percent of missions with easterly trajectories are predicted to impact the Carpinteria Harbor Seal Rookery. 88 percent of the boom levels were predicted to be less than 1.0 psf, and 98 percent were predicted to be less than 2.0 psf. The highest predicted level was 3.7 psf, although a 4.4 psf sonic boom was detected in Santa Barbara County during one Falcon 9 mission, which is expected to rarely occur. For the Point Mugu Lagoon haulout, approximately 93 percent of missions with easterly trajectories are predicted to impact the site. However, 99.8 percent of the boom levels were predicted to be less than 1.0 psf, and 100 percent were predicted to be less than 1.5 psf. The highest predicted level was 1.6 psf. Sonic booms of approximately 1.0 psf are expected to generally correspond to the NMFS threshold of 100 dB SEL for behavioral disruption for harbor seals. This is supported by over two decades of pinniped monitoring by the DAF during sonic booms caused by numerous launches where the DAF has observed that there are generally no substantial behavioral disruptions caused to pinnipeds by sonic booms less than 1.0 psf.

NMFS concurred with the DAF on 7 January 2025 that that any marine mammal take from launch noise at haulouts on the south coast of southeastern Santa Barbara, Ventura, and northwestern Los Angeles Counties is not likely to exceed the number of authorized takes in the April 2024 LOA and that modifying the LOA was not warranted (Appendix E). The DAF's LOA permits a total of 11,135 Pacific harbor seals to be incidentally taken by Level B harassment (behavioral disruption) annually due to launch activities (NMFS 2024b). Although this total did not include estimates of take at haulouts on the south coast of southeastern Santa Barbara, Ventura, and northwestern Los Angeles Counties, any increase in annual take by Level B harassment of Pacific harbor seals (estimated to be 2,868 per year total) would be offset by a reduction in take on San Miguel Island (SMI). This is because as the trajectory of the Falcon 9 and resultant sonic boom moves more to the east and approaches 140 to 145 degrees the sonic boom no longer overlaps SMI, where there are large numbers of Pacific harbor seals and other pinnipeds. It is therefore unnecessary to increase the number of permitted takes by Level B harassment of Pacific harbor seals under the LOA, despite the change in geographic area of potential impacts.

MMPA-protected marine mammals have the potential to be disturbed during RORO barge operations. However, we do not anticipate adverse effects because Environmental Protection Measures (EPMs;

Appendix F, Section F.3), including entering the harbor to the extent possible at high tides when pinnipeds are not present, limiting and restricting nighttime activities and using artificial lighting, and slowly starting any noisy activities, would help minimize and avoid any behavior disruptions.

Given the authorizations and EPMs in place (as described in Appendix F, Section F.3, Marine Biological Resources), including the monitoring required under the LOA (Appendix E), the Proposed Action would not result in permanent adverse effects on MMPA protected pinnipeds. Consistent with the policies of the CCMP, these species of special biological significance will be afforded the protections mandated by applicable federal law.

Consistency Review Conclusion

The DAF and USFWS initiated formal consultation for potentially adverse effects resulting from the Proposed Action that may affect and is likely to adversely affect the southern sea otter. The DAF, to reduce and avoid adverse effects to these resources, will comply with the terms and conditions of the resultant BO. NMFS issued a new LOA to SLD 30 in April 2024 that authorizes Level B Harassment (behavioral disruption) of pinnipeds incidental to rocket and missile launches and supporting operations at VSFB. The DAF will comply with the conditions of the LOA and will implement the necessary monitoring and mitigation activities to protect marine mammal species.

The DAF has determined that the Proposed Action would not result in population-level effects on any marine resources and biological productivity of coastal waters would be maintained for long-term commercial, recreational, scientific, and educational purposes. Therefore, the Proposed Action would be consistent with Sections 30230 and 30231 of the CCA.

3.2.4 ARTICLE 4: MARINE ENVIRONMENT (WATER QUALITY)

Policies

CCA Section 30231 – “Biological productivity; water quality” states (in part):

... minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.

CCA Section 30232 – “Oil and hazardous substance spills” states:

Protection against the spillage of crude oil, gas, petroleum products, or hazardous substances shall be provided in relation to any development or transportation of such materials. Effective containment and cleanup facilities and procedures shall be provided for accidental spills that do occur.

Consistency Review

Surface Water

A wetland delineation was performed in February and March 2023 to evaluate potential jurisdictional features within the proposed construction areas and surrounding habitat (MSRS 2024d). Two surface water drainages occur at SLC-6. The north drainage conveys flow from Red Roof Canyon through SLC-6 to Grey Canyon and then the Pacific Ocean. A system of concrete v-ditches, pipes, earthen channels, and rip-rap channels throughout the northern half of the SLC-6 facility also convey storm water runoff from the facility into the north drainage. The south drainage conveys natural flow from an unnamed drainage west

through SLC-6. East of SLC-6 flow through the unnamed drainage is highly ephemeral predominantly subsurface. Through the SLC-6 facility, the south drainage is channeled into a culvert and conveyed west into SLC-6 where it enters the porous riprap lined channel. Flow within the south drainage is intermittent and also collects surface water from a system of concrete v-ditches, pipes, earthen channels, and riprap channels throughout the southern half of the SLC-6 facility and empties into the Pacific Ocean. A seep occurs south of N Road which consists of a narrow, intermittent, slow-flowing, and shallow surface water that arises within undeveloped land and terminates in a small pool located on an active unpaved access trail. The pool basin appears to have been created via regular vehicle traffic down the trail during wet soil conditions. None of the aquatic features assessed qualify as Waters of the U.S. (MSRS 2024d). The north drainage in the project area is composed of impermeable concrete v-ditches and culverts. Although flows are ephemeral, this drainage carries significant water volume during storm events. There is no riparian zone associated with the portion of the north drainage in the project area and it has little ecological value. The bed of the south drainage is composed of riprap, has no riparian zone, and has little ecological value. The impacts to these features under the Proposed Action would be confined to VSFB with no discernible impacts to jurisdictional waters off Base.

Two surface water drainages occur at SLC-6. The north drainage conveys flow from Red Roof Canyon through SLC-6 to Grey Canyon and then the Pacific Ocean. A system of concrete v-ditches, pipes, earthen channels, and rip-rap channels direct stormwater from the northern portion of the SLC-6 facility into the north drainage. The south drainage conveys highly ephemeral, natural flow from an unnamed drainage east of SLC-6 to the Pacific Ocean.

Under the Proposed Action, a portion of the north drainage could be enclosed within the project vicinity. Impacts to flow within the north drainage could be avoided by completing any modifications to the drainage during the dry season and restoring drainage function prior to the onset of winter rains. Approximately 0.02 ac. of the north drainage would be affected, which is currently impermeable concrete v-ditches and culverts. Since any disturbance would be temporary and the site has little ecological value, impacts to the north drainage would not have an adverse effect on surface waters.

Approximately 0.01 ac. of the south drainage, which is currently riprap line, would be temporarily disturbed during installation of the nitrogen line. Impacts to the south drainage could be avoided by boring under the drainage, suspending the pipeline over the drainage, or completing construction during the dry season and restoring drainage function prior to the onset of winter rains. SpaceX would ensure that there is no overland flow reaching these drainages as a result of water ejected from the flame trench at SLC-6 during launches. Given that the south drainage is in the direct path of the flame trench, the plume, a combination of steam and exhaust, would be expected to travel above the south drainage feature but is not anticipated to cause overland sheet-flow into the drainage. The proximity of the flame trench is not expected to significantly increase water temperatures in the south drainage. Additionally, monitoring of plume temperatures taken in the path of the flame trench at CCSFS has shown that the deluge water (the use of water for acoustic suppression) dramatically lowers the temperature of the plume, returning to ambient temperatures at approximately 530 feet away in the direct path of the flame trench. The flame trench at CCSFS is parallel to grade, whereas the flame trench at SLC-6 is sloped upward. Therefore, the plume at SLC-6 would be directed upward and have significantly more time to cool before reaching any features at ground level. Thus, no adverse impacts to the south drainage are expected as a result of launch or construction at SLC-6.

Spring Canyon originates approximately 1.4 mi inland and flows toward the Pacific Ocean. Surface water in Spring Canyon is entirely on VSFB property, originating at the west end of the Santa Ynez Mountains,

north of Honda Canyon. Spring Canyon has surface waters with flowing or standing water for only a short duration in direct response to significant precipitation (surface flow only occurs during and immediately after rain events and standing water may be present sporadically for hours to days after rainfall events). Surface flow percolates into the groundwater to pass beneath road embankments, but has no connectivity to the navigable waters of the Pacific Ocean; therefore, under the revised 2023 definition (88 FR 61964), it does not qualify as a WOTUS.

Surface waters in Spring Canyon could be affected during launches from SLC-4 from the exhaust plume and evaporation and subsequent condensation of deluge water. However, the plume consists largely of steam with negligible amounts of hazardous materials from exhaust. As the volume of water that condenses from the exhaust cloud is minimal, the plume would not have discernable effects on surface water quality near SLC-4E. Additionally, the impacts to Spring Canyon under the Proposed Action would be confined to VSF with no discernible impacts to surface waters off Base.

Activities during launch operations would include using hazardous materials and generating wastewater that if not properly controlled and managed could result in an adverse impact to water resources in the coastal zone. However, EPMs would continue to be implemented to properly manage materials, and to reduce or eliminate project-associated runoff, which reduces the potential for adverse effects (see Appendix F). Commercial space companies are responsible for compliance with provisions of the Clean Water Act and its requirements for development of site-specific Spill Prevention, Contingency, and Countermeasures (SPCC) plan under 40 C.F.R. 112. Inspection and enforcement of each SPCC and any permitted tanks are delegated to the Santa Barbara County Certified Unified Programs Agency. The SPCC requirements for commercial space companies do not fall under the jurisdiction of SLD 30. SpaceX maintains and operates under an SPCC with Santa Barbara County CUPA. Under 40 C.F.R. 112, the SPCC includes elements that the CCC considers critical for these plans, including: an oil spill risk and worst-case scenario spill assessment, response capability analysis of the equipment, personnel, and strategies (both on-site and under contract) capable of responding to a worst-case spill, including alternative response technologies, oil spill preparedness training and drills, and evidence of financial responsibility demonstrating capability to pay for costs and damages from a worst-case spill. SpaceX's secondary containment is sized to capture all materials contained within any tanks present and the SPCC includes the necessary specifications on the spill response supplies needed at the site during operations.

Launch activities at SLC-4 and SLC-6 would create exhaust clouds; however, Falcon does not use solid rocket motors, which are known to result in toxic clouds and/or acid deposition. Wastewater discharges would continue to follow the conditions of the Regional Water Quality Control Board (RWQCB) letter for Enrollment in the General Waiver of Waste Discharge Requirements for SLC-4E Process Water Discharges to eliminate potential adverse effects to water quality. SpaceX would enroll in RWQCB's General Waiver for Specific Types of Discharges for SLC-6 activities prior to discharging any water accumulated in the flame trench. Any water that remains after launches or stormwater that accumulates within the trench would be tested for contamination. If contamination is encountered, the contents would be pumped out and disposed of per the waiver/permit and state and Federal regulations. If the water is clean enough to go to grade, it would be discharged from the retention basin via a spray field. Currently, the water can be discharged to grade via the spray field approximately 90-95% of the time. It would then percolate into the groundwater system and flow down gradient. Therefore, launch operations under the Proposed Action would not have an adverse effect on surface water.

The current water source for VSF is via an existing connection between State Water and the VSF water supply system. VSF primarily relies on State Water; however, during annual maintenance that lasts two

to three weeks, VSFB utilizes four water wells in the San Antonio Creek Basin. At maximum cadence, the Proposed Action would use up to 65.6 ac-ft of water per year. This would represent approximately 2.3 percent of the total annual water usage on VSFB; which, even if extracted from the San Antonio Creek Basin, would be negligible and not result in any measurable effects to flow rates, hydration periods, or water levels in San Antonio Creek. Therefore, the Proposed Action would not have an adverse effect on surface water in San Antonio Creek.

Ground Water

Construction and demolition activities at SLC-6 would not require substantial excavation activities or require the use of footings at a depth that would interact with groundwater. Any remaining deluge water after launches and stormwater that is collected in the flame trench would be managed per the RWQCB's General Waiver for Specific Types of Discharges enrollment conditions (or other state discharge permit). Any deluge water that remains after launches or stormwater that accumulates within the basin would be tested for contamination. If contamination is encountered, the contents would be pumped out and disposed of per applicable state and Federal regulations. If the water is clean enough to go to grade (currently 90-95% of launches), it would be discharged from the retention basin to an infiltration area or spray field. During operation at SLC-6, accidental discharge of pollutants could occur; however, proper handling of hazardous materials and waste management and implementation of applicable EPMs (see Appendix F) would reduce or eliminate potential contaminated runoff that could infiltrate groundwater. Therefore, the Proposed Action would not impact groundwater at SLC-6. With implementation of the EPMs and adherence to applicable federal, State, and local laws and regulations, no effects on groundwater would be anticipated.

Marine Debris

It is SpaceX's goal to land and recover all first-stage boosters for reuse. However, due to mission requirements (e.g., missions that require all available propellant due to heavier payloads or higher energy orbits), on rare occasions boosters may be unable to complete a boost-back burn and landing and would be expended in the broad open ocean well outside of State jurisdictional waters and the state coastal zone. When a first stage booster is intentionally expended, the first stage is expected to break up upon atmospheric reentry, and any residual fuel is dispersed and evaporated such that none remains when the vehicle debris hits the ocean. Upon impact with the ocean's surface, the inert vehicle debris is expected to sink, like the fate of traditional non-reusable first stage boosters. However, these boosters would not have the potential to affect coastal water resources because they are made of inert materials that would not impact water quality, and they would be expended well outside of the state coastal zone. SpaceX has not conducted an expendable booster mission from SLC-4E since 2018.

SpaceX attempts to recover potential debris where practicable. However, due to weather conditions, sea state, or other factors, some recovery attempts may be unsuccessful. SpaceX successfully completed all landing attempts in 2023 and 2024, all attempted fairing recoveries (180 fairing halves) in both the Pacific and Atlantic Oceans and recovered approximately 75 percent of parafoils in the Pacific Ocean. Fairings, parachutes, and parafoils would land well outside of State jurisdictional and U.S. territorial waters but could land within the U.S. Exclusive Economic Zone. The fairings, parachutes/parafoils and their assemblies are all inert.

Weather balloons may land within State jurisdictional waters. The balloons are 100% biodegradable and would split into pieces and quickly sink, along with the plastic radiosonde which contains two AA lithium batteries. After the decay of the batteries, the residual battery electrolytes released incidentally to the

Proposed Action would be rapidly diluted in seawater and, except for the immediate vicinity of the debris, would not occur at levels that would cause adverse effects. In an effort to reduce marine debris, SpaceX has reduced the number of weather balloons used for each launch event, from typically 15 per launch in 2023 to between five to ten balloons per launch currently. If launches are delayed, more balloons would be required. Not all balloons land in the coastal zone, as they are driven by wind direction at time of release.

SpaceX's recovery efforts have reduced marine debris by approximately 74,804 lbs per launch. If SpaceX's 2024 launch manifest for missions originating from SLC-4E was launched using expendable boosters and fairings, as all other launch providers currently operate, approximately 3.4 million lbs of debris would have been deposited in the Pacific Ocean (beyond state coastal waters). These recovery efforts have reduced marine debris by approximately 99.8 percent compared to traditional launch providers.

To offset any potential impacts from marine debris within State jurisdictional waters, SpaceX participates in the SLD 30 Adopt-A-Beach Program, which conducts quarterly beach cleanups at Surf Beach. DAF will ensure that annual payments are made at a rate of \$20 (adjusted annually for inflation) for each pound of unrecoverable marine debris generated as a result of space launch and landing activities, including the release of weather balloons in advance of launch and/or landing activities occurring in State waters. The annual marine debris offset payment will be divided equally and provided to the U.C. Davis Lost Fishing Gear Recovery Project and the National Marine Sanctuary Foundation. Under nominal conditions, the first stage, fairing halves, parachutes, and parafoils impact the ocean well outside of State or Federal jurisdictional waters. DAF will provide annual reports on recovery efforts to the CCC.

While not necessary to be consistent with the CCMP policies, as already accomplished by reducing the number of balloons released for launches, the DAF and SpaceX will voluntarily continue to explore alternatives to the release of weather balloons and modifying the radiosondes. The DAF will provide updates on marine debris (see Appendix G) which would be discussed within the Working Group. The DAF will inform the CCC of this progress and will also provide an annual report to the CCC by 1 January of each year that includes the amounts and types of marine debris released as part of each SpaceX launch and provide details about the amounts of plastics and other materials within the released debris.

Water Supply

VSFB has two sources of drinking water; during normal operating conditions, the primary source comes from the State Water Project and the secondary source comes from four groundwater wells located on VSFB property. The VSFB wells are typically only used to augment State Water supplies and become the primary source during emergency repair or annual maintenance shutdowns on the State Water Project system. Over the past twenty years there have been several persistent drought periods affecting State Water Project supplies and VSFB has had to rely on its groundwater wells for extended periods to meet supply demands. At maximum cadence, the Proposed Action would use up to 65.6 ac-ft of water per year. This would represent approximately 2.3 percent of the total annual water usage on VSFB; which would be negligible and not result in any measurable impacts to the water supply or San Antonio Creek Groundwater Basin. The Proposed Action is within the normal fluctuation and water demand of VSFB. The Proposed Action's water usage would result in no effect to sensitive coastal resources in San Antonio Creek.

Consistency Review Conclusion

Based upon the foregoing analysis and review, the Proposed Action would not interfere with surface water flow and would not alter the quality of coastal waters, streams, wetlands, or estuaries. Therefore, the Proposed Action is consistent with Sections 30231 and 30232 of the CCA.

3.2.5 ARTICLE 4: MARINE ENVIRONMENT (COMMERCIAL AND RECREATIONAL FISHING)

Policies

CCA Section 30234 – “Commercial fishing and recreational boating facilities” states:

Facilities serving the commercial fishing and recreational boating industries shall be protected and, where feasible, upgraded. Existing commercial fishing and recreational boating harbor space shall not be reduced unless the demand for those facilities no longer exists or adequate substitute space has been provided. Proposed recreational boating facilities shall, where feasible, be designed and located in such a fashion as not to interfere with the needs of the commercial fishing industry.

CCA Section 30234.5 – “Economic, commercial and recreational importance of fishing” states:

The economic, commercial, and recreational importance of fishing activities shall be recognized and protected.

Consistency Review

Southern California’s west coast is a leading recreational and commercial fishing area. SpaceX launches missions from VSFB with a launch azimuth between 140 and 325 degrees, supporting a wide range of U.S. Government missions. The maritime hazard area follows the path of the trajectory and is approximately 21 miles wide at its widest for both Falcon 9 and Falcon Heavy (Figure 3.2-1 through Figure 3.2-4). The maritime hazard area for any given mission would include up to approximately 16 to 20 California Commercial Fisheries Blocks as defined by the California Department of Fish and Wildlife (Figure 3.2-5). Southerly and northerly trajectories would cover more blocks than westerly trajectories, as the vehicle’s trajectory is over state waters for longer. These launch azimuths also include multiple State Marine Reserves, which prohibit or significantly limit fishing. These are generally clustered around VSFB and the NCI.

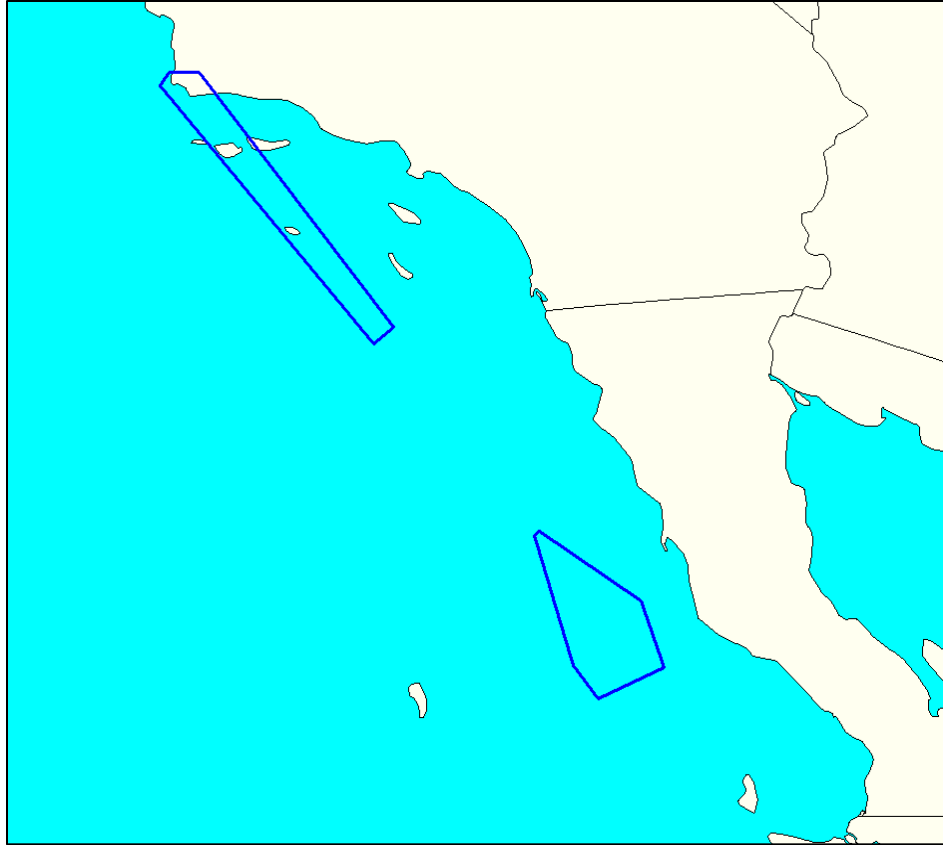


Figure 3.2-1. Example vehicle maritime hazard area (blue) for Falcon 9 launches. Note the maritime surveillance area is not shown because it does not extend off of land.

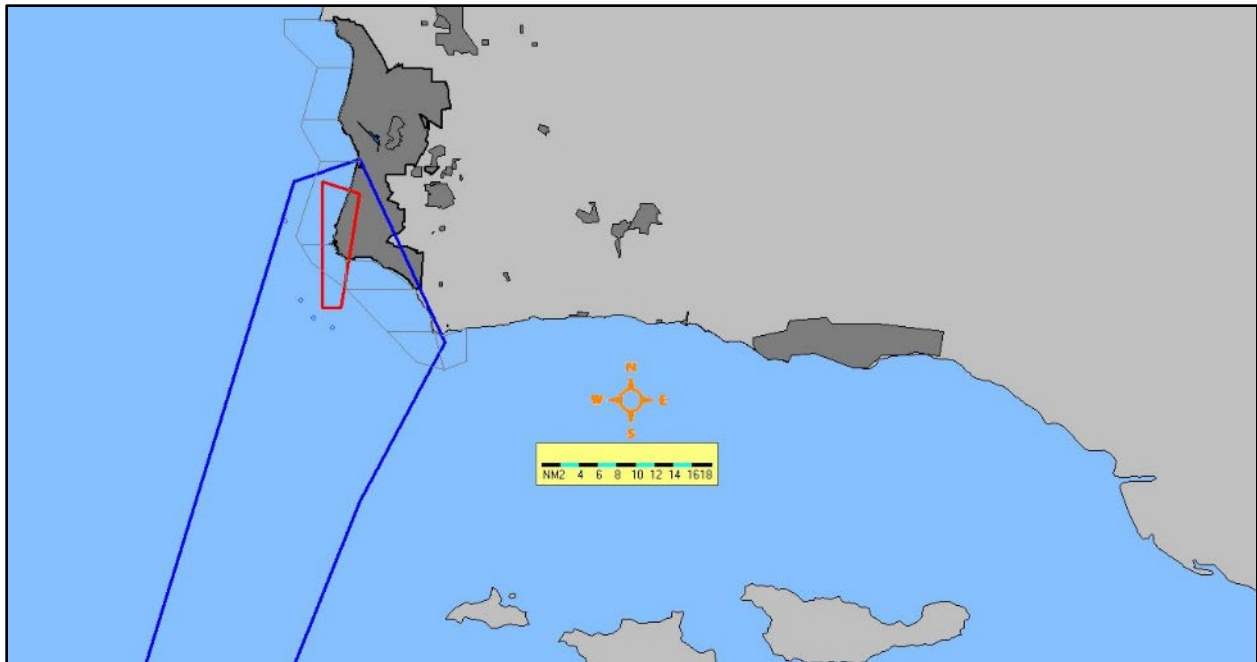


Figure 3.2-2. Example vehicle maritime hazard area (blue) and maritime surveillance area (red) for Falcon 9 launches

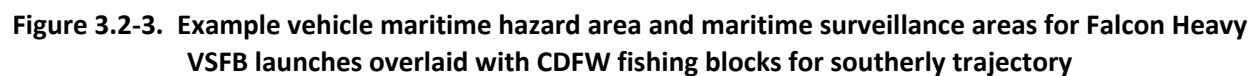




Figure 3.2-4. Example vehicle maritime hazard area and maritime surveillance areas for Falcon Heavy VSFB launches overlaid with CDFW fishing blocks for northerly trajectory

Fishing in these blocks varies and is largely conducted by vessels from the Santa Barbara Harbor, Port San Luis, and Morro Bay Harbor. Fishing in the blocks potentially affected by SpaceX VSFB launches is limited compared to other areas but is valuable for select species. The range of potential launch azimuths primarily overlays low producing fishing blocks and does not affect the high producing blocks that are further east around the Channel Islands (Figure 3.2-5). In 2023, the blocks overlaid by the range of SpaceX's potential azimuths landed a total of 10,949,361 pounds (lbs) worth \$18,037,773, which is 9.9% of California's total landings, or 11.2% of the value of the state's total landings (Table 3.2-9; CDFW 2023). As discussed in the following paragraphs, each block is not impacted for every launch and many launches do not result in any restriction to these fishing blocks.

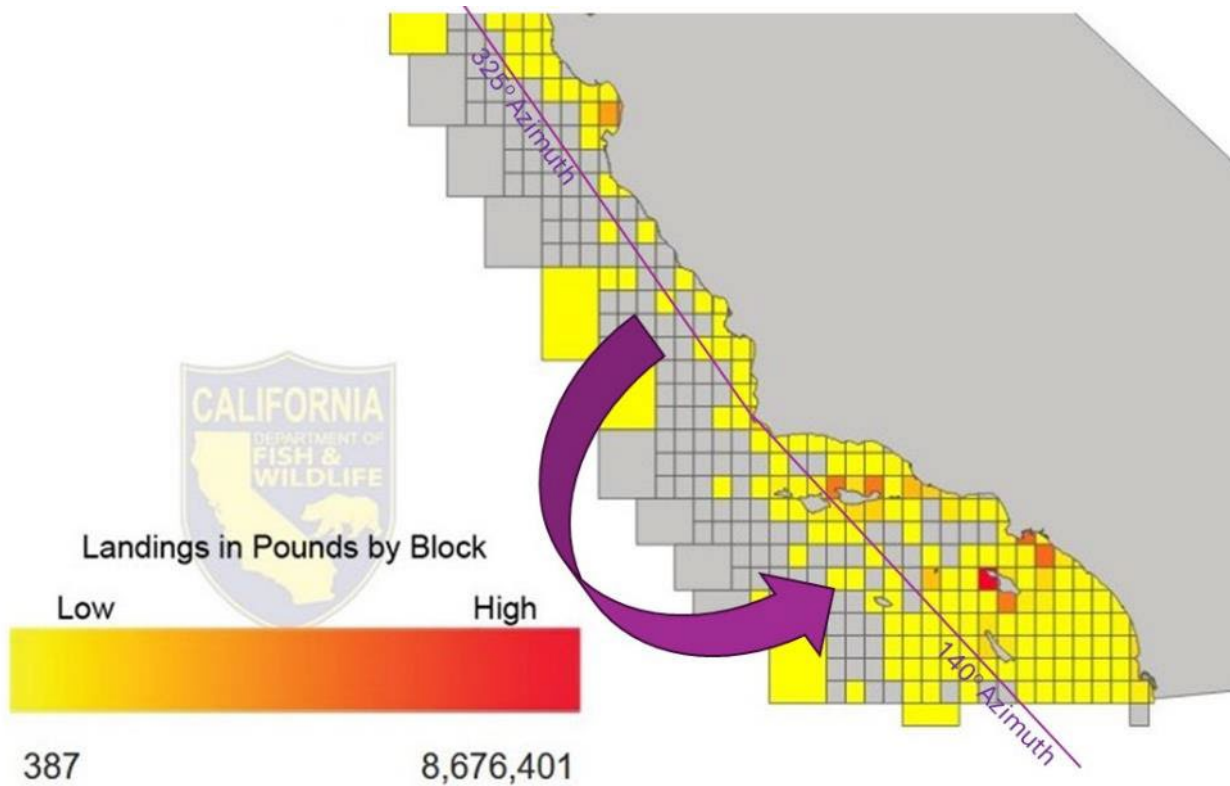


Figure 3.2-5. Productivity of fishing blocks in 2023 potentially affected by SpaceX launches

Table 3.2-9. Productivity of fishing blocks by species management group

Species Management Group	Pounds	Value	% of Selected Blocks		% of State Total	
			lbs	\$	lbs	\$
Coastal Pelagic Species (CPS)	7,946,236	\$ 4,289,677.00	72.6%	23.8%	12.3%	13.2%
Groundfish	857,498	\$ 2,480,089.00	7.8%	13.7%	6.1%	14.9%
Highly Migratory Species (HMS)	232,784	\$ 1,325,434.00	2.1%	7.3%	8.7%	14.5%
Marine State Managed Fish	396,281	\$ 792,260.00	3.6%	4.4%	12.4%	9.6%
Marine State Managed Invertebrates	1,478,625	\$ 8,938,281.00	13.5%	49.6%	5.6%	9.5%
Nearshore Fishery Management Plan Species	37,937	\$ 212,032.00	0.3%	1.2%	29.0%	28.4%
Total	10,949,361	\$18,037,773				

The public's safety during launch operations is of upmost importance to SLD 30, FAA, USCG, and SpaceX, in accordance with statutory and regulatory requirements, which includes the protection of maritime users near the launch vehicle's flight trajectory. Comprehensive safety measures, governed by federal regulations, are put into place for every launch to identify, communicate, and monitor areas that are at risk. Launch operations are conducted in a manner that is biased towards public safety and vessels that ignore hazard warnings near the launch trajectory may delay or cancel a launch if they present unacceptable public risk. While considerable formal planning and regulatory communications are accomplished during this process, successful implementation is dependent upon the good faith and collaboration of all maritime users.

The USCG supports launches from federal ranges by notifying the public of the maritime hazard upon request by the range authority or by the launch operator if a Letter of Intent has been signed by both parties. The USCG is not obligated to provide assets during commercial launch activities and maintains the discretion to determine how to employ its resources and manage maritime risks within their jurisdiction. The USCG issues various types of NOTMARs; including Local Notice to Mariners (LNM), Broadcast Notice to Mariners (BNM), and Marine Safety Informational Bulletin (MSIB), all of which include the predicted time and location of the hazard. These are notifications of potential hazardous operations and do not explicitly prohibit vessels from entering the identified areas. In determining the appropriate NOTMAR for the planned hazard areas, USCG District 11 reviews the risk assessments performed by SLD 30 for the launch or reentry activity and impacted commercial and recreational vessels on the high seas off the California Coast.

To ensure public safety, such warnings are issued for a window of time that includes the nominal launch duration plus the expected debris fall time in the event of a failure. The timing, duration, and direction of the launch is highly dependent upon the mission's requirements for accessing space. Akin to the ocean tides often dictating the best times for fishing, the earth's rotation and orbital mechanics dictate when and in what direction to launch. For example, when needing to rendezvous with another spacecraft, the length of available times to launch can be as short as instantaneous and inflexible to move. Similarly,

launch opportunities may be available every few days or may only be available as infrequently as once every few years, which often is the case in launching to other planets or space objects. Alternatively, populating satellite constellations and launching prototype satellites are typically more flexible and may result in longer and adjustable times. Even with the most flexible orbital requirements, the length of the time window for launch, as well as the number of consecutive launch attempts, must be constrained to properly fit into other maritime operations as well as with the FAA-managed national airspace system and the efficient operations and movement across VSFB. In addition to mission requirements, launch days/times are adjusted to reduce range scheduling conflicts with SLD 30, national airspace impacts with FAA, radio frequency conflicts with U.S. Government users, and maritime impacts with USCG and U.S. Navy.

FAA regulations require the public to be notified of all maritime hazard areas for each launch. If the risk, as calculated by SLD 30, within a portion of the maritime hazard area exceeds a threshold determined by the FAA, access to this smaller area, known as the “surveillance area” may be restricted in order for launch to be allowed to proceed. Due to Falcon’s reliability, surveillance areas for Falcon launches from VSFB have minimal impacts to maritime activities. For many missions, this closure area does not even leave land. Accordingly, only a small subset of fishing blocks within the vicinity of VSFB have the potential to be closed by each launch and for a relatively short period of time. The “hazard area”, which is not closed to vessel traffic, is approximately two blocks wide along each given trajectory. The size and shape of this area is described in the published NOTMAR and is specific to the mission and timing. As previously stated, this corridor is approximately 21 miles wide at its widest to a point where the risk is below safety thresholds. The size varies based on several factors including the launch flight trajectory and simulations of variations of the trajectory, expected seasonal winds, launch vehicle reliability, launch vehicle break-up modeling in case of an anomaly, anticipated vessel traffic, population data near the launch site, and other factors. Figure 3.2-1 through Figure 3.2-4 show example NOTMARs for different Falcon 9 and Falcon Heavy launches from VSFB. The areas in red are the maritime surveillance areas, which restricts access, while the area in blue is the maritime hazard area, which does not restrict access. As shown in Figure 3.2-1, there was no maritime surveillance area and therefore this mission did not require a closure or restriction of state waters. Given the proximity of SLC-4 and SLC-6, NOTMARs would be very similar for all Falcon 9 launches from either site. Falcon Heavy would be expected to have a larger vessel surveillance area than Falcon 9 but is only proposed to launch at most five times per year.

As noted above, since the NOTMARs are notices for unpatrolled hazard areas and not hard closures, vessels that enter the hazard area pose a safety risk for the launch. When an incursion of the NOTMAR occurs, SLD 30 or USCG personnel may contact the vessel and request confirmation of the number of passengers on board, if the vessel cannot be contacted, a conservative estimate is assumed. SLD 30 range safety personnel then use this value to update risk safety calculations in real-time and verify the safety requirements are not exceeded. For small vessels with only a few people, such as most recreational and commercial fishing vessels, the risk calculations often are not violated, and the launch may proceed. However, an increase in vessel traffic in the vehicle hazard area and/or a vessel (even a small one) close to the trajectory may violate the safety criteria and cause the launch to be delayed or cancelled. SLD 30 has both delayed and cancelled launch attempts to protect the safety of vessels that did not heed the warning in the NOTMAR and proceeded to enter the hazard area. A launch delay or cancellation adds significant operations costs to a launch, including rescheduling of range assets and staffing, perishable launch commodities (e.g., liquid oxygen, nitrogen gas, helium gas), mission delay costs, and potential customer penalties. DAF and SpaceX are therefore highly motivated to work with other maritime users to avoid conflicts that could cause inadvertent delays.

Communication beyond the NOTMAR is key to successfully minimize and avoid impacts to recreational and commercial fishing stakeholders. DAF, in coordination with SpaceX, has developed a Commercial and Recreational Fishing Coordination Plan (Appendix H), which established a communication protocol with maritime stakeholders in the region and maintains regular dialogue with a variety of commercial and recreational fishing stakeholders. This protocol includes the following:

- **Danger Zone Hotline** for mariners operating in the VSFB to receive the status of Vandenberg Danger Zones via email or text alert.
- **Frontier Control** will be manned and available on marine channels 6 & 16 no later than 3 hours prior to scheduled launch operations.
- **Distribution List** for which Harbor Masters at Morro Bay, Santa Barbara, Oxnard, San Luis Obispo, Ventura Marina, and Port Hueneme receive launch notifications and updates through the Launch Service Provider and SLD 30 Public Affairs.
- **Public Notices to Mariners** links are available at the Vandenberg SFB website at <http://www.vandenberg.spaceforce.mil>
- **Local Notice to Mariners** publicly published on the USCG LNM District 11 page, which is updated weekly. Mariners can access these notices at: <https://www.dco.uscg.mil/Featured-Content/Mariners/Local-Notice-to-Mariners-LNMs/District-11/>
- **Concerns and Questions** - an avenue for questions or concerns will be established on the <http://www.vandenberg.spaceforce.mil> website to address concerns from the fishing community.
- **Sign-up System** to notify commercial and recreational fishermen who opt-in to either text or email of the date, time frame, and launch activities, including a map of avoidance areas if available. This system will ensure timely and accurate information dissemination to the affected parties.
- **Town Hall Meetings** that will be held at the Santa Barbara and San Luis Obispo harbors and organized to provide a platform for direct communication between VSFB and the commercial and recreational fishing community. These meetings will serve to address concerns, provide updates, and gather feedback from stakeholders.

Consistency Review Conclusion

The communication protocol with maritime stakeholders in the region will minimize any potential effect to recreational and commercial fishermen. Therefore, there will be no permanent effects on recreational and commercial fishing activity, and the Proposed Action is consistent with Sections 30234 and 30234.5 of the CCA.

3.2.6 ARTICLE 5: LAND RESOURCES

Policies

CCA Section 30240 (b) – “Environmentally sensitive habitat areas, adjacent developments” states:

Development in areas adjacent to environmentally sensitive habitat areas and parks and recreation areas shall be sited and designed to prevent impacts which would significantly degrade those areas, and shall be compatible with the continuance of those habitat and recreation areas.

Consistency Review

Section 30107.5 defines “Environmentally sensitive area” as “any area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which could be easily disturbed or degraded by human activities and developments.” It is the position of DAF that environmentally sensitive habitat areas (ESHA) policy, is not applicable to the activities only affecting VSFB property or species confined to VSFB property. While the CZMA allows the CCC to review federal agency activities and actions that have reasonably foreseeable effects on coastal uses or resources in the state coastal zone (off VSFB property) affecting any land or water use or natural resources, Section 304 of the CZMA defines the state coastal zone to exclude “lands the use of which is by law subject solely to the discretion of or which is held in trust by the Federal Government, its officers or agents.” The DAF is providing the analysis of habitat areas of species on VSFB property in this section since some of these on base species may move in and out of VSFB and the adjacent state coastal zone habitat areas; and because the noise data analyses informs on potential effects on habitat areas of wildlife species off VSFB depending upon the noise level. Thus, the DAF will consider this data in a review of the noise levels modeled in areas where noise has been heard in the state coastal zone.

Construction activities would occur entirely on land controlled by the DAF, which are excluded from the state coastal zone. Therefore, the DAF considered potential effects on off-base environmentally sensitive areas. The Proposed Action would have no impact to vegetation resources off-base in the state coastal zone. Therefore, the DAF examined the potential effects on off-base environmentally sensitive areas by considering the effects of the action on the habitat of federally-protected species and on the species themselves.

Biological resources within and near the Proposed Action Area were characterized based on a review of VSFB GIS data that includes multiple survey efforts and observations since the 1990’s, review of prior survey reports for the area, and available documents for the Proposed Action. In addition, qualified biologists surveyed the Proposed Action Area where construction and/or other physical impacts would occur in October 2023, November 2023, February 2024, and March 2024. Qualified biologists conducted these surveys to identify species and habitats likely to be affected by the Proposed Action and characterized and mapped vegetation communities within the terrestrial Action Area subject to physical impacts. Qualified biologists conducted surveys by walking meandering transects throughout the construction area. Prior special status species monitoring data, survey reports, and California Natural Diversity Database (CNDDDB) records, were reviewed to assess the potential occurrence, distribution, and habitat use of special status species within the Action Area. During surveys, biologists mapped any special status species detected and evaluated habitat for the potential occurrence of special status species. The survey covered all areas and was adequate to detect any special status plants occurring in the area due to multiple visits at different times of year. Biologists surveyed for potential wetlands, wetland vegetation, standing water, or defined channels. Biologists delineated all vegetation communities within the Proposed Action Area. The potential occurrence of special status animal species that were not observed during surveys was determined based on the presence of suitable habitat and records of occurrence of the species within and near the Action Area. These species were assumed present if suitable habitat or prior records indicated localities in the area. Additional sources reviewed to determine potential for occurrence included the CNDDDB and existing local and regional references (e.g., University of California, Santa Barbara Museum of Natural History catalog records, SLD 30 survey records).

Appendix C includes a list of all special status species assumed to occur within the Action Area (Table C.0-1). All species that were reasonably likely to occur were assumed potentially present; therefore, the

DAF believes there is no requirement to conduct protocol surveys. Federally listed species likelihood of occurrence and where they may be found within the Action Area are discussed below. The Proposed Action does not involve any construction or ground disturbing activities in the coastal zone. However, multiple federally listed species protected under the ESA, potential habitat that supports these listed species, and several state special status species occur within the Action Area in the vicinity of SLC-4 and SLC-6 at VSFB, southeastern Santa Barbara County, Ventura County, northwestern Los Angeles County, and on the NCI that could experience impacts due to launch and landing. Pursuant to Section 7 of the ESA, DAF prepared a Biological Assessment for the USFWS (Appendix D) and will comply with the terms and conditions of the resultant BO.

Federally Listed Threatened and Endangered Species

Table 3.2-10 contains the species that occur within the action area (construction area, noise footprint, and recovery area) that are federally listed as threatened or endangered under the ESA and reasonably likely to occur within the coastal zone. The DAF determined these species may be potentially affected by the Proposed Action from noise and/or construction-related impacts. The DAF initiated formal consultation with the USFWS for these species, and the Biological Assessment (Appendix D; MSRS 2024e) has been shared with the CCC Staff. Full details of all analyses described below can be found in the Biological Assessment. The federally endangered California tiger salamander, arroyo toad, short-tailed albatross, and Hawaiian petrel also occur within the action area and are included in the DAF's Section 7 consultation with the USFWS; however, these species are not reasonably likely to occur within the coastal zone and thus not included in this CD or Table 3.2-10.

Table 3.2-10: Determination of Potential Effects to Federally Listed Threatened & Endangered Species

Common Name	Scientific Name	Federal Listing	Critical Habitat	Effects Determinations for the Proposed Action
Tidewater Goby	<i>Eucyclogobius newberryi</i>	FE	Designated, no overlap with Action Area	NLAA
Unarmored Threespine Stickleback	<i>Gasterosteus aculeatus williamsoni</i>	FE	Not designated	NLAA
California Red-legged Frog	<i>Rana draytonii</i>	FT	NE	LAA
Marbled Murrelet	<i>Brachyramphus marmoratus</i>	FT	Designated, no overlap with Action Area	NLAA
Southwestern Willow Flycatcher	<i>Empidonax traillii extimus</i>	FE	NE	NLAA

Common Name	Scientific Name	Federal Listing	Critical Habitat	Effects Determinations for the Proposed Action
Least Bell's Vireo	<i>Vireo bellii pusillus</i>	FE	Designated, no overlap with Action Area	NLAA
Western Snowy Plover	<i>Charadrius nivosus</i>	FT	NE	LAA
California Least Tern	<i>Sternula antillarum browni</i>	FE	Not designated	LAA
California Condor	<i>Gymnogyps californianus</i>	FE	Designated, no overlap with Action Area	NLAA
California Gnatcatcher	<i>Polioptila californica californica</i>	FT	NE	NLAA
Light-footed Ridgway's Rail	<i>Rallus obsoletus levipes</i>	FE	Not designated	NLAA

Notes: FE = Federally Endangered Species; FT = Federally Threatened Species; NE = No effect; NLAA = May affect, but not likely to adversely affect; LAA = May affect, and is likely to adversely affect.

Launch monitoring conducted between 2017 and 2024 has not found long-term or permanent impacts to California red-legged frog (CRLF), California least tern (LETE), or western snowy plover (SNPL) populations. Monitoring has not found launch noise to have an adverse effect on CRLF, including call frequency. Nesting terns and plovers have been found to hunker down or briefly flee during noise events, but no damage to eggs has been found that can be directly attributed to the noise event. A detailed discussion of potential effects to each species is below and Appendix D.

Note that sonic boom model results can vary in geographic impact locations and intensity as a result of specific mission trajectories and meteorological conditions on the day of the launch. The sonic boom contours depicted in the figures included in Appendix D represent example predicted model results for median meteorological conditions, not actual measurements nor precise predictions. For easterly trajectories, sonic booms may impact southeastern Santa Barbara County, Ventura County, and Los Angeles County on the mainland (Figure 3.2-6). The vast majority of the sonic booms that would affect these areas would be less than 1.0 psf. Even with identical trajectories, atmospheric conditions create considerable variation in where sonic booms impact and the level at which they impact. To account for this variation, PCBoom can utilize meteorological parameters in the model that effect where and at what level a sonic boom may impact the surface of the earth. In the late 1990's, SRS Technologies, Inc. assembled a series of daily meteorological profiles across 10 years (1984-1994, one per day for 10 years)

from radiosonde data for weather balloons released by the VSFB weather squadron. The data include pressure, temperature, wind speed, and wind direction along an elevational profile from ground, every 1,000 feet (ft), to 110,000 ft. Figure 3.2-6 depicts the overlaid output from sonic boom modeling software (PCBoom) for eight actual SpaceX easterly trajectories, each trajectory run between 29 and 34 times, each run representing 1 of between 29 and 34 randomly selected meteorological profiles that capture potential weather conditions throughout the year (308 model outputs total) overlaid in the image. In order to depict the potential variability in results from multiple model outputs under many potential conditions, these results have not been transformed into contours. This also enables an evaluation of the likelihood that specific areas within the overall potential impact area may be impacted at different sonic boom intensities.

For these trajectories sonic booms may impact a sub-portion of the potential impact area shown in Figure 3.2-6, which shows the conglomeration of 308 different model results (i.e. the combined sonic boom footprints of 308 separately modeled atmospheric conditions). Probabilities were then derived from this modeling to predict the potential location and intensity of a sonic boom (Table 3.2-11). These estimated values have been generally consistent with sonic boom measurements in these areas, with the exception of one 4.4 psf sonic boom being detected in Santa Barbara County during one Falcon 9 mission.

Table 3.2-11. Estimated proportion of sonic boom ranges in level (psf) overlapping eastern Santa Barbara, Ventura, and Los Angeles Counties as depicted in Figure 3.2-6 (Note: highest level estimated from model presented in parentheses).

County	Percentage of Sonic Boom Levels Overlapping			
	0-1 psf	1-2 psf	2-3 psf	3+ psf
Santa Barbara	12.0%	7.8%	1.3%	0.3% (3.7 psf)
Ventura	84.7%	19.5%	2.9% (2.3 psf)	0%
Los Angeles	100% (0.8 psf)	0%	0%	0%

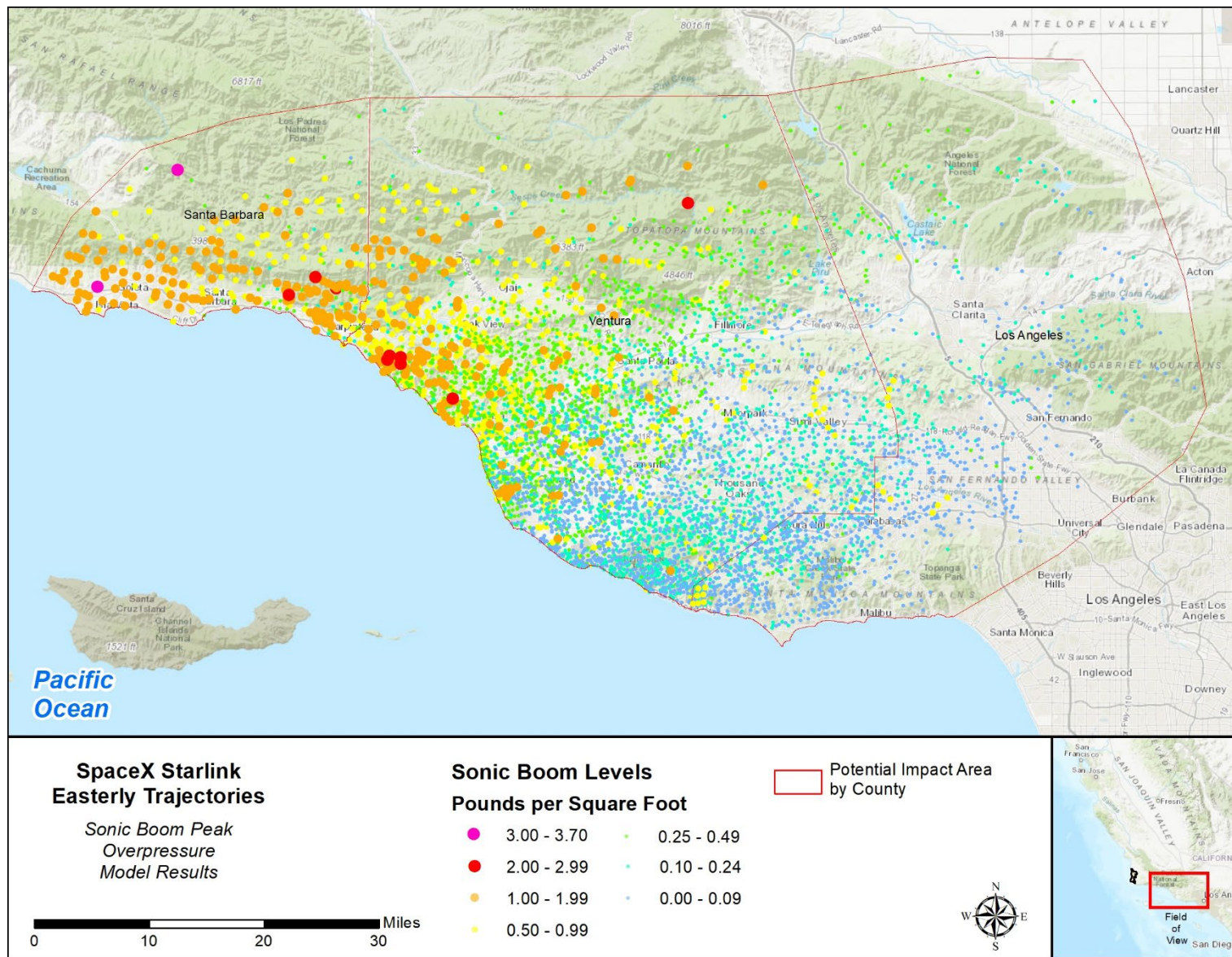


Figure 3.2-6. Potential sonic boom impact areas in eastern Santa Barbara, Ventura, and Los Angeles Counties

Tidewater goby (TWG)

Direct Impacts. No aspects of the Proposed Action would have potential physical impacts on TWG.

Noise Impacts. Engine noise produced during Falcon 9 launches, landings, and static fire events would reach between 100 and 115 dB Lmax in TWG habitat at Jalama Creek, the Santa Ynez River, and San Antonio Creek. Noise at potential TWG habitat at Honda Creek could reach up to 125 dB Lmax; however, TWG are very unlikely to be present in Honda Creek. During first stage landings at SLC-6, up to 17 sonic boom events per year would impact the Santa Ynez River (estimated at 2.5 psf), Honda Creek (estimated at up to 9.0 psf), and Jalama Creek (estimated at approximately 2.5 psf). As described in Appendix E; MSRS 2024e, exceptionally little sound is transmitted between the air-water interface (Godin 2008). Therefore, in-air sound during launches, landings, and static fire events is not expected to cause more than a temporary behavioral disruption to fish.

Water Use. At maximum cadence, the Proposed Action under Alternative 1 would use up to 65.6 ac-ft of water per year. This would represent approximately 2.3 percent of the total annual water usage on VSFB; which would be negligible and not result in any measurable effects to flow rates, hydration periods, or water levels in San Antonio Creek.

Conclusion. Because of the low likelihood of TWG presence in Honda Creek, the minimal transfer of in-air noise into underwater noise, and the negligible increase in water extraction from the San Antonio Creek Basin, we anticipate the level of disturbance from the Proposed Action would be discountable. Therefore, the DAF has determined that the Proposed Action may affect, but is not likely to adversely affect, the TWG. The Proposed Action will be carried out in a manner that will not disrupt or degrade the habitat of the TWG in the state coastal zone.

Unarmored Threespine Stickleback (UTS)

Direct Impacts. No aspects of the Proposed Action would have potential physical impacts on UTS.

Noise Impacts. Engine noise levels at San Antonio Creek during Falcon 9 launches from SLC-4 would reach approximately 105 dB Lmax during up to 70 launch events per year of Falcon 9 at SLC-4. During up to 12 SLC-4W landing events per year, engine noise would be less than 100 dB Lmax at San Antonio Creek. Static fire events at SLC-4 would produce approximately 100 dB Lmax at San Antonio Creek. For first stage landing events at SLC-4, up to 12 sonic booms per year would impact San Antonio Creek, estimated between 1.5 and 2.0 psf. For up to 25 Falcon 9 launches per year from SLC-6, engine noise would reach levels of approximately 106 dB Lmax at San Antonio Creek. During up to 17 Falcon 9 first stage landing events per year at SLC-6, engine noise would be less than 100 dB Lmax at San Antonio Creek. For Falcon 9 Heavy launches from SLC-6, engine noise would reach levels of approximately 101 dB Lmax at San Antonio Creek. During first stage landings at SLC-6, up to 17 sonic boom events per year would impact San Antonio Creek, estimated at 1.0 psf. Exceptionally little sound is transmitted between the air-water interface (Godin 2008). Therefore, in-air sound during launches, landings, and static fire events is not expected to cause more than a brief behavioral disruption, if any reaction, to UTS.

Water Use. At maximum cadence, the Proposed Action under Alternative 1 would use up to 65.6 ac-ft of water per year. This would represent approximately 2.3 percent of the total annual water usage on VSFB;

which would be negligible and not result in any measurable effects to flow rates, hydration periods, or water levels in San Antonio Creek.

Conclusion. Because of the minimal transfer of in-air noise into underwater noise and that the increase in water extraction from the San Antonio Creek Basin under the Proposed Action would be discountable, the DAF has determined that the Proposed Action may affect, but is not likely to adversely affect, the UTS. The Proposed Action will be carried out in a manner that will not disrupt or degrade the habitat of the UTS in the state coastal zone.

California red-legged frog (CRLF)

Direct Impacts. CRLF were consistently found in three decommissioned wastewater treatment pools approximately 0.5 mi west of SLC-6 in the late 1990's up to 2001; however, these pools have been almost completely dried for the past 20 years. These ponds were assessed in February 2024 and the northern pond was completely dry; the southern pond had shallow standing water that would not support anything more than temporary transitory habitat. One adult CRLF was observed in 2001 at the Industrial Wastewater Treatment Ponds, approximately 0.4 mi southwest of SLC-4; however, that was likely a transient as these two ponds rarely contain water, and when water is present it is shallow (less than 3 inches) and evaporates quickly. When they were assessed in February 2024, they had standing water that would not support anything more than temporary transitory habitat (Appendix C, Figure C.0-6). Two drainages border SLC-6, one to the north and one to the south (Appendix C, Figure C.0-6). These drainages were assessed for CRLF habitat in February and March 2024. Although some surface water was observed, there was no deep pool habitat suitable for supporting breeding CRLF. Adjacent to SLC-6, they were determined to hold surface water flow inconsistently in response to seasonal storms that would only serve as temporary transitory habitat for CRLF. At the southwestern corner of SLC-6, the southern drainage transitions to potential aquatic, non-breeding habitat. Open water and flow were observed, which was determined to likely be long-lived during seasons with average to above average rainfall. Although open water, suitable aquatic and riparian vegetation, and refugia were observed, there was no deep pool habitat (> 0.7 meters) that could support CRLF breeding. Therefore, the drainage could likely serve as a suitable site for temporary occupation by CRLF. No visual or auditory evidence of CRLF presence was observed.

During the February and March 2024 CRLF habitat assessment, two areas within the SLC-6 fenceline were observed holding enough water to be potentially attractive habitat to CRLF: a "vault" structure and the "flame trench" (Appendix C, Figure C.0-6). Due to the lack of maintenance of the site since 2022, these structures have collected water during rainstorms. The volume of water in both structures could be attractive to transiting frogs. The flame trench is sloped; thus animals could enter and exit. The vault presents an entrapment hazard since it has steep walls with no escape ladder. DAF has installed an escape mechanism within the vault to reduce potential for entrapment. No visual or auditory evidence of CRLF presence was noted. Neither site has elements such as vegetation or shelter that would make them suitable for long-term occupancy, and no suitable breeding habitat was observed.

Construction activities may directly affect CRLF. However, qualified biologists will monitor these activities and search the site for CRLF. Any CRLF detected within the construction area would be captured and relocated to nearby suitable habitat. The active construction areas would be surrounded by exclusion fence and additional EPMs (see Appendix A) would be implemented to reduce the risk of injuring CRLF.

Noise Impacts. Construction noise during day and night hours would potentially disrupt CRLF if present within the area affected by these noise sources. Standard types of construction equipment would be

employed that have well known noise profiles. Noise during construction greater than 80 dB is not expected to extend more than 320 feet from the construction site. There are no current extant CRLF populations or suitable breeding habitat within this distance; Semi-aquatic habitat exists at both the northern and southern drainages and the Industrial Wastewater Treatment Ponds where transitory CRLF could occur (Appendix C, Figure C.0-6). However, any CRLF transiting through the area would be unlikely to remain at these locations for extended periods of time. In addition, transiting CRLF could be drawn to the vault structure and the flame trench. CRLF would be unlikely to spend extensive time in the flame trench due to the lack of aquatic vegetation and cover. Although CRLF could potentially be trapped in the vault structure, qualified biologists would survey the area while establishing a wildlife exclusion zone and capture and relocate any CRLF found in the vault. The nearest suitable CRLF breeding habitat and extant records is approximately 1.4 mi north at Honda Creek, well outside the typical dispersal distance of CRLF (210 meters). Therefore, construction noise is unlikely to have an effect on any CRLF. In the event that a CRLF is transiting through SLC-6 or upland habitat near the construction areas during construction activities, it could conceivably be exposed to noise levels of 80 dB or above. However, implementation of the EPMs (Appendix A) during construction would greatly reduce the likelihood of CRLF being within this area since a wildlife exclusion zone would be established prior to construction which would be surveyed and monitored by a qualified biologist who would capture and relocate any CRLF encountered. Therefore, the likelihood of CRLF being disturbed by of construction noise in upland habitat is very low.

See Appendix C, Figure C.0-1 through Figure C.0-5 for rocket engine noise and sonic boom model results and CRLF localities. During up to 70 events per year, engine noise produced during Falcon 9 launches from SLC-4 would reach approximately 123 dB Lmax at Honda Creek, up to approximately 115 dB Lmax at the Santa Ynez River, and up to approximately 105 dB Lmax at Jalama Creek. During up to 12 SLC-4W landing events per year, engine noise would reach approximately 120 dB Lmax at Honda Creek, approximately 105 dB Lmax at the Santa Ynez River, and up to approximately 100 dB Lmax at Jalama Creek. Static fire events at SLC-4 would produce approximately 115 dB Lmax at Honda Creek, approximately 110 dB Lmax at the Santa Ynez River, and up to approximately 100 dB Lmax at Jalama Creek. For first stage landing events at SLC-4, up to 12 sonic booms per year would impact the Santa Ynez River (estimated between 1.5 and 2.0 psf), Honda Creek (estimated between 2.0 and 3.0 psf), and Jalama Creek (estimated at approximately 1.5 psf).

For up to 25 Falcon 9 launches per year from SLC-6, engine noise would reach levels of approximately 125 dB Lmax at Honda Creek, up to approximately 112 dB Lmax at the Santa Ynez River, and up to approximately 110 dB Lmax at Jalama Creek. During up to 12 Falcon 9 first stage landing events per year at SLC-6, engine noise would reach approximately 119 dB Lmax at Honda Creek, approximately 108 dB Lmax at the Santa Ynez River, and up to approximately 105 dB Lmax at Jalama Creek. For Falcon 9 Heavy launches from SLC-6, engine noise would reach levels of approximately 130 dB Lmax at Honda Creek, up to approximately 117 dB Lmax at the Santa Ynez River, and up to approximately 115 dB Lmax at Jalama Creek. During first stage landings at SLC-6, up to 17 sonic boom events per year would impact the Santa Ynez River (estimated at 2.5 psf), Honda Creek (estimated at 9.0 psf), and Jalama Creek (estimated at approximately 2.5 psf).

The received maximum noise levels estimates are conservative since the modeling assumes a flat landscape and does not account for features like hills, bluffs, or dense vegetation that would attenuate sound during noise events. Engine noise would reach as high as 150 dB Lmax with sonic booms up to 8.5 psf in upland CRLF dispersal habitat on SLC-4 and potentially as high as 12 psf at SLC-6. However,

vegetation management within and around SLC-4 and SLC-6 would make CRLF presence above ground in these areas unlikely during typical dry conditions.

In addition to rocket engine noise and sonic boom impacts to CRLF at VSFB and areas nearby, approximately 80% of missions with easterly trajectories are predicted to impact at least one CRLF population in eastern Santa Barbara, Ventura, and Los Angeles Counties. Of the sonic booms predicted to impact within 10 km of a CRLF locality, 93% of the boom levels were predicted to be less than 1.0 psf, and 99.9% were predicted to be less than 2.0 psf (Figure C.0-7). Given that sonic booms greater than 1.0 psf would impact CRLF populations in these areas infrequently and the lack of any coupled visual stimuli, sonic booms created during missions with easterly trajectories are not expected to have an adverse effect on CRLF in eastern Santa Barbara, Ventura, and Los Angeles Counties.

While we assume that the noises and/or visual disturbances produced during launches, landings, and static fire events would likely trigger a startle response in CRLF, causing them to flee to water or attempt to hide in place (resulting in a temporary disruption of behaviors including foraging, calling, and mating), there are no data on what level of sonic boom would cause this reaction. To date, one SpaceX landing event at SLC-4W has occurred during CRLF breeding season, the NROL-87 on 2 February 2022. Bioacoustic monitoring was performed at two locations within the predicted boom impact area. Though the landing occurred during daylight hours, CRLF were detected calling at both monitoring locations, a drainage near the VSFB Recreation Center and lower Honda Creek. The sonic boom did not cause a measurable reduction in CRLF calling frequency at either of the two locations where the received overpressures were between 1 (VSFB Recreation Center) and 2.4 psf (lower Honda Creek). Of the four calls that occurred during the hour period when the boom was received, all four were detected after the boom, at 32, 37, 47, and 48 minutes following the sonic boom.

During the SWOT mission in December 2022, no CRLF were detected calling at Honda Creek in the days prior to or during the launch. CRLF were calling at a Recreation Center Drainage approximately 6.8 mi northeast of SLC-4 and were monitored for the launch. There was no evidence that the noise from the launch or sonic boom negatively affected breeding behavior based on calls per hour. CRLF calling rates increased during the 5-hour period after the sonic boom; however, the increase did not appear to be in response to the sonic boom. During the hour immediately prior and following the sonic boom, CRLF calls were not detected prior and only one call was detected after. Call rate then steadily increased for the next several hours, peaking at or near sunrise.

CRLF would likely exhibit a startle response to noise, vibrations, and visual disturbance during launch, landing, and static fire, causing them to flee to water or attempt to hide in place. Any reaction would likely depend on the sensitivity of the individual, the behavior that it is engaged in when it experiences the noise, and past exposure to similar noise. Regardless, we expect the reaction to be the same—the frog's behavior would likely be disrupted and it may flee to cover in a similar way a frog reacts to a predator. As a result, CRLF behaviors including foraging, calling, and mating (during the breeding season) could be temporarily disrupted. However, as numerous studies indicate (Appendix E; MSRS 2024e), after being disturbed frogs tend to quickly return to normal behavior. In addition, USFWS-permitted biologists working on VSFB and elsewhere in CRLF occupied habitat have also routinely observed a similar response in this species after disrupting individuals while conducting frog surveys (A. Abela, M. Ball, and J. LaBonte, pers. obs.). Therefore, once the disturbance from the noise event has ended, we expect CRLF would resume normal activities quickly, and any behavioral response to individual noise events would be short-term.

Previous studies on the effects of anthropogenic noise disturbance on anurans (see Appendix E; MSRS 2024e) examined sustained traffic noise and multiple daily airplane flights and are not directly comparable to the potential effects of the Proposed Action. Rocket noise is likely to be minimally perceptible to the CRLF's hearing range but would likely cause perceptible vibrations that are non-sustained and infrequent compared to the available literature. Additionally, no thresholds in the literature quantify what level of noise or frequency of disturbance would elicit stress hormone responses, effects on breeding and reproduction, or negative population level effects. While these studies show effects on behavior and physiology that could affect fitness and populations, none of them present direct evidence of effects on populations, so the long-term effects of chronic exposure to anthropogenic noise on populations is unknown for these species.

The DAF will continue to implement a monitoring program to track CRLF habitat occupancy, breeding behaviors, and tadpole densities in Honda Creek, Bear Creek, Jalama Creek, the Santa Ynez River, and a control site at Baron Ranch. This will enable the DAF will be able to assess the changes in the acoustic environment in CRLF habitat by using passive bioacoustic recorders and analyze these data to assess any associated effects on the CRLF population. If CRLF occupancy, calling frequency, or tadpole densities decline from baseline by 15 percent or more, the 15 percent decline from baseline is maintained for two consecutive years, and the decline is not attributable to other non-launch-related factors, SLD 30 would offset for these effects by creating new CRLF breeding habitat at a site on VSFB.

Monitoring survey data from 2024 shows that CRLF populations in Honda Creek and Bear Creek have increased significantly despite the increased cadence in 2024. Table 3.2-12 shows the established baseline CRLF night survey results for a set survey stretch in lower Honda Creek that has been surveyed repeatedly since 2013 using the same methods. During 2024, both the total number of adult CRLF and CRLF detected per survey hour are approximately twice as high as pre-project implementation.

The most recent thorough pre-project baseline night survey efforts of Bear Creek were performed in 2013. A total of 12 post-metamorphic CRLF were observed within the creek across two nighttime surveys in March 2013 (MSRS 2014a). Drought conditions persisted from 2013 through 2022, which affected CRLF habitat quality in Bear Creek during this period. In 2023, above average rainfall levels rehydrated portions of Bear Creek, including the basin at the western terminus of the creek. Biologists performed a night survey of this basin in April 2023, but only detected Baja California tree frogs (*Pseudacris hypochondriaca*) despite suitable CRLF habitat. Rainfall during the 2023-2024 wet season was again above average. Extensive vegetation which had overgrown the creek during the drought from 2013 through 2022 required a large trail cutting effort in order to access the creek which delayed entry to the upper portions of the creek until later in the season. Additionally, the increase in hydrated portions of the creek required it to be surveyed across four separate set stretches to obtain a full survey of the creek each quarter. Table 3.2-13 shows the results of these survey efforts with the baseline from 2013 for comparison. Because of the differences in survey stretches surveyed in 2013 and 2024 and missing survey lengths for 2013, they are not directly comparable; however, the numbers of CRLF observed in 2024 are clearly greater than 2023, suggesting that available habitat (i.e., hydrated portions of the stream) are the driving factor in CRLF presence.

Table 3.2-12. Baseline and post-project implementation CRLF night survey results for lower Honda Creek*.

Survey Date		Adults Detected	Total Survey Time	CRLF per Survey hour
Pre-Project Baseline*				
Lagoon + Lower	3/14/2013	11	*	*
Upper 1 + Upper 2	3/20/2013	1	*	*
Post-Project Implementation Monitoring Surveys				
Lagoon	2/27/2024	23	2:39	8.7
Lagoon	3/11/2024	4	2:18	1.7
Lagoon	5/23/2024	16	4:14	3.8
Lagoon	7/2/2024	15	2:20	6.4
Lagoon	8/13/2024	15	1:12	12.5
Lower	5/23/2024	0	1:47	0.0
Lower	7/2/2024	0	1:36	0.0
Lower	8/13/2024	1	1:01	1.0
Upper 1	4/29/2024	0	3:04	0.0
Upper 1	7/8/2024	0	2:30	0.0
Upper 1	8/14/2024	1	1:05	0.9
Upper 2	6/12/2024	3	2:47	1.1
Upper 2	7/1/2024	1	1:42	0.6
Upper 2	8/15/2024	1	2:43	0.4
* In 2013, CRLF night surveys of the entire hydrated portions of Bear Creek required two night survey efforts, however survey data was not available to provide the survey length for each date and CRLF per survey hour.				

Table 3.2-13. Baseline and post-project implementation CRLF night survey results for Bear Creek.

Survey Date		Adults Detected	Total Survey Time	CRLF per Survey hour
Pre-Project Baseline*				
Lagoon + Lower	3/14/2013	11	*	*
Upper 1 + Upper 2	3/20/2013	1	*	*
Post-Project Implementation Monitoring Surveys				
Lagoon	2/27/2024	23	2:39	8.7
Lagoon	3/11/2024	4	2:18	1.7
Lagoon	5/23/2024	16	4:14	3.8
Lagoon	7/2/2024	15	2:20	6.4
Lagoon	8/13/2024	15	1:12	12.5
Lower	5/23/2024	0	1:47	0.0
Lower	7/2/2024	0	1:36	0.0
Lower	8/13/2024	1	1:01	1.0
Upper 1	4/29/2024	0	3:04	0.0
Upper 1	7/8/2024	0	2:30	0.0
Upper 1	8/14/2024	1	1:05	0.9

Upper 2	6/12/2024	3	2:47	1.1
Upper 2	7/1/2024	1	1:42	0.6
Upper 2	8/15/2024	1	2:43	0.4
* In 2013, CRLF night surveys of the entire hydrated portions of Bear Creek required two night survey efforts, however survey data was not available to provide the survey length for each date and CRLF per survey hour.				

Quarterly protocol night surveys of the Santa Ynez River at the 13th Street Bridge on VSFB, performed from winter 2014 through fall 2015, documented between 4 and 13 adult CRLF per survey, with an average of 8.5 adult CRLF per survey. The majority of these observations were within an agricultural runoff channel on the southeastern side of the 13th Street Bridge. Upstream of the bridge, only one adult CRLF was detected in the stretch of the Santa Ynez River extending from approximately 200 meters east of the bridge to the base boundary during survey efforts in 2008 and 2015. The 13th Street Bridge was replaced during a two-year construction effort from August 2016 to October 2017. During this project, the agricultural runoff channel was almost entirely removed. The channel was reconstructed at the end of the project, with efforts made to recreate the deep pools the channel had included prior to construction. Sedimentation of the drainage from off-base agricultural fields quickly decreased the depth of these pools to approximately 6 inches on average. During monthly night surveys of the area impacted by bridge replacement project from November 2017 through October 2018, between 0 and 5 adult (average 1.25) CRLF were observed per survey, with an overall average of 0.47 adult CRLF per surveyor-hour. Most CRLF were observed in the main channel of the Santa Ynez River, with very low numbers within the agricultural runoff channel. Although up to 5 CRLF were detected calling in 2018, no tadpoles were observed during seine surveys in July 2018. The lower number of observations and detection rates suggests that the loss of the agricultural channel negatively affected the CRLF population in the area surrounding the bridge. As of 2022, the habitat in the agricultural channel remained shallow and completely filled with emergent vegetation. Therefore, the pre-project baseline was estimated to be 5 adult CRLF at the 13th Street Bridge (including the agricultural channel). High flow events during 2024 delayed monitoring surveys of the river due to safety concerns; however, 8 adult CRLF were detected during a night survey of the 13th Street bridge stretch on 20 March 2024, 4 adults on 30 May 2024, and 1 adult on 20 August 2024. Although robust baseline data are not available for the lower Santa Ynez River (west of the 13th Street Bridge), a night survey on 26 August 2024 detected 77 adult CRLF on this stretch. These data are still being analyzed to compare to environmental variables, but overall, CRLF on the Santa Ynez River appear to shift occurrence based on changes in habitat quality in this highly dynamic system and there is no indication that launch noise is causing declines in this system.

The DAF will continue to implement a monitoring program to track CRLF habitat occupancy, breeding behaviors, and tadpole densities in Lower Honda Creek, Bear Creek, the Santa Ynez River, Jalama Creek, and a control site at Baron Ranch. The DAF will also continue to use passive bioacoustic recorders and analyze these data to assess any associated effects on the CRLF population.

Water Use. At maximum cadence, the Proposed Action under Alternative 1 would use up to 65.6 ac-ft of water per year. This would represent approximately 2.3 percent of the total annual water usage on VSFB; which would be negligible and not result in any measurable effects to flow rates, hydration periods, or water levels in San Antonio Creek.

Conclusion. The DAF determined that the potential, but reasonably unlikely need to capture and relocate CRLF during construction activities at SLC-6 may affect, and is likely to adversely affect, the CRLF on VSFB. Monitoring data from 2024 shows that there is no population-level emigration away from areas impacted

by noise under the Proposed Action. Therefore, the DAF has determined that noise as a result of the Proposed Action may affect, and is likely to adversely affect, the CRLF on VSFB. The DAF initiated Section 7 consultation with the USFWS for potential effects on CRLF and would implement all applicable minimization, monitoring, and avoidance measures in the resultant BO. The Proposed Action will be carried out in a manner that will not disrupt or degrade the habitat of the CRLF in the state coastal zone.

Marbled Murrelet (MAMU)

Direct Impacts. No ground disturbing activities would occur within or near MAMU habitat; therefore, the Proposed Action would have no direct physical impacts on MAMU or MAMU habitat.

Noise and Visual Impacts. MAMU do not nest on VSFB so exposure to noise would be limited to foraging adults that have occasionally been observed between the late summer through winter foraging off the coast of VSFB. Although unlikely, if MAMU were present immediately off the coast they would experience engine noise of less than 130 dB Lmax during Falcon 9 launch at SLC-4, less than 115 dB Lmax during SLC-4 landings, approximately 125 dB Lmax during static fire events at SLC-4, and sonic booms up to approximately 4 psf during SLC-4 landings. If MAMU were present immediately off the coast of SLC-6 during a Falcon 9 launch they would experience engine noise of less than 130 dB Lmax during launch, approximately 120 dB Lmax during SLC-6 landings, and less than 130 dB Lmax during static fire events at SLC-6. If MAMU were present immediately off the coast of SLC-6 during a Falcon Heavy launch they would experience engine noise of less than 140 dB Lmax during launch, approximately 120 dB Lmax during SLC-6 landings, and less than 130 dB Lmax during static fire events at SLC-6. Sonic booms at the shoreline adjacent to SLC-6 are expected to be up to approximately 10 psf during SLC-4 landings. However, the majority of MAMU are found in a band about 984 to 6,561 ft from shore (Strachan et al. 1995) where noise levels would be much lower.

Based on limited data available regarding MAMU's response to noise and visual disturbances (Appendix D), the dominant response of MAMU to approach by boats is to dive and resurface a short distance away. MAMU are, therefore, expected to exhibit a startle response that would cause birds to dive and resurface, but they are expected to return to normal behavior soon after each launch, landing, or static fire event has been completed.

Conclusion. Based on our analysis, MAMU are unlikely to be present during a launch or static fire event and if present may have a temporary behavioral reaction in response to noise. Thus, the Proposed Action would have a discountable effect on MAMU. Therefore, the DAF has determined that the Proposed Action may affect, but is not likely to adversely affect, the MAMU. The Proposed Action will be carried out in a manner that will not disrupt or degrade the habitat of the MAMU in the coastal zone.

Southwestern Willow Flycatcher (SWFL)

Direct Impacts. No ground disturbing activities or vegetation management activities would occur within SWFL habitat and the EPMs discussed in Appendix A would ensure that there are no SWFL near the construction area. Therefore, these actions would have no effect on SWFL.

Noise Impacts. See Appendix C, Figure C.0-25 through Figure C.0-31 for rocket engine noise and sonic boom model results and SWFL localities. At SWFL sites along the Santa Ynez River at Buellton, maximum noise exposure during a Falcon 9 Heavy launch event would be around 105 dB Lmax during up to five events per year. Unweighted noise levels are very conservative when considering the perceived loudness an animal would experience because only a portion of launch noise energy across frequency spectra would overlap with the hearing sensitivity of each species. Although there are no SWFL-specific audiograms or

other data on this species' hearing sensitivity available, most bird species' greatest sensitivity to sounds is within a relatively narrow range from 1 kHz - 4 kHz (Konishi 1970). Most of the noise energy produced by rocket engines is less than 200 Hz (Appendix D; MSRS 2024e). In addition, noise energy in higher frequencies ranges attenuates more quickly while traveling through the atmosphere; therefore, the maximum noise levels within bird's hearing sensitivity range that would reach SWLF sites near Buellton, approximately 22 mi from SLC-6, would have reduced significantly as they travel through the atmosphere. Finally, the predicted noise levels based on modeling are conservative since the models do not take into account attenuation due to land forms (e.g., mountains, hills, valleys, etc.). It is therefore reasonable to conclude that perceived noise levels for SWFL at this location would be substantially less than 105 dB Lmax and very little of the noise energy perceivable by SWFL would reach these sites.

Approximately 57% of missions with easterly trajectories are predicted to create sonic booms which would impact a SWFL population in eastern Santa Barbara, Ventura, and Los Angeles Counties. Of the sonic booms predicted to impact within 10 km of a SWFL locality, 81% of the boom levels were predicted to be less than 1.0 psf, and 99.9% were predicted to be less than 2.0 psf (Figure C.0-31). Given that sonic booms greater than 1.0 psf would be very unlikely to impact SWFL populations and the lack of any coupled visual stimuli, sonic booms created during missions with easterly trajectories are not expected to have an adverse effect on SWFL.

Conclusion. Given the lack of an extant SWFL breeding population on VSFB, SWFL presence on VSFB is likely limited to migrants. Recent observations of SWFL at the Santa Ynez River in Buellton were limited to one territorial male with suspected, but unconfirmed, pairing. SWFL occurrence and breeding activity within the Action Area during a launch event is, therefore, rare. Additionally, attenuation of noise over the 22 mi from SLC-6 to SWLF sites would reduce noise levels within the sensitivity range of birds. Finally, sonic booms created during easterly trajectories are very unlikely to impact SWFL populations in eastern Santa Barbara, Ventura, and Los Angeles Counties at greater than 1.0 psf. For these reasons, the DAF has determined that the Proposed Action would have a discountable effect and may affect, but is not likely to adversely affect, the SWFL. The Proposed Action will be carried out in a manner that will not disrupt or degrade the habitat of the SWFL in the state coastal zone.

Least Bell's Vireo (LBVI)

Direct Impacts. No ground disturbing activities or vegetation management activities would occur within LBVI habitat and avoidance and minimization measures discussed in Appendix A would ensure that there are no LBVI near the construction area.

Noise Impacts. See Appendix C, Figure C.0-32 through Figure C.0-38 for rocket engine noise and sonic boom model results and LBVI localities. At LBVI sites along the Santa Ynez River at Buellton, maximum noise exposure during a Falcon 9 Heavy launch event would be around 105 dB Lmax during up to five events per year. At LBVI sites in the Santa Maria Valley, maximum noise exposure during a Falcon 9 Heavy launch event would be approximately 102 dB Lmax during up to five events per year. Unweighted noise levels are very conservative when considering the perceived loudness an animal would experience because only a portion of launch noise energy across frequency spectra would overlap with the hearing sensitivity of each species. Although there are no LBVI-specific audiograms or other data on this species' hearing sensitivity available, most bird species' greatest sensitivity to sounds is within a relatively narrow range from 1 kHz - 4 kHz (Konishi 1970). Most of the noise energy produced by rocket engines is less than 200 Hz (Appendix E; MSRS 2024e). In addition, noise energy in higher frequencies ranges attenuates more quickly while traveling through the atmosphere; therefore, the maximum noise levels within bird's hearing

sensitivity range that would reach LBVI sites near Buellton, approximately 22 mi from SLC-6, and Santa Maria, approximately 30 mi from SLC-6, would have reduced significantly as they travel through the atmosphere. Finally, the predicted noise levels based on modeling are conservative since the models do not take into account attenuation due to land forms (e.g., mountains, hills, valleys, etc.). It is therefore reasonable to conclude that perceived noise levels for LBVI at this location would be substantially less than 105 dB Lmax at Buellton and less than 102 dB Lmax in the Santa Maria Valley and very little of the noise energy perceivable by LBVI would reach these sites.

Approximately 98% of missions with easterly trajectories are predicted to create sonic booms which would impact a LBVI population in eastern Santa Barbara, Ventura, and Los Angeles Counties (Figure C.0-37). Of the sonic booms predicted to impact within 10 km of a LBVI locality, 98% of the boom levels were predicted to be less than 1.0 psf, and 99.9% were predicted to be less than 2.0 psf. Given that sonic booms greater than 1.0 psf would be very unlikely to impact LBVI populations and the lack of any coupled visual stimuli, sonic booms created during missions with easterly trajectories are not expected to have an adverse effect on LBVI.

Conclusion. Given the lack of an extant LBVI breeding population on VSFB, LBVI presence on VSFB is likely limited to migrants. Recent observations of LBVI at the Santa Ynez River in Buellton were limited to one territorial male with suspected, but unconfirmed, pairing. LBVI occurrence and breeding activity within the Action Area during a launch event is, therefore, rare. Additionally, attenuation of noise over the 22 mi from SLC-6 to LBVI sites at Buellton and 30 mi to LBVI sites in the Santa Maria Valley would reduce noise levels within the sensitivity range of birds. Finally, sonic booms created during easterly trajectories are very unlikely to affect LBVI populations in eastern Santa Barbara, Ventura, and Los Angeles Counties at greater than 1.0 psf. For these reasons, the DAF has determined that the Proposed Action may affect, but is not likely to adversely affect, the LBVI. The Proposed Action will be carried out in a manner that will not disrupt or degrade the habitat of the LBVI in the coastal zone.

Western Snowy Plover (SNPL)

Direct Impacts. No ground disturbing activities would occur within or near SNPL habitat; therefore, the Proposed Action would have no direct physical impacts on SNPL or SNPL habitat.

Noise and Visual Disturbance. See Appendix C, Figure C.0-39 through Figure C.0-46 for rocket engine noise and sonic boom model results and SNPL localities. SNPL on VSFB beaches would be exposed to levels between 100 and 130 dB Lmax during up to 70 Falcon 9 launches from SLC-4 per year, between approximately 100 and 110 dB Lmax during up to 12 SLC-4W first stage landings, and between 100 and 125 dB Lmax during static fire events at SLC-4. During first stage landings at SLC-4, sonic booms between approximately 1.5 and 5.0 psf are expected to impact these areas up to 12 times per year. For Falcon 9 launches at SLC-6, SNPL on VSFB beaches would be exposed to levels between approximately 100 and 118 dB Lmax during up to 25 Falcon 9 launches from SLC-6 per year, between approximately 100 and 111 dB Lmax during up to 12 SLC-6 first stage landing, and between 100 and 116 dB Lmax during static fire events at SLC-6. During Falcon Heavy launches at SLC-6, SNPL on VSFB beaches would be exposed to levels between approximately 100 and 122 dB Lmax during up to 5 launches from SLC-6 per year, between approximately 100 and 115 dB Lmax during up to 5 SLC-6 double first stage landings, and between approximately 100 and 119 dB Lmax during static fire events at SLC-6. During 15 SLC-6 booster landings per year, sonic booms between approximately 1.0 and 5.0 psf are expected to impact these areas. Launch and landing noise events would last less than one minute and static fire noise would last less than 7 seconds.

An estimated 100% of missions with easterly trajectories are predicted to create a sonic boom that overlaps a SNPL population in eastern Santa Barbara, Ventura, and Los Angeles Counties (Figure C.0-45). Of the sonic booms predicted to impact within 10 km of a SNPL locality, 96% of the boom levels were predicted to be less than 1.0 psf, and 99.9% were predicted to be less than 2.0 psf. Given that sonic booms greater than 1.0 psf would be very unlikely to impact SNPL populations and the lack of any coupled visual stimuli, sonic booms created during missions with easterly trajectories are not expected to have an adverse effect on SNPL.

Determining the amount of noise energy that overlaps with the hearing sensitivity of SNPL is critical to understanding the potential effects that the noise disturbances would have. With the lack of SNPL-specific audiograms or other data on this species' hearing sensitivity, a weighted noise function for SNPL was deduced based on call frequency. In Appendix D we provide background on developing the weighted noise function, as well as narrative and graphical descriptions of SNPL call frequency, and analogous species' hearing sensitivity curve and weighting function. The weighting function was applied to a timewave form recording of the June 2022 Falcon 9 SARah-1 launch, resulting in a peak level of approximately 60 dB Lmax. In comparison to human hearing sensitivity, 60 dBA is equivalent to the noise level of typical conversation. The very low incidence of behavioral responses to launch noise and lack of evidence of changes in SNPL abundance, nesting behavior, and distribution on VSFB beaches in response to launches is likely because SNPL perceive very little of the noise produced by rocket engine noise.

SNPL monitoring for effects from launch-related engine noise and visual disturbance has been conducted during numerous launches on VSFB over the past two decades during the breeding and non-breeding seasons, and has routinely demonstrated that SNPL behavior is not adversely affected by launch noise or vibrations. In addition, no incidents of injury or mortality to adults, young, or eggs attributable to launch noise have been documented, and SNPL monitoring during prior Falcon 9 launches and landing events has not shown evidence of injury, mortality, or abnormal behavior. Direct observations of SNPL during launches have also shown little to no reaction to launch-related noise.

Historical data from monitoring efforts documenting SNPL responses to noise are described in detail in Appendix D. Incubating SNPLs were captured on video during two Falcon 9 launches with first stage landing in 2022 eleven Falcon 9 launch events, some with first stage landing, in 2023, and thirteen Falcon 9 launch events, some with first stage landing, in 2024. The majority of these SNPL's only exhibited alerting behavior involving minor head movements; a smaller proportion showed a startle effect, where the bird was observed to physically jolt, often accompanied by quick head movements; and an even smaller proportion "hunkered down" on the nest (Robinette & Rice 2022a, 2022b; Robinette et al. 2024a, 2024b). In 2023, these videos showed SNPL that 92% had minor alerting, 11% startled, 7 % hunkered, and 0% flushed off nests during launch noise events (n=26; Robinette et al. 2024a). In response to sonic booms during first stage SLC-4 landings in 2023, 100% exhibited minor alerting, 43% startled, 14% hunkered, and 0% flushed off nests during sonic booms (n=7; Robinette et al. 2024a). In 2024, SNPL video nest monitoring during launches showed that 95% had minor alerting, 69% startled, 35% hunkered, and 5% flushed off nests during launch noise events (n=77; Robinette et al. 2024b). Video monitoring of nests for sonic booms during first stage SLC-4 landings showed that 91% startled, 54% hunkered, and 0% flushed (n=24; Robinette et al. 2024b). In 2022, 2023, and 2024, there were no significant changes in incubation rates, overall plover abundance, or nest attendance before and after the launches and boost-back events to rocket noise. Rates of nest abandonment were lower in 2024 compared to 2023 when a high abandonment rate was documented for the Surf South beach section closest to SLC-4, which was likely attributed to many high surf and wind events during 2023 (Robinette et al. 2024a, 2024b). Additionally,

both hatch rates and abandonment rates were similar among north and south VSFB beaches in 2024 (Robinette et al. 2024c).

In 2024 video/in-person monitoring of non-nesting SNPL was performed, as required under the 2024 BO (USFWS 2024), for the first time during two launch events. During the OneWeb-4 mission on 19 October 2024, thermal scopes were used to attempt to film reactions to the launch and subsequent landing at SLC-4. Although challenges were encountered with this first attempt at obtaining video footage during a nighttime launch, a small number of SNPL were observed to have brief behavioral reactions to the launch and subsequent boom, but appeared to return to normal behavior quickly. For the 24 October 2024 NROL-167 mission, video monitoring was not performed but two monitors observed a flock of 78 SNPL during the launch. The flock responded to the launch by tilting their head, appearing to look at the rocket as it took off. This response was observed prior to the noise of the rocket heard on the beach by the monitors. No other movement or response by the plovers was observed. No birds flushed, all remained roosting in the same area.

Conservatively, the DAF has assumed that up to 100 Falcon missions each year may result in a 1 psf sonic boom or greater, impacting SNPL at Santa Rosa Island. Depending on mission trajectories, ascent sonic boom may occasionally reach approximately 8 psf. Sonic boom footprints vary by mission-specific trajectories and weather conditions and the actual number of impacts above 1 psf would likely be less than 100 per year. As established through monitoring on VSFB (discussed above), SNPL would be expected to have a startle reaction to a sonic boom on Santa Rosa Island. However, there would not be any exposure to associated visual stimuli, which can heighten the perception of threats. Since the sonic boom would be disassociated from these other stimuli, SNPL on Santa Rosa Island would likely have less intensity than on VSFB but would still be expected to have a brief startle reaction. Reactions would likely be short-term and be unlikely to cause any long-term consequences for individuals or populations.

Conclusion. The DAF has determined that the Proposed Action may affect, and is likely to adversely affect, the SNPL on VSFB and NCI. The DAF initiated Section 7 consultation with the USFWS for potential effects on SNPL and would implement all applicable minimization, monitoring, and avoidance measures in the resultant BO. The Proposed Action will be carried out in a manner that will not disrupt or degrade the habitat of the SNPL in the coastal zone.

California Least Tern (LETE)

Direct Impacts. No ground disturbing activities would occur within or near LETÉ habitat; therefore, the Proposed Action would have no direct physical impacts on LETÉ or LETÉ habitat.

Noise and Visual Disturbance. See Appendix C, Figure C.0-47 through Figure C.0-52 for rocket engine noise and sonic boom model results and LETÉ localities. If missions are performed when LETÉ are present (approximately 15 April through 15 August), LETÉ at the Purisima colony would receive launch engine noise of approximately 108 dB L_{max} during up to 70 Falcon 9 launches per year from SLC-4. During up to 12 first stage landings at SLC-4W per year, the Purisima colony would receive landing engine noise of approximately 115 dB L_{max}. During static fire at SLC-4, which typically occur 1 to 3 days prior to launch, noise levels at the Purisima colony would be approximately 102 dB L_{max}. During SLC-4 first stage landing events, overpressures would be between approximately 1 and 3 psf from a sonic boom.

For Falcon 9 launches at SLC-6, the Purisima colony would be exposed to levels of approximately 108 dB L_{max} during up to 25 launches per year, between approximately 100 and 104 dB L_{max} during up to 12 SLC-6 first stage landings, and approximately 115 dB L_{max} during static fire events at SLC-6. During Falcon Heavy launches at SLC-6, SNPL on VSFB beaches would be exposed to levels approximately 113 dB L_{max}

during up to 5 launches from SLC-6 per year, between approximately 100 and 102 dB Lmax during up to 5 SLC-6 double first stage landings, and approximately 110 dB Lmax during static fire events at SLC-6. During up to 17 SLC-6 booster landings, sonic booms between approximately 1.0 and 2.0 psf are expected to impact these areas. Launch and landing noise events would last less than one minute and static fire noise would last less than 7 seconds.

An estimated 100% of missions with easterly trajectories are predicted to create a sonic boom that would overlap a LETÉ population in eastern Santa Barbara, Ventura, and Los Angeles Counties (Figure C.0-52). Of the sonic booms predicted to impact within 10 km of a SNPL locality, 96% of the boom levels were predicted to be less than 1.0 psf, and 99.9% were predicted to be less than 2.0 psf. Given that sonic booms greater than 1.0 psf would be very unlikely to impact LETÉ populations and the lack of any coupled visual stimuli, sonic booms created during missions with easterly trajectories are not expected to have an adverse effect on LETÉ.

Appendix D presents historical data from monitoring launch and landing noise. Data implied that LETÉ response to noise relates to timing with the nesting cycle. For instance, at the beginning of the nesting season when LETÉ are arriving at the breeding colony, the adults seem to be more disturbed, but once courtship and nest-tending begins, the adults are more focused on those activities and less distracted by noise events. Most recently, in 2023 monitoring over the entire season showed no significant difference in incubation rates before and after launches (Robinette, et al. 2024a). Video footage performed during landing events has shown that the reaction of incubating LETÉ consistently ranges from alert and minor looking around to a startle effect, to flushing with birds typically returning to their nests within 45 seconds (Robinette, et al. 2024a).

Based on the existing monitoring observations, the audible and visual components of the Proposed Action could cause LETÉ to respond behaviorally. This stimulus could trigger a startle response that alerts predators to nest locations and causes temporary (minutes) abandonment of nests. The proposed EPMs (Appendix A) would be employed to characterize potential effects on LETÉ from launch-related noise events.

In 2023, monitoring over the entire season showed no significant difference in incubation rates before and after launches (Robinette, et al. 2024a). Video footage incubating LETÉ during Falcon 9 launches in 2023 (n=7) showed that 100% of LETÉ reacted, 43% flushed off nests, and all flushed birds returned to nest within 45 seconds (Robinette, et al. 2024a). Video footage of incubating LETÉ for Falcon 9 launches with SLC-4 landings during the LETÉ nesting season in 2023 (n=5) showed that 100% reacted, 100% startled, 40% hunkered, 40% flushed, and all returned to nest within 45 seconds. In 2024, video footage of incubating LETÉ during Falcon 9 launches (n=21) found that 90% of the adults alerted, 50% were startled, less than 20% hunkered or shifted on their nests, and less than 10% flushed off their nests (Robinette et al. 2024b). In 2024, there were no Falcon 9 launches with SLC-4 landings during the LETÉ breeding season.

Launch engine noise and sonic booms are acute, non-sustained, and unpredictable. It is more similar to aircraft noise disturbances studied in the literature, yet would be relatively much less frequent. There are almost no studies on the effects of rocket launch on birds beyond the launch monitoring efforts performed by the DAF. In 2024, despite the minor behavioral disruptions recorded during launch events, DAF monitoring found that LETÉ reproductive success at VSFB was well above the long-term average for the first time since 2016 (Robinette et al. 2024a, 2024b). There was only one LETÉ nest abandoned in 2024 and that was due to one of the breeding adults being depredated by an owl, not due to a launch event.

Predation and food availability, rather than launch noise, appear to be the primary drivers acting on these populations (Robinette et al. 2024a, 2024b).

Conclusion. As of November 2024, many launch and landing events have occurred and been monitored during the LETE breeding season. Although a proportion of brooding birds may startle and a smaller proportion may flush, there is no evidence that exposure to rocket engine sound and sonic booms from Falcon launches has caused reduced numbers of nesting adults or reduced productivity of the nesting colony over the past several years, as evident from 2024 reproductive success exceeding the long-term average for the first time since 2016 (Robinette et al. 2024a, 2024b). LETE have been observed to be more sensitive to disturbance while initiating nesting. Analysis of monitoring data will help determine if population declines occur. As a result, the DAF has determined that the Proposed Action may affect, and is likely to adversely affect, the LETE on VSFB. The DAF initiated Section 7 consultation with the USFWS for potential effects on LETE and would implement all applicable minimization, monitoring, and avoidance measures in the resultant BO. The Proposed Action will be carried out in a manner that will not disrupt or degrade the habitat of the LETE in the coastal zone.

California Condor

Direct Impacts. No ground disturbing activities would occur within or near California condor habitat. Therefore, the Proposed Action would have no direct physical impacts on California condor or condor habitat.

Noise and Visual Disturbance. It has been difficult to analyze the effect human disturbance could have on California condors. Generally, California condors are less tolerant of human disturbances near nesting sites than at roosting sites. The species is described as being “keenly aware of intruders” and may be alarmed by loud noises from distances greater than 1.6 mi. In addition, the greater the disturbance in either noise level or frequency, the less likely the condor would be to nest nearby. As such, USFWS typically requires isolating roosting and nesting sites from human intrusion (USFWS 1996). Noise from a launch coupled with visual disturbance could cause a startle response and disrupt behavior if a condor is within the Action Area near VSFB.

Approximately 30% of missions with easterly trajectories are predicted to create sonic booms which would impact a California condor population in eastern Santa Barbara, Ventura, and Los Angeles Counties (B.0-55). Of the sonic booms predicted to impact within 10 km of a California condor locality, 98% of the boom levels were predicted to be less than 1.0 psf, and 99.7% were predicted to be less than 2.0 psf. Given that sonic booms greater than 1.0 psf would be very unlikely to impact California condor populations and the lack of any coupled visual stimuli, sonic booms created during missions with easterly trajectories are not expected to have an adverse effect on California condors.

Although launch noise, sonic booms, and visual disturbance may cause a startle response and disrupt behavior, the likelihood of a condor being present during these activities is extremely low and, therefore, the effect of the Proposed Action would be discountable.

Conclusion. The overall likelihood of a California condor occurring within the Action Area during a launch, landing, or static fire event is extremely unlikely, hence, discountable. Therefore, the DAF has determined that Proposed Action may affect, but is not likely to adversely affect, the California condor. The DAF will coordinate with the USFWS and Ventana Wildlife Society to monitor for condor presence prior to launches. The Proposed Action will be carried out in a manner that will not disrupt or degrade the habitat of the California condor in the coastal zone.

Coastal California Gnatcatcher

Direct Impacts. No ground disturbing activities would occur within or near CAGN habitat; therefore, the Proposed Action would have no direct physical impacts on CAGN or CAGN habitat.

Noise Impacts. See Appendix C, Figure C.0-53 for boom model results and CAGN localities. CAGN are not reasonably likely to occur in the VSFB area. An estimated 94% of missions with easterly trajectories are predicted to create sonic booms which would impact a CAGN population in eastern Santa Barbara, Ventura, and Los Angeles Counties (Figure C.0-53). Of the sonic booms predicted to impact within 10 km of a CAGN locality, 99% of the boom levels were predicted to be less than 1.0 psf, and 99.9% were predicted to be less than 2.0 psf. Given that sonic booms greater than 1.0 psf would be very unlikely to impact CAGN populations and the lack of any coupled visual stimuli, sonic booms created during missions with easterly trajectories are not expected to have an adverse effect on CAGN.

Conclusion. The likelihood that missions with an easterly trajectory generate a sonic boom greater than 1.0 psf that would impact CAGN localities is very low. Therefore, the DAF has determined that Proposed Action may affect, but is not likely to adversely affect, the CAGN. The Proposed Action will be carried out in a manner that will not disrupt or degrade the habitat of the CAGN in the coastal zone.

Light-footed Ridgway's Rail

Direct Impacts. No ground disturbing activities would occur within or near light-footed Ridgway's rail (RIRA) habitat; therefore, the Proposed Action would have no direct physical impacts on RIRA or RIRA habitat.

Noise Impacts. See Appendix C, Figure C.0-57 for boom model results and RIRA localities. RIRA are not reasonably likely to occur in the VSFB area. An estimated 98% of missions with easterly trajectories are predicted to create sonic booms which would impact a RIRA population in eastern Santa Barbara, Ventura, and Los Angeles Counties. Of the sonic booms predicted to impact within 10 km of a RIRA locality, 97% of the boom levels were predicted to be less than 1.0 psf, and 99.9% were predicted to be less than 2.0 psf. Given that sonic booms greater than 1.0 psf would be very unlikely to impact RIRA populations and the lack of any coupled visual stimuli, sonic booms created during missions with easterly trajectories are not expected to have an adverse effect on RIRA.

Conclusion. The likelihood that missions with an easterly trajectory generate a sonic boom greater than 1.0 psf that would impact RIRA localities is very low. Therefore, the DAF has determined that Proposed Action may affect, but is not likely to adversely affect, the RIRA. The Proposed Action will be carried out in a manner that will not disrupt or degrade the habitat of the RIRA in the coastal zone.

State Sensitive Habitats

Portions of the Proposed Action Area would be permanently disturbed as a result of constructing a new HIF, a nitrogen line, new landing zones, establishing a new firebreak, and managing vegetation to reduce fire risk within the facility. Giant Wild Rye Grassland is classified as S3 (vulnerable statewide) under the California Native Plant Society's (CNPS) classification system for vegetation alliances (CNPS 2025), but is not a federal listed threatened or endangered vegetation community. The Proposed Action would result in the removal of approximately 0.17 ac. of Giant Wild Rye Grassland for the construction of the firebreak described in Section 2.1.5.2. While there is no estimate of remaining Giant Wild Rye Grassland in California, this vegetation alliance is distributed broadly along the coast and inland areas from northern Baja California to Santa Barbara County, and the islands off of southern California (CNPS 2025). The relatively small area that would be affected by the Proposed Action represents an extremely small portion

of the remaining Giant Wild Rye Grassland. There are no reasonable connections, ecological or otherwise, between this slight reduction of grassland vegetation on VSFB to areas off VSFB in the coastal zone. The disturbance of the Giant Wild Rye Grassland on VSFB would have no effect on coastal resources in the coastal zone off Base.

Special State Wildlife Species

A wide variety of wildlife species may occur in the Proposed Action Area, including many that are delisted or not federally listed as threatened or endangered but are afforded other federal and/or state protections, such as birds protected under the Migratory Bird Treaty Act (MBTA), species classified as species of special concern by the California Department of Fish and Wildlife, or birds considered birds of conservation concern by the USFWS. A list of species of concern with the potential to occur in the Action Area is provided in Appendix C. Because the amount of potential habitat that would be disturbed is relatively small, no significant effects are expected to state wildlife species of concern on VSFB property. Nor would those effects to state wildlife species of concern on VSFB property have an effect on these species in the coastal zone because no reasonable connections, ecological or otherwise, exist between the relatively small area of disturbance on VSFB property and the coastal zone.

Off VSFB property, within the coastal zone, temporary disturbances to terrestrial wildlife species within the Action Area would occur due to noise and visual disturbance during launch and landing events. Wildlife responses to noise can be behavioral or physiological, ranging from mild, such as an increase in heart rate, to more damaging effects on metabolism and hormone balance. Because responses to noise are species specific, exact predictions of the effects on each species are unreliable without data pertaining to the behavioral responsiveness and physiological sensitivity to noise of those species or similar species.

The various species of wildlife within the Action Area, including the region surrounding VSFB, the NCI, southeastern Santa Barbara County, and portions of Ventura and northwestern Los Angeles Counties would be expected to react to noise, vibrations, and visual disturbance during launches and landing events in a similar manner that has been documented during monitoring efforts for federally listed species (discussed above). These may elicit a startle response in individuals that may either see, hear, or sense vibrations caused by these activities. Exceptionally little sound is transmitted between the air-water interface; thus, in-air sound would not have a significant effect on submerged animals (Godin 2008).

Sonic boom footprints vary by mission-specific trajectories and weather conditions and the actual number of impacts above 1.0 psf at any specific location would likely be less than 100 per year. Since the sonic boom would be disassociated from visual stimuli, wildlife resources on the NCI and southeastern Santa Barbara County, and portions of Ventura and northwestern Los Angeles Counties would likely have less intensity than on VSFB but would still be expected to have a brief startle reaction. Reactions would likely be short-term and be unlikely to cause any long-term consequences for individuals or populations. The Proposed Action will be carried out in a manner that will not disrupt or degrade the habitat of the species of concern listed in Appendix C in the coastal zone.

Reporting

The DAF would send a final annual report to the Commission on all monitoring work conducted for biological resources and outline the data and results collected to date, and any initial conclusions regarding potential effects to the species resulting from the Proposed Action. The final report will include the annual reports prepared for the USFWS for SNPL, LETE, and CRLF. In addition, the DAF would provide a final report to the Commission 5 years from project implementation on how the Proposed Action is, or is not, impacting the surrounding special-status species and their habitats.

Consistency Review Conclusion

The DAF and USFWS are conducting formal Section 7 consultation for effects resulting from the Proposed Action for the species listed in Table 3.2-10. The terms and conditions and reasonable and prudent measures identified during the Section 7 consultation with the USFWS and the resultant BO would be implemented. With continued species monitoring and implementation of measures required by the USFWS and the implementation of the EPMs described in Appendix F the Proposed Action would not result in population-level impacts on any biological resource or disrupt or degrade state sensitive habitats or the habitat of the species of concern listed in Appendix C in the coastal zone. Therefore, the Proposed Action would be carried out in a manner consistent with Section 30240 (b) of the CCA.

3.2.7 ARTICLE 6: LAND DEVELOPMENT

Policies

CCA Section 30251 – “Scenic and visual qualities” states:

The scenic and visual qualities of coastal areas shall be considered and protected as a resource of public importance. Permitted development shall be sited and designed to protect views to and along the ocean and scenic coastal areas, to minimize the alteration of natural land forms, to be visually compatible with the character of surrounding areas, and, where feasible, to restore and enhance visual quality in visually degraded areas. New development in highly scenic areas such as those designated in the California Coastline Preservation and Recreation Plan prepared by the Department of Parks and Recreation and by local government shall be subordinate to the character of its setting.

Consistency Review

Scenic and visual qualities of coastal areas as a resource of public importance in developing the proposed launch site were considered. The former launch site (SLC-6) would be used for the proposed launch program. Construction of SLC-6 began in 1966 to support the Titan III rocket and Manned Orbiting Laboratory (MOL) programs. In 1986 the former MOL launch facility was reconfigured to support Space Shuttle launch; however, the Space Shuttle program was cancelled at SLC-6 in 1989. Construction in the 1980s included many of the launch infrastructure and support buildings that exist at the sites today: a mobile support tower, tracks, flame duct, exhaust ducts, liquid oxygen and liquid hydrogen storage tanks, a fixed launch pad access tower, a mobile payload checkout facility with a clean room, a shuttle assembly building (Building 360), and a payload processing facility (Building 375; Geomatrix 2005). Additional buildings and pavement was added in the early 1990s. Lockheed Martin Launch Vehicle I was the first launch at SLC-6 in 1995. By 1999, the Boeing Company modified SLC-6 to launch the Delta IV. A total of 10 Delta IV launches occurred at SLC-6 until the program ended in 2022. SpaceX’s proposed reconfiguration of SLC-6 is almost entirely within the previously developed area or within close proximity to existing launch support infrastructure. This site and adjacent land has been developed and used for similar operations since 1966. Additionally, as part of the proposed demolition of structures at SLC-6, several large towers and buildings would be removed, therefore reducing the number of permanent tall structures at the site and enhancing the visual quality of the area.

Proposed activities would be similar to launch activities that have been historically performed at this site and nearby launch sites on VSF. Proposed construction at the launch site would not be in a highly scenic area for the public and viewsheds would not be degraded because the project would still be consistent with launch operations and the operational character of the area and SLC-6 is not visible to the relevant

public for Section 30251, with the exception of Amtrak train passengers. The proposed activities would not result in any significant change to view, as the site has been developed for launches since 1966 and cannot otherwise be seen from public beaches or coastal trails. Therefore, the Proposed Action is consistent with Section 30251 of the CCA.

4 STATEMENT OF CONSISTENCY

The DAF has reviewed the CCMP and has determined that the policies identified in Section 3.1 of this CD do not apply to the Proposed Action. In addition, the DAF has determined that all or parts of the policies reviewed in Section 3.2 of this CD are relevant for purposes of assessing whether the project would be consistent to the maximum extent practicable with the CCMP. These policies include Sections 30210, 30213, 30214, 30220, 30230, 30231, 30232, 30234, 30234.5, 30240, and 30244, and 30251.

An effects test was conducted by the DAF to analyze how and to what degree the Proposed Action would affect California coastal zone uses and resources, as defined and/or described in the relevant policies. The results of the effects test demonstrate that some components of the Proposed Action could have short-term, temporary effects to California coastal zone uses and resources. While some biological species may be temporarily affected, the Proposed Action would not have population-level permanent effects. The DAF would implement measures, standard operating procedures, and EPMs for the Proposed Action (Appendix A), to be consistent with the relevant policies. The DAF initiated formal consultation with the USFWS and informal consultation with NMFS for potential impacts on species listed under the ESA. The DAF will implement all applicable minimization, monitoring, and avoidance measures in the resultant BO, expected by August 2025. NMFS has issued a LOA to the DAF for potential Level B Harassment of marine mammals due to rocket, missile, or aircraft activities from VSFB. Therefore, the Proposed Action is consistent with the relevant policies of the CCMP.

The DAF requests the CCC concur that launch operations at SLC-4 and SLC-6 on VSFB would be consistent with the enforceable policies of the CCMP.

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APPENDIX A – EVACUATION EMAIL NOTIFICATIONS

Contingency Evacuation Email: Updated Protocols

From: [Santa Barbara County Parks Reservations](#)
To: [Santa Barbara County Parks Reservations](#)
Subject: IMPORTANT INFORMATION REGARDING YOUR JALAMA BEACH RESERVATION (November 16)

Dear Valued Jalama Beach County Park Visitor,

Vandenberg Space Force Base and SpaceX has scheduled a launch for **Thursday, November 16, 2023**. The launch window is from **11:38 pm to 3:30 am the early morning of the 17th**.

At this time **Jalama Beach is not subject to an evacuation** order due to the estimated number of overnight visitors being below the population threshold set by Space Force Launch Control, Safety Office, and the Federal Aviation Administration (FAA). **However, as the launch date/time approaches, if the estimated population threshold is exceeded, there will be a need to evacuate the campground from 3-hrs prior am/pm on November 16th until an all-clear status is issued by Space Force.**

While we **do not** anticipate the need to evacuate the campground at this time, please note the following:

- If an evacuation order is issued you will be notified in a subsequent email and all campers will be evacuated to the end of Jalama Road on to Highway 1. If you will be in mid-stay, you do not have to break down your campsite, and large camping gear may be left behind; however, we do recommend you take your valuables with you.
- While the campground is not currently subject to evacuation, if you do stay overnight in the park, please be advised while highly unlikely, there is a small risk of launch vehicle failure which could cause debris to fall on the campground.
- If you would like to move your check-in date or shorten your stay, depending on availability, please submit a reservation change form by visiting www.sbparks.org/support or contact our Call Center at (805) 568-2460. All changes will be made at no additional charge, and any shortened stays will be partially refunded.
- You may move your stay the evening of the launch to Cachuma Lake Recreation Area, depending on availability, which is approximately 50 miles from Jalama Beach. Please submit a reservation change form by visiting www.sbparks.org/support or contact our Call Center at (805) 568-2460 for availability at Cachuma Lake.
- If you would like to completely cancel the reservation, please submit a reservation change form by visiting www.sbparks.org/support or contact our Call Center (805) 568-2460. You must contact the Call Center by web form or phone to receive a full refund for your cancellation. Remember to disclose the "Jalama Safety Relocation" as the reason for your cancellation. Alternatively, please be advised that cancellations and refund requests initiated through the website will only include the site fee.

Please note that there is always a possibility that the launch may be cancelled or postponed to a later time. **Backup dates are November 17th, 18th, and 19th.**

We sincerely apologize for any inconvenience this may have caused, and hope this notification will

help you make any necessary adjustments to your plans. Please let us know if you have any questions or concerns regarding this launch, and thank you for camping at Jalama Beach Park.

Evacuation Email: Sent by SBC for all launches with early 2023 Protocols. Now only used if SLD 30 issues a full evacuation notice.

From: [Santa Barbara County Parks Reservations](#)
To: [Santa Barbara County Parks Reservations](#)
Subject: IMPORTANT INFORMATION REGARDING YOUR JALAMA BEACH RESERVATION (Jan 28)

Dear Valued Jalama Beach County Park Visitor,

Santa Barbara County Parks has just been notified by Vandenberg Space Force Base of a launch scheduled for **Sunday, January 29. from 5:30 AM to approximately 1:06 PM**, or until Park Staff receives an approval from the base to re-enter. All campers at Jalama Beach will be mandatorily evacuated during this window for safety reasons. All business should return to normal outside the relocation window and campers may return to Jalama Beach as soon as an all-clear status is received.

You are being contacted because you currently have a camping reservation that may conflict with this mandatory safety evacuation window, and we wanted to take the time to notify you of this occurrence so that you may make any changes to your travel plans accordingly. Please review the following options:

- If you are scheduled to camp on **Saturday, January 28th**, you may do so, but please be advised that you will be forced to evacuate the site **5:30 AM**. All campers will be evacuated to the end of Jalama Road on to Highway 1. If you will be in mid-stay, you do not have to break down your campsite, and large camping gear may be left behind; however, we do recommend you take your valuables with you.
- If you would like to move your check-in date or shorten your stay, depending on availability, please submit a reservation change form by visiting www.sbparks.org/support or contact our Call Center at (805) 568-2460. All changes will be made at no additional charge, and any shortened stays will be partially refunded.
- You may move your stay the evening before the launch to Cachuma Lake Recreation Area, depending on availability, which is approximately 50 miles from Jalama Beach. Please submit a reservation change form by visiting www.sbparks.org/support or contact our Call Center at (805) 568-2460 for availability at Cachuma Lake.
- If you would like to completely cancel the reservation, please submit a reservation change form by visiting www.sbparks.org/support or contact our Call Center (805) 568-2460. You must contact the Call Center by web form or phone to receive a full refund for your cancellation. Remember to disclose the "Jalama Safety Relocation" as the reason for your cancellation. Alternatively, please be advised that cancellations and refund requests initiated through the website will only include the site fee.

Please note that there is always a possibility that the event may be cancelled or postponed to a later time. **The backup date is Monday, January 30th.**

We sincerely apologize for any inconvenience this may have caused, and hope this notification will help you make any necessary adjustments to your plans. Please let us know if you have any questions or concerns regarding the mandatory safety relocation, and thank you for camping at Jalama Beach Park.

Santa Barbara County Parks

123 E Anapamu Street, 2nd Floor

Santa Barbara, CA 93101

Phone: (805) 568-2460

Email: Reservations@sbparks.org

Parks-County-0

APPENDIX B – COASTAL ACCESS AND RECREATION ENHANCEMENT PLAN

Introduction

In accordance with Consistency Determination CD-0003-24, the Department of the Air Force (DAF), through SLD 30 in cooperation with SpaceX has begun implementation of the following condition to keep beach closures at no more than 12 and to prevent other potentially negative effects on beach access (e.g. reservation cancelations, etc.).

5. Coastal Access and Recreation Enhancement. Within 30 days of the Commission's consideration of Consistency Determination No. CD-0003-24, DAF will provide, for Executive Director review and comments, an update on the Coastal Access and Recreation Enhancement efforts it is pursuing. The update will include (1) specific details and schedules for implementation of the commitments DAF has made for the evacuation shuttle, satellite internet and Highway 1 digital signage projects for Jalama Beach County Park and the Lompoc Unified School District third grade beach field trip program; (2) details of measures that SpaceX and DAF will take to ensure that the proposed launch activities will not exceed DAF's commitment to cause more than 12 annual closures of Jalama Beach; and (3) a minimum notice period, coordinated with the Santa Barbara County Parks and Recreation Department, for any planned evacuations for Jalama Beach. DAF will consider comments provided by the Executive Director in response to the update and strive to address them when possible.

Highway 1 Signage

Santa Barbara County Parks & Recreation, with the cooperation and support from DAF and SpaceX, has the lead for the project scope and timeline for implementation of a new informational welcome sign to Jalama Beach County Park based upon its jurisdictional responsibilities over the park. The DAF maintains ongoing coordination and support with Santa Barbara County on implementation of this project. The variable message sign is expected to be in place at the Highway 1 and Jalama Road intersection pending Santa Barbara County project plan timing. DAF can provide an update when a specific timeline is established.

Jalama Beach County Park Evacuation Shuttle

For launches that require an evacuation of Jalama Beach County Park, in cooperation with DAF, SpaceX had offered complimentary shuttle service to assist overnight campers in evacuating the site. Santa Barbara County Parks & Recreation, likely having jurisdictional authority on the park's access along with other Santa Barbara County offices, has declined use of this, citing concerns that it would "complicate the evacuation that some people already understand" (Jeffrey Lindgren, pers. comm.). If in the future Santa Barbara County Parks & Recreation determines it would be helpful in reducing access or reservation concerns and necessary, SpaceX would provide the shuttle service.

Starlink at Jalama Beach County Park

In cooperation with DAF and in coordination with Santa Barbara County Parks & Recreation and the Santa Barbara County Information Technology office, SpaceX has provided increased Starlink coverage for the public at Jalama Beach County Park. SpaceX provided an additional high power

Starlink satellite dish to complement the existing dish operated by Santa Barbara County. Two years of priority Starlink service has been provided to Jalama Beach County Park. The arrangement will be assessed at that time to determine if any improvements or changes are needed. Santa Barbara County Information Technology confirmed the system was fully operational on July 30, 2024.

Figure 1. Starlink Dish Installed at Jalama Beach County Park



Lompoc Unified School District Program

DAF has coordinated with Lompoc Unified School District (LUSD) Curriculum Director to coordinate logistics and requirements for all 3rd grade students to participate in a field trip to Surf Beach/Ocean Park. There are approximately 900 students across 9 schools that would participate in this program. DAF and SpaceX will provide staff to facilitate a natural resources program during the field trips. DAF would implement this program for two consecutive school years. Approximately 100 students would visit the beach at a time for an approximate 9 trips per school year.

Jalama Beach Evacuations

Prior to launch, Space Launch Delta 30 Range Safety evaluates risk criteria to determine if Jalama Beach County Park must be closed for public safety. Under the agreement between the Department of the Air Force and Santa Barbara County, SLD 30 must provide notice of a launch at least 7 days prior to the closure, and the closure is not to exceed 48 hours to cover the primary and back up day for the launch event. These evacuations would be infrequent and would only last as long as necessary to assure the public are safe during a launch (approximately up to six hours). A notification of receipt procedure has been developed between Space Launch Delta 30 Range Safety and Santa Barbara County Parks Department to ensure the request for the beach closure has been received and acknowledged to ensure timelines for notification to the country have been adhered to.

The Space Launch Delta, 2nd Range Operations Squadron maintains the current launch schedule for all activities occurring on Vandenberg Space Force Base. If a Jalama Beach evacuation is necessary, the operation in question is annotated and added to a calendar year running tally to ensure Space Launch Delta 30 does not exceed the 12 annual closures agreed to with Santa Barbara County.

APPENDIX C – SENSITIVE SPECIES AND WILDLIFE OCCURRENCE WITHIN THE PROPOSED ACTION AREA AND THE COASTAL ZONE

Table C.0-1 includes all special status species records and survey locations from multiple sources in the action area and coastal zone. Figures C.0-1 through C.0-62 include federally listed species localities within the noise footprint. Figures C.0-63 through C.0-81 include localities of additional special status species within the noise footprint, gathered from DAF long-term monitoring and annual survey efforts and the CNDDDB.

Table C.0-1: Federal and State Special Status Species Occurrence Within the Proposed Action Area

Species	Status		Occurrence within the Proposed Action Area
	USFWS	CDFW	
Invertebrates			
Crotch bumble bee (<i>Bombus crotchii</i>)	-	SSC	Present in the noise footprint on VSFB, in eastern Santa Barbara, Ventura, and western Los Angeles Counties.
Monarch butterfly (<i>Danaus plexippus</i>)	P	Special Animal	Overwintering stands within noise footprint on VSFB, in eastern Santa Barbara, Ventura, and western Los Angeles Counties.
Fish			
Tidewater goby (<i>Eucyclogobius newberryi</i>)	FT	SSC	Present in San Antonio Creek, Santa Ynez River, and Jalama Creek on VSFB. Present in coastal streams within the noise footprint in eastern Santa Barbara, Ventura, and western Los Angeles Counties.
Unarmored Threespine Stickleback (<i>Gasterosteus aculeatus</i>)	FE	SE	Present in San Antonio Creek on VSFB and the Santa Clara River drainage in Ventura and Los Angeles Counties
Arroyo chub (<i>Gila orcuttii</i>)	-	SSC	Present in San Antonio Creek on VSFB. Present within the noise footprint on Malibu and Calleguas Creeks in Ventura and western Los Angeles Counties.
Steelhead - southern California DPS (<i>Oncorhynchus mykiss</i>)	FE	Candidate, SSC	Present within the noise footprint in coastal streams and rivers of Santa Barbara (including the Santa Ynez River and potentially Jalama Creek on VSFB) and western Los Angeles Counties.
Amphibians			

Species	Status		Occurrence within the Proposed Action Area
	USFWS	CDFW	
Coast range newt (<i>Taricha torosa</i>)	-	SSC	Not present on VSFB. Present within the noise footprint in coastal streams of Santa Barbara, Ventura, and western Los Angeles Counties.
California red-legged frog (<i>Rana draytonii</i>)	FT	SSC	Present on VSFB and within noise footprint in Santa Barbara County.
Western spadefoot (<i>Spea hammondi</i>)	P	SSC	Present on VSFB and within noise footprint in Santa Barbara, Ventura, and Los Angeles Counties.
Reptiles			
Northern legless lizard (<i>Anniella pulchra</i>)	-	SSC	Present within the noise footprint in Santa Barbara County, including VSFB.
Southern legless lizard (<i>Anniella stebbinsi</i>)	-	SSC	Not on VSFB. Present within the noise footprint in Ventura and western Los Angeles Counties.
Coastal whiptail (<i>Aspidoscelis tigris stejnegeri</i>)	-	SSC	Not on VSFB. Present within the noise footprint in western Los Angeles County. Not on VSFB. Present within the noise footprint in western Los Angeles County.
Coast horned lizard (<i>Phrynosoma blainvillii</i>)	-	SSC	Present within the noise footprint in Santa Barbara (including VSFB), Ventura, and western Los Angeles Counties.
Southwestern pond turtle (<i>Actinemys pallida</i>)	P	SSC	Present within the noise footprint in coastal streams and wetlands of Santa Barbara (including VSFB), Ventura, and western Los Angeles Counties.
Two-striped garter snake (<i>Thamnophis hammondi</i>)	-	SSC	Present within the noise footprint in Honda Creek on VSFB and the noise footprint in western Santa Barbara County. Potential occurrence in the noise footprint in eastern Santa Barbara and western Los Angeles Counties.
Birds			
Allen's hummingbird (<i>Selasphorus sasin</i>)	BCC	-	Documented within noise footprint.

Species	Status		Occurrence within the Proposed Action Area
	USFWS	CDFW	
Ashy storm petrel (<i>Oceanodroma homochroa</i>)	-	SSC	Present within the noise footprint and recovery area offshore of the California coast.
Bald eagle (<i>Haliaeetus leucocephalus</i>)	BCC; BGEPA	SE; Fully Protected	Documented occasional flyovers; foraging habitat within noise footprint. Unlikely to be present.
Bank swallow (<i>Riparia riparia</i>)	-	ST	Present within noise footprint in Santa Barbara (including VSFB), Ventura, and western Los Angeles Counties.
Belding's savannah sparrow (<i>Passerculus sandwichensis beldingi</i>)	-	SE	Present in coastal plains within the noise footprint in Santa Barbara (including VSFB), Ventura, and western Los Angeles Counties.
Black oystercatcher (<i>Haematopus bachmani</i>)	BCC	-	Documented on sandy beaches and cliffs of VSFB shoreline within the noise footprint.
Black skimmer (<i>Rynchops niger</i>)	BCC	-	Documented on nearshore ocean within the noise footprint.
Black storm petrel (<i>Oceanodroma melania</i>)	-	SSC	Present within the noise footprint and recovery area offshore of the California coast.
Brant (<i>Branta bernicla</i>)	-	SSC	Documented on nearshore ocean within the noise footprint
Burrowing owl (<i>Athene cunicularia</i>)	BCC	SSC	Likely: winters in burrows in grassland areas impacted by noise. Breeding on VSFB has not been documented in optimal breeding habitat on Base since 1984 (reflects a well-documented county-wide decline of the species).
California brown pelican (<i>Pelecanus occidentalis californicus</i>)	-	Fully Protected	Documented in nearshore ocean waters and roosts on beaches and rocks within the noise footprint.
California condor (<i>Gymnogyps californianus</i>)	FE	SE	Unlikely: may stray into region on occasion. One documented brief occurrence on VSFB in 2017.
California least tern (<i>Sterna antillarum browni</i>)	FE	SE	Present in noise footprint in Santa Barbara (including VSFB), Ventura, and western Los Angeles Counties.

Species	Status		Occurrence within the Proposed Action Area
	USFWS	CDFW	
Cassin's auklet (<i>Ptychoramphus aleuticus</i>)	-	SSC	Present within the noise footprint and recovery area offshore of the California coast.
Channel Island song sparrow (<i>Melospiza melodia graminea</i>)	-	SSC	Present in noise footprint on Santa Rosa and San Miguel Islands.
California gnatcatcher (<i>Poliophtila californica californica</i>)	FT	SSC	Documented in the noise footprint
Costa's hummingbird (<i>Calypte costae</i>)	BCC	-	Nesting habitat in Honda Canyon and erosional wash habitat impacted by noise.
Golden eagle (<i>Aquila chrysaetos</i>)	BGEPA	Fully Protected	Documented in areas within noise footprint
Grasshopper sparrow (<i>Ammodramus savannarum</i>)	-	SSC	Present in coastal plains within the noise footprint in Santa Barbara (including VSFB), Ventura, and western Los Angeles Counties
Island loggerhead shrike (<i>Lanius ludovicianus anthonyi</i>)	-	SSC	Present within the noise footprint on Santa Cruz and Santa Rosa Islands.
Lawrence's goldfinch (<i>Spinus lawrencei</i>)	BCC	-	Documented in shrub and riparian habitat within noise footprint.
Least Bell's vireo (<i>Vireo bellii pusillus</i>)	FE	SE	Documented in riparian habitat within noise footprint.
Loggerhead shrike (<i>Lanius ludovicianus</i>)	BCC	SSC Nesting	Documented in shrub and riparian habitat within noise footprint.
Light-footed Ridgway's rail (<i>Rallus obsoletus levipes</i>)	FE	SE	Documented in the noise footprint.
Loggerhead shrike (<i>Lanius ludovicianus</i>)	BCC	SSC	Documented in shrub and riparian habitat within noise footprint in Santa Barbara (including VSFB), Ventura, and western Los Angeles Counties.
Long-billed curlew (<i>Numenius americanus</i>)	BCC	-	Documented on rocky coastline at low tide and beaches within noise footprint.
Marbled godwit (<i>Limosa fedoa</i>)	BCC	-	Documented on sandy beaches and rocky coastline at low tide within noise footprint.
Marbled murrelet (<i>Brachyramphus marmoratus</i>)	FT	SE	Documented in nearshore ocean waters within noise footprint.
Northern harrier (<i>Circus hudsonius</i>)	-	SSC Nesting	Documented in grassland within noise footprint.

Species	Status		Occurrence within the Proposed Action Area
	USFWS	CDFW	
Nuttall's woodpecker (<i>Dryobates nuttallii</i>)	BCC	-	Documented in riparian habitat within noise footprint.
Oak titmouse (<i>Baeolophus inornatus</i>)	BCC	-	Documented in riparian and non-native tree habitat within noise footprint.
Peregrine falcon (<i>Falco peregrinus anatum</i>)	BCC Nesting	Fully Protected Nesting	Documented in coastal habitat within noise footprint.
Santa Cruz Island rufous-crowned sparrow (<i>Aimophila ruficeps obscura</i>)	-	SSC	Present in noise footprint on Santa Cruz Island
Short-billed dowitcher (<i>Limnodromus griseus</i>)	BCC	-	Documented on rocky coastline at low tide and beaches within noise footprint.
Southwestern willow flycatcher (<i>Empidonax traillii extimus</i>)	FE	-	Documented in riparian habitat within noise footprint.
Tufted puffin (<i>Fratercula cirrhata</i>)	-	SSC	Present within the noise footprint and recovery area offshore of the California coast.
Whimbrel (<i>Numenius phaeopus</i>)	BCC	-	Documented on rocky coastline at low tide and beaches within noise footprint.
Western snowy plover (<i>Charadrius nivosus nivosus</i>)	FT; BCC	SSC Nesting	Documented on rocky coastline at low tide, nests on sandy beaches within noise footprint.
Willet (<i>Tringa semipalmata</i>)	BCC	-	Documented on rocky coastline at low tide and beaches impacted by noise.
White-tailed kite (<i>Elanus leucurus</i>)	-	Fully Protected Nesting	Documented in riparian and non-native tree habitat within noise footprint.
Yellow warbler (<i>Setophaga petechia</i>)	BCC	SSC Nesting	Documented in riparian habitat within noise footprint.
Terrestrial Mammals			
Pallid bat (<i>Antrozous pallidus</i>)	-	SSC	Documented within the noise footprint.
Townsend's big-eared bat (<i>Corynorhinus townsendii</i>)	-	SSC	Documented within the noise footprint.
Spotted bat (<i>Euderma maculatum</i>)	-	SSC	Documented within the noise footprint.
Western red bat (<i>Lasiurus blossevillii</i>)	-	SSC	Documented within the noise footprint.
Western mastiff bat (<i>Eumops perotis californicus</i>)	-	SSC	Documented within the noise footprint.

Species	Status		Occurrence within the Proposed Action Area
	USFWS	CDFW	
San Diego desert woodrat (<i>Neotoma lepida intermedia</i>)	-	SSC	Documented within the noise footprint.
American badger (<i>Taxidea taxus</i>)	-	SSC	Documented within noise footprint.

Notes: BGEPA = Bald and Golden Eagle Protection Act; FE = Federally Endangered Species; FT = Federally Threatened Species; P = Proposed for federal listing; ST = State Threatened Species; SE = State Endangered Species; SSC = California State Species of Special Concern; SE = State Endangered Species; SSC = State Candidate Species; BCC = Federal Bird of Conservation Concern

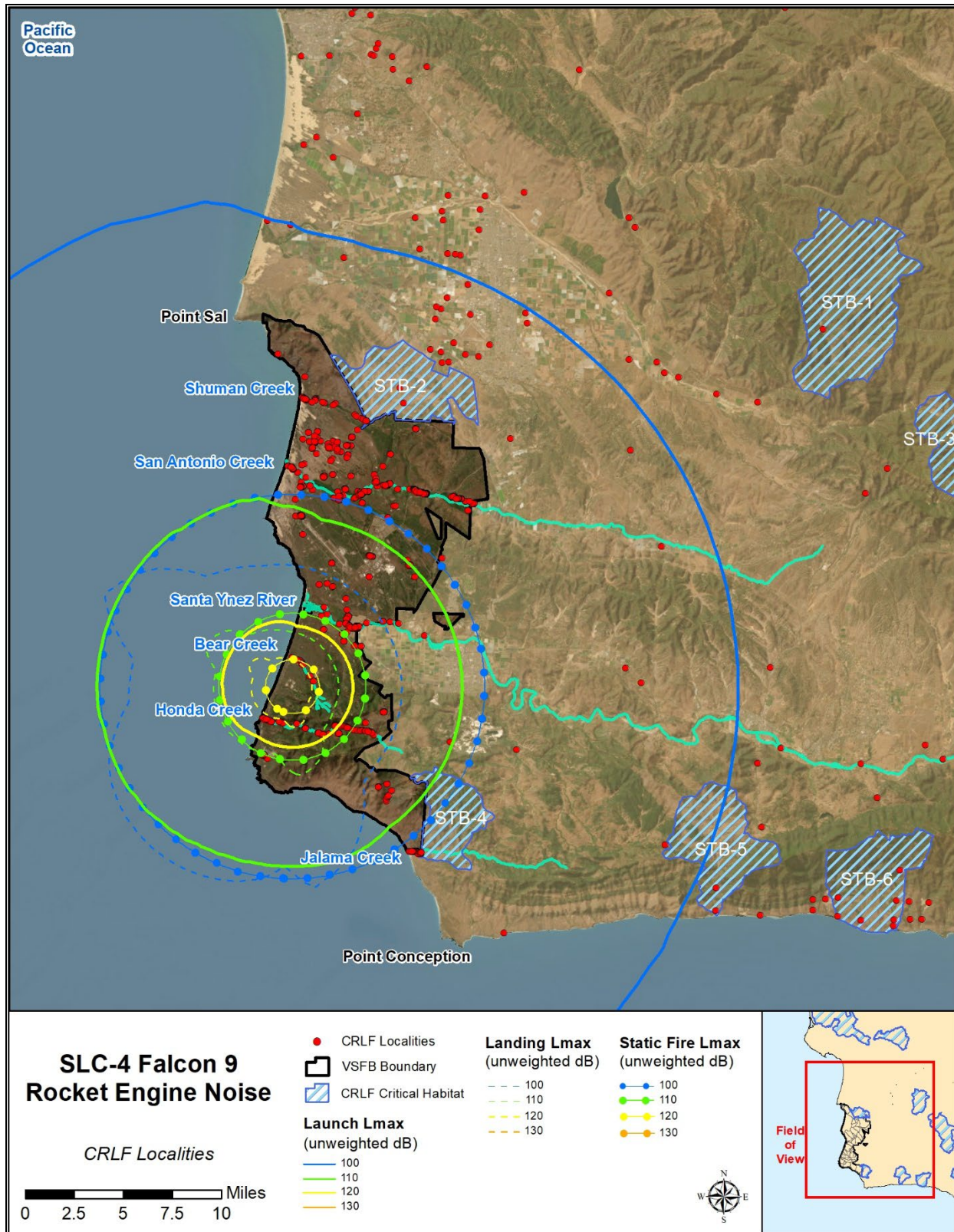


Figure C.0-1. California red-legged frog localities, Critical Habitat, and Falcon 9 SLC-4 static fire, launch, and landing rocket engine noise model results.

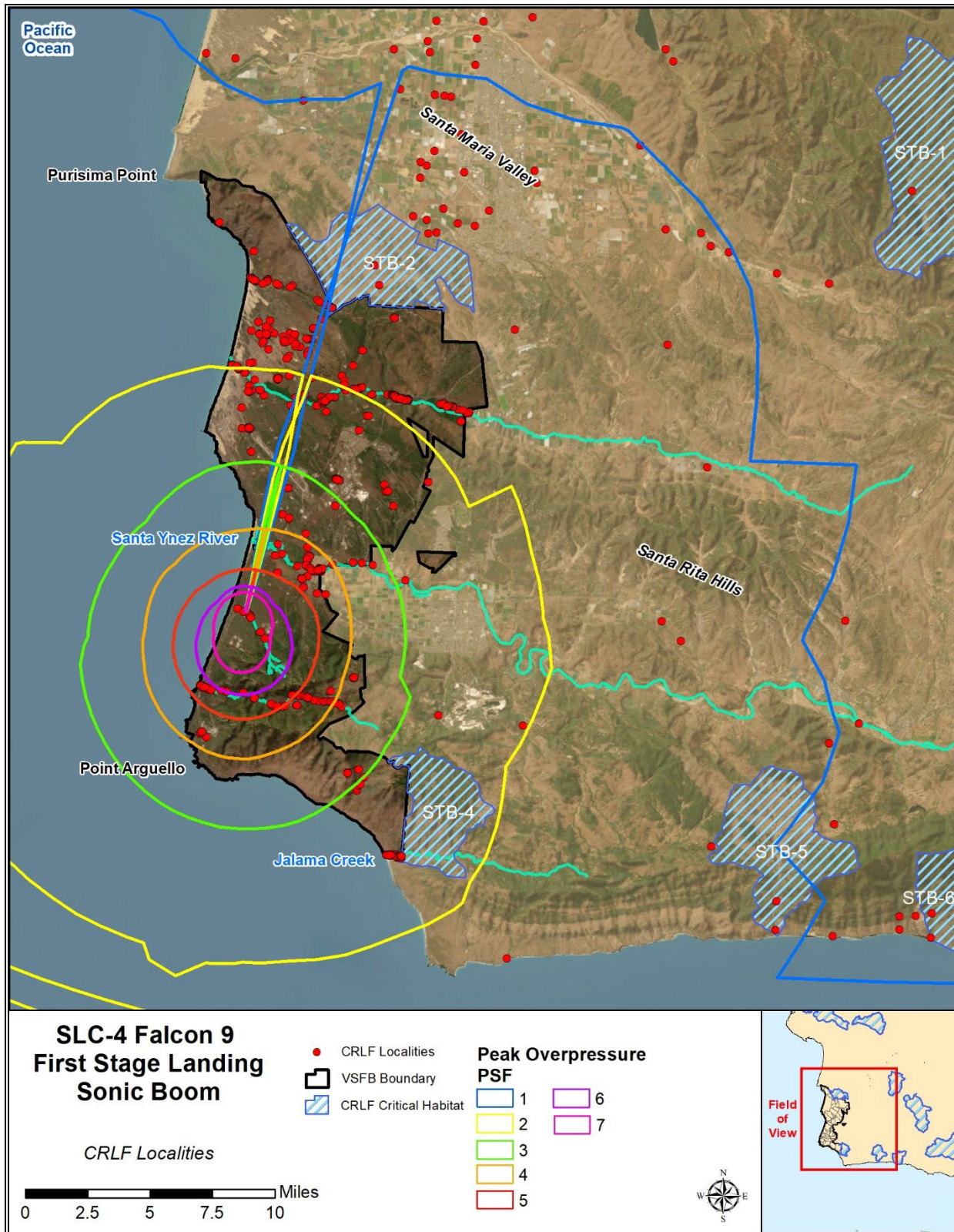


Figure C.0-2. California red-legged frog localities, Critical Habitat, and example SLC-4 landing sonic boom contours.

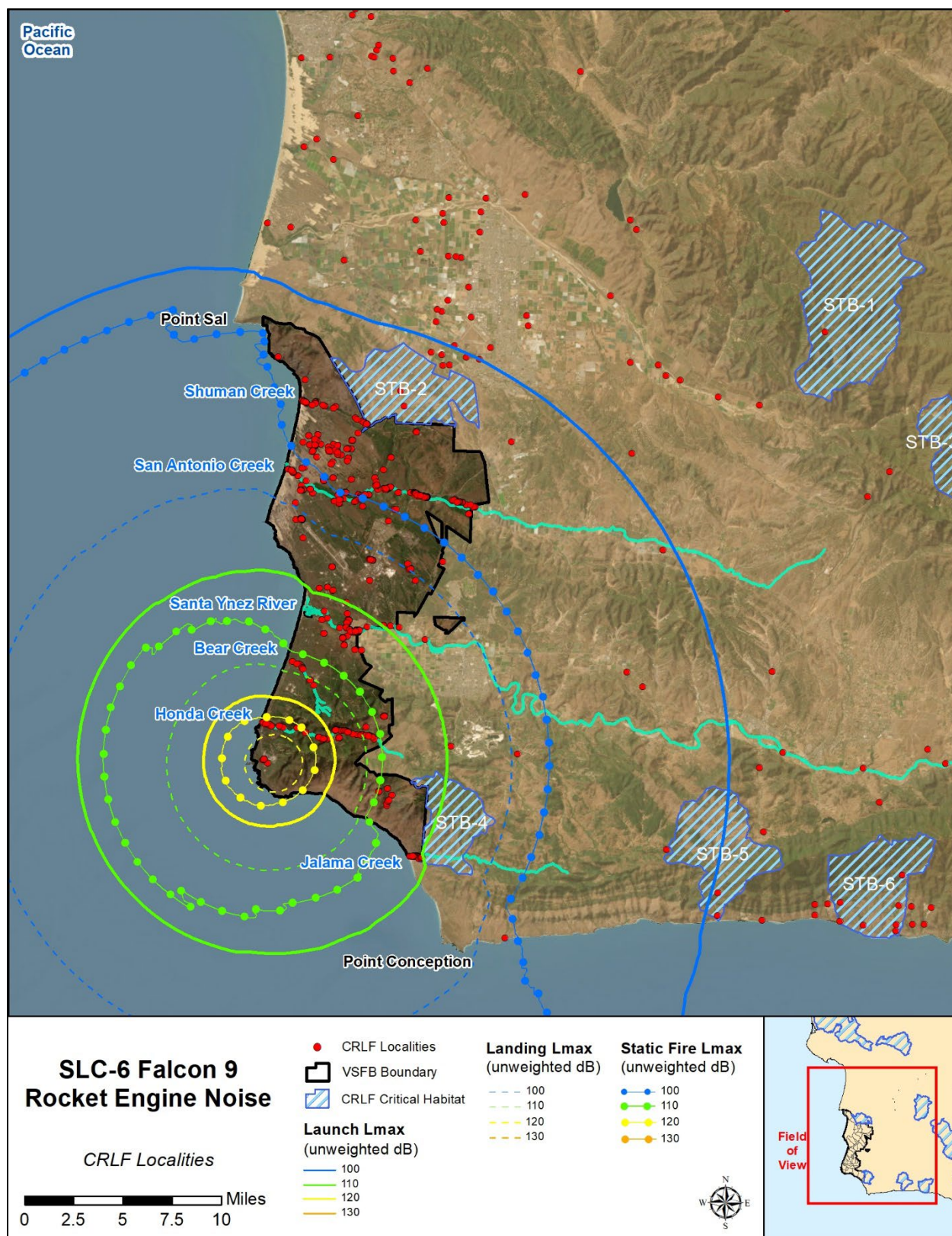


Figure C.0-3. California red-legged frog localities, Critical Habitat, and Falcon 9 SLC-6 static fire, launch, and landing rocket engine noise model results.

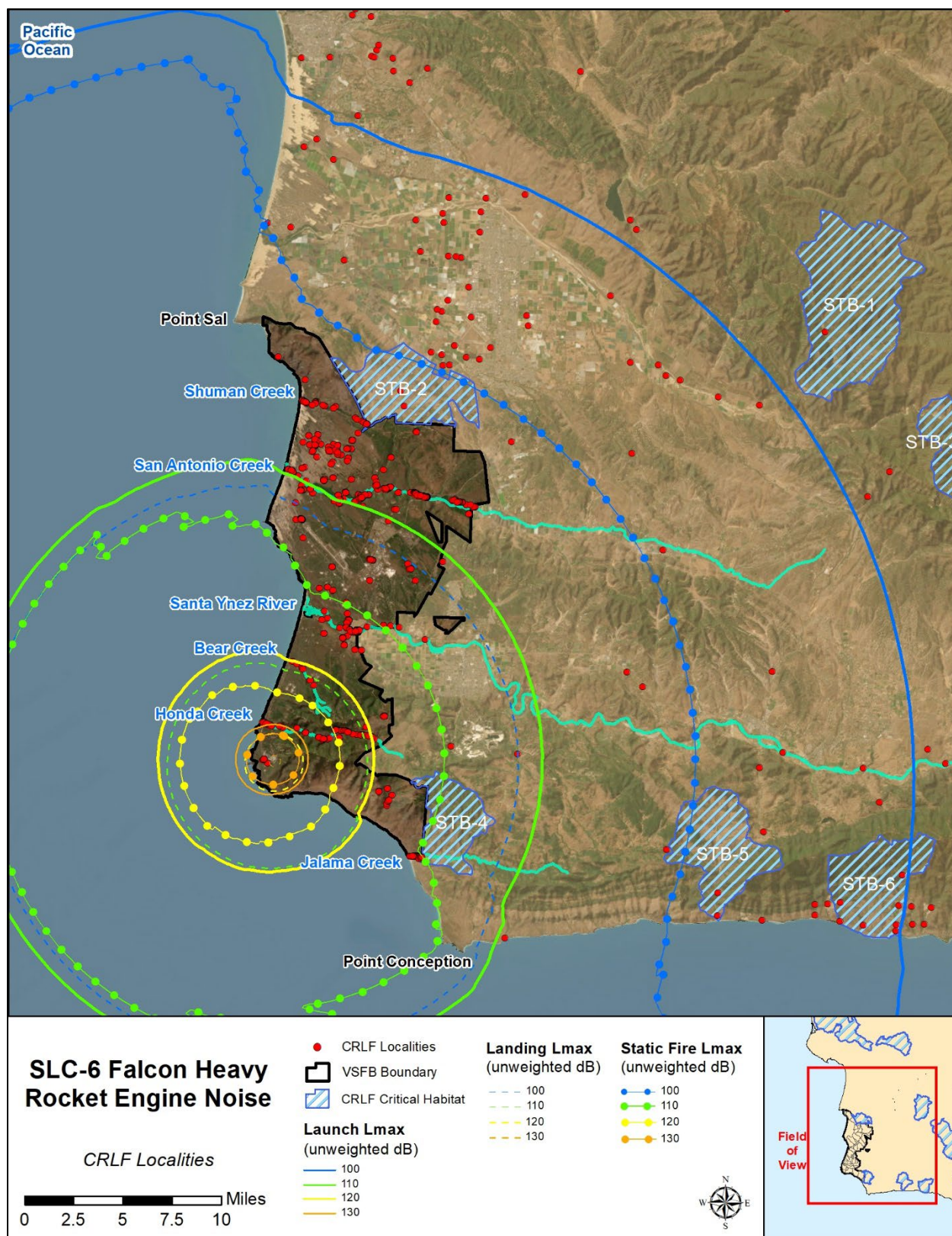


Figure C.0-4. California red-legged frog localities, Critical Habitat, and Falcon Heavy SLC-6 static fire, launch, and landing rocket engine noise model results.

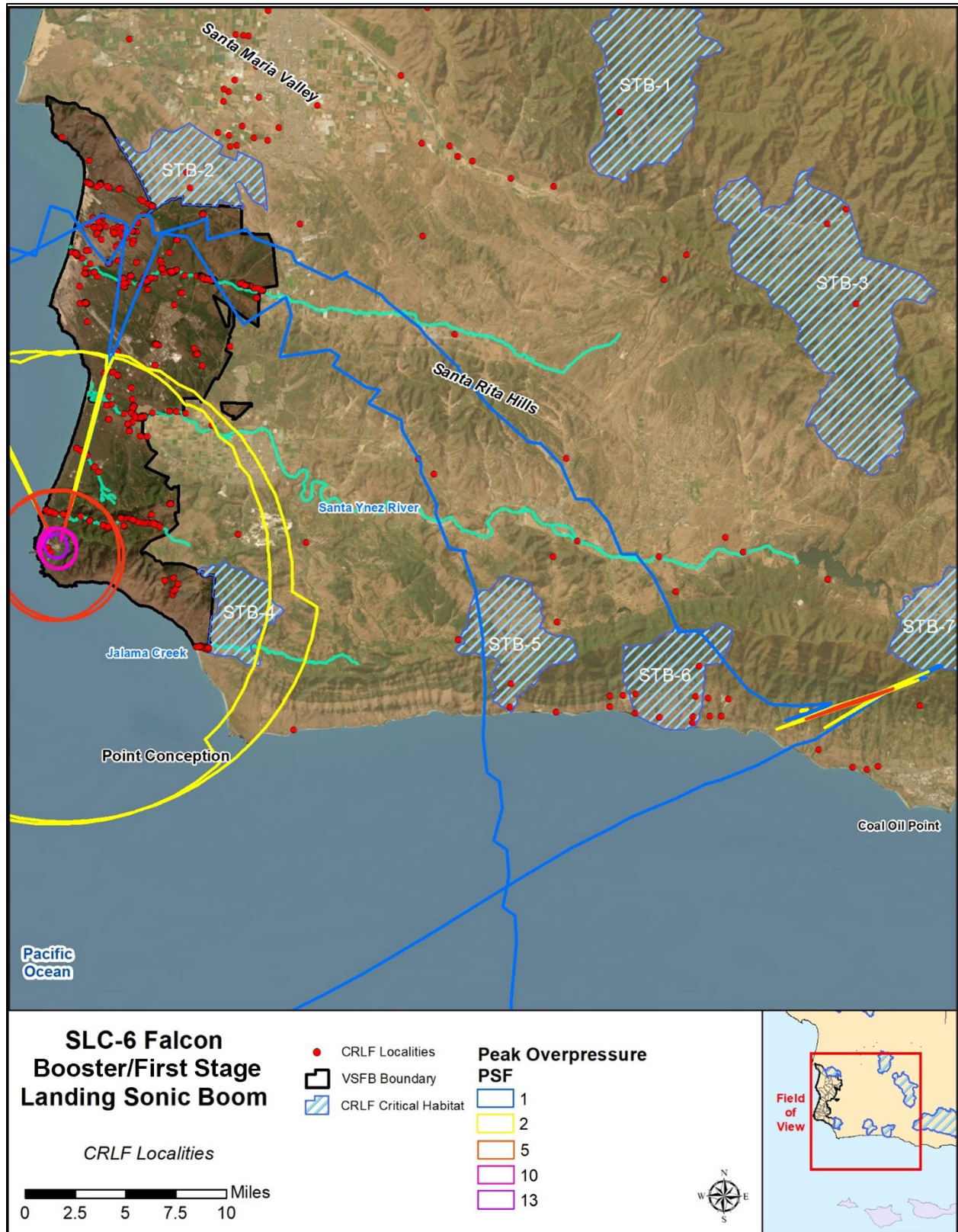


Figure C.0-5. California red-legged frog localities, Critical Habitat, and example SLC-6 landing sonic boom contours.

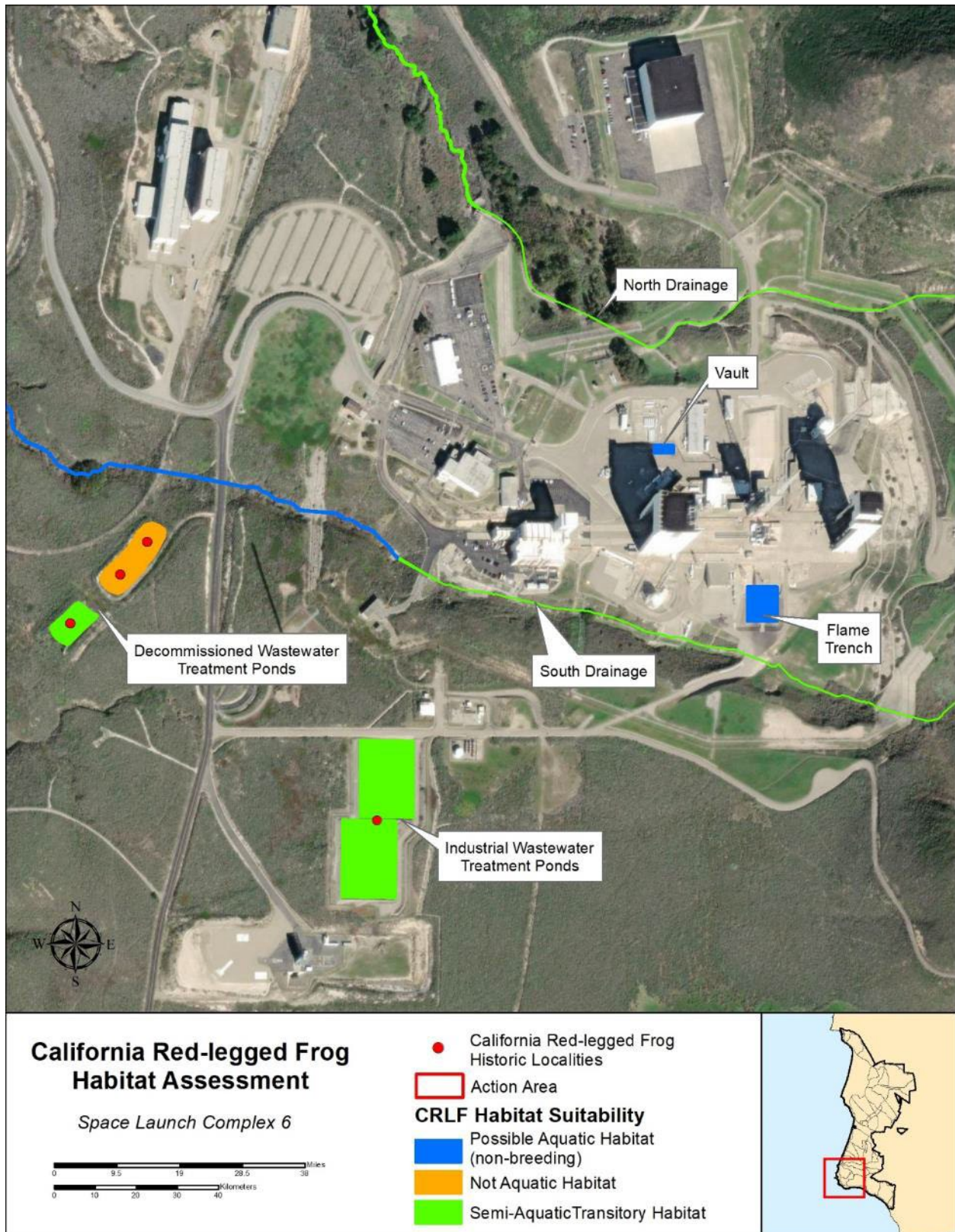


Figure C.0-6. California red-legged frog habitat assessment of SLC-6.

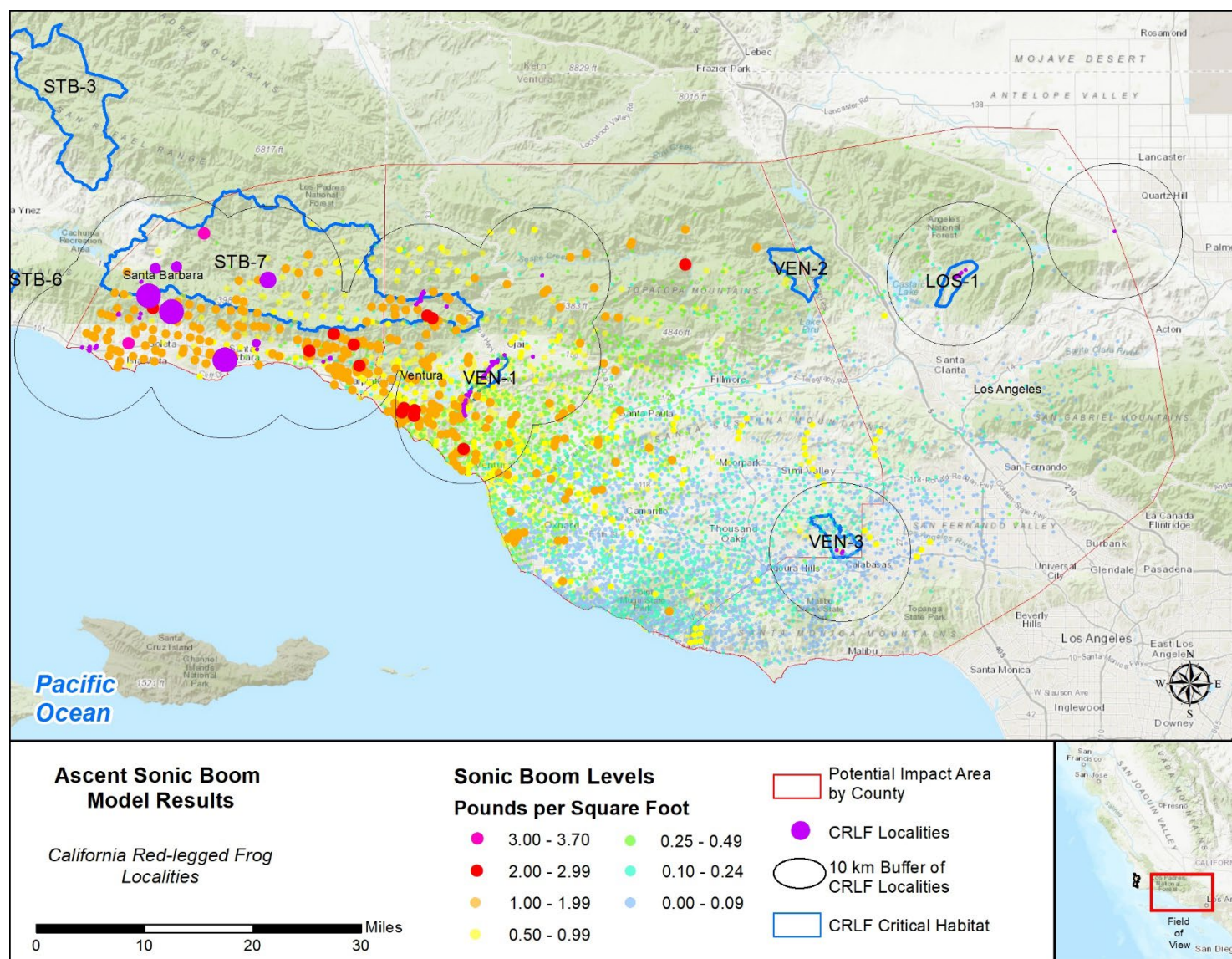


Figure C.0-7. CRLF localities, critical habitat, and potential sonic boom impact areas in eastern Santa Barbara, Ventura, and Los Angeles Counties.

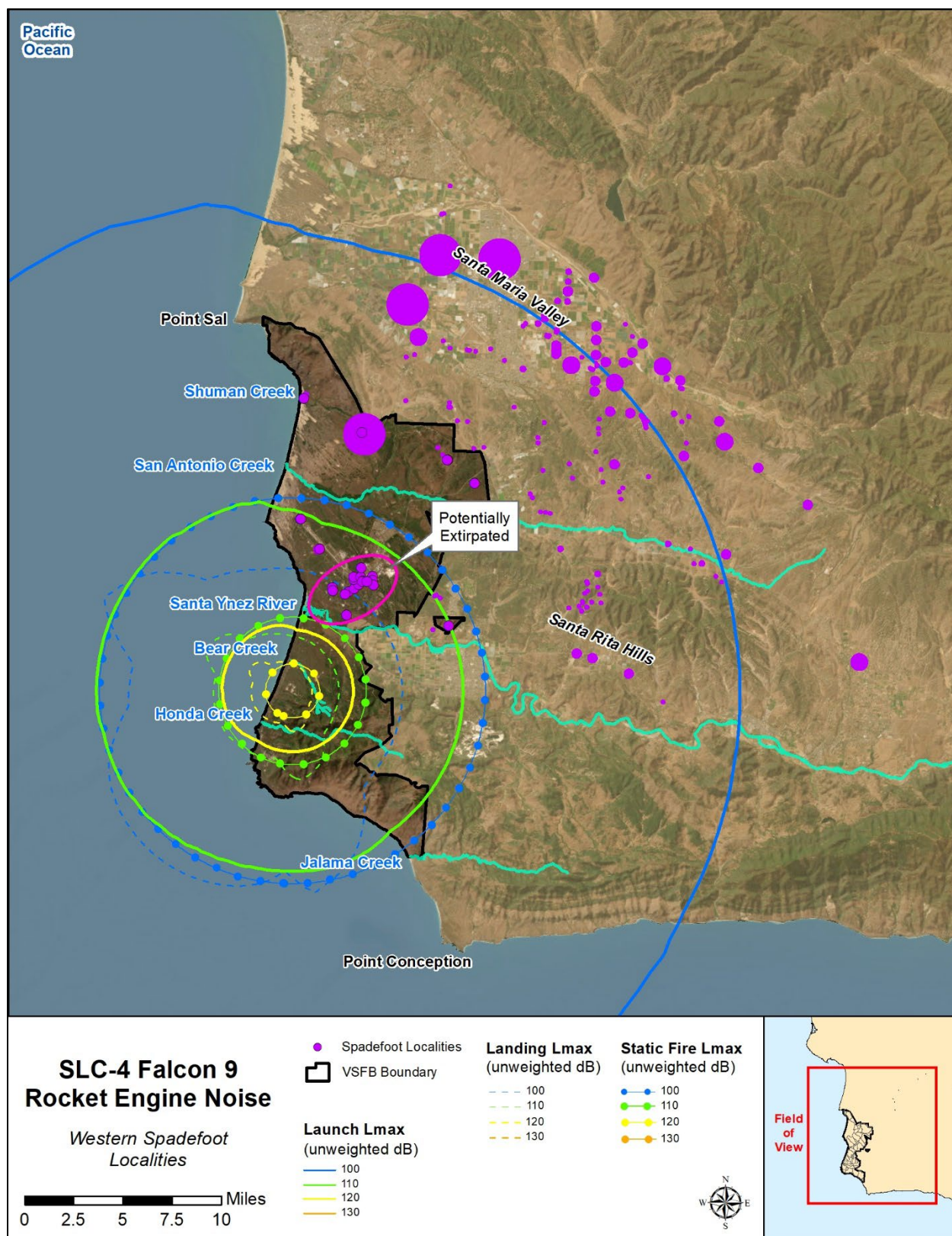


Figure C.0-8. Western spadefoot localities and Falcon 9 SLC-4 static fire, launch, and landing rocket engine noise model results.

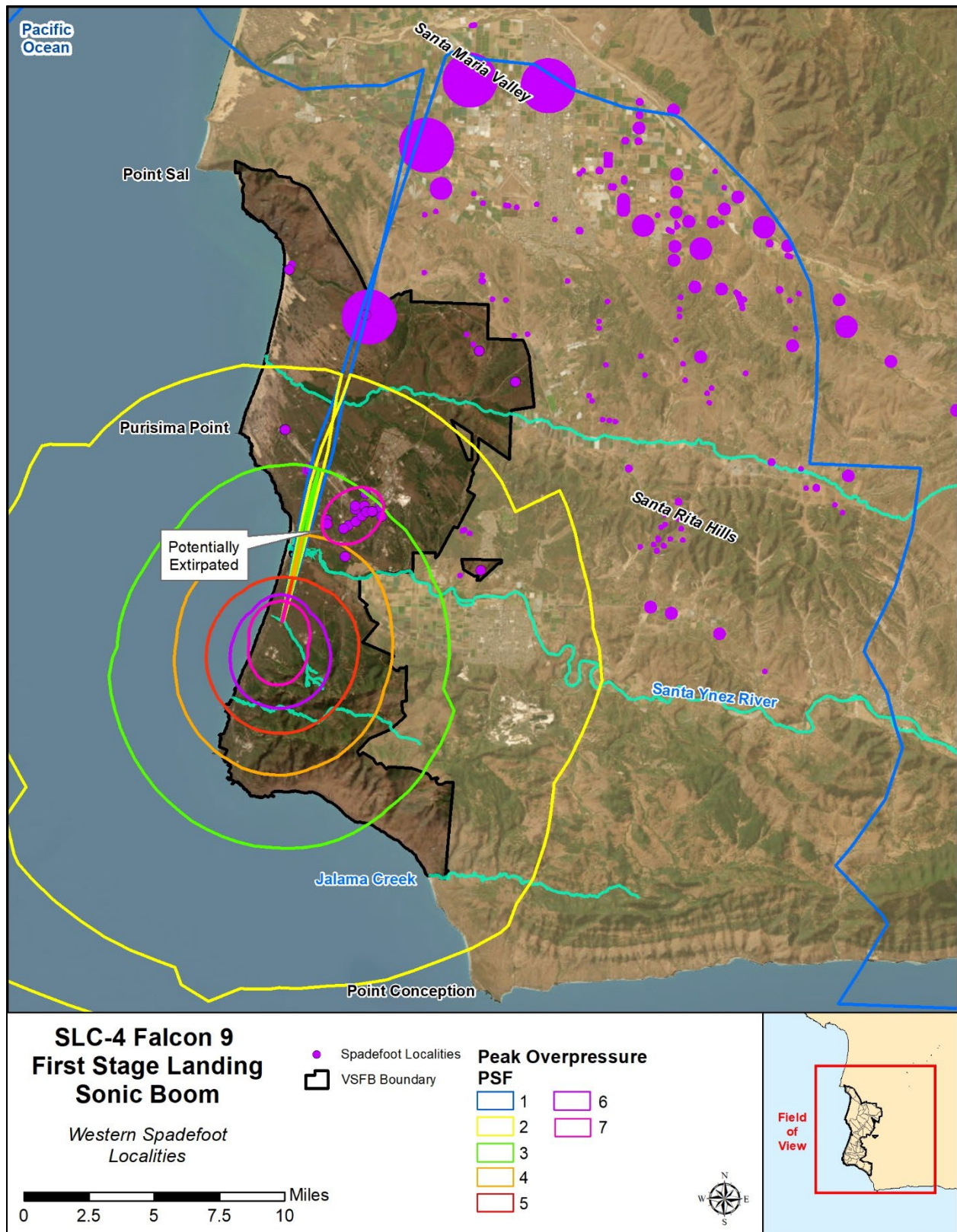


Figure C.0-9. Western spadefoot localities and example SLC-4 landing sonic boom contours.

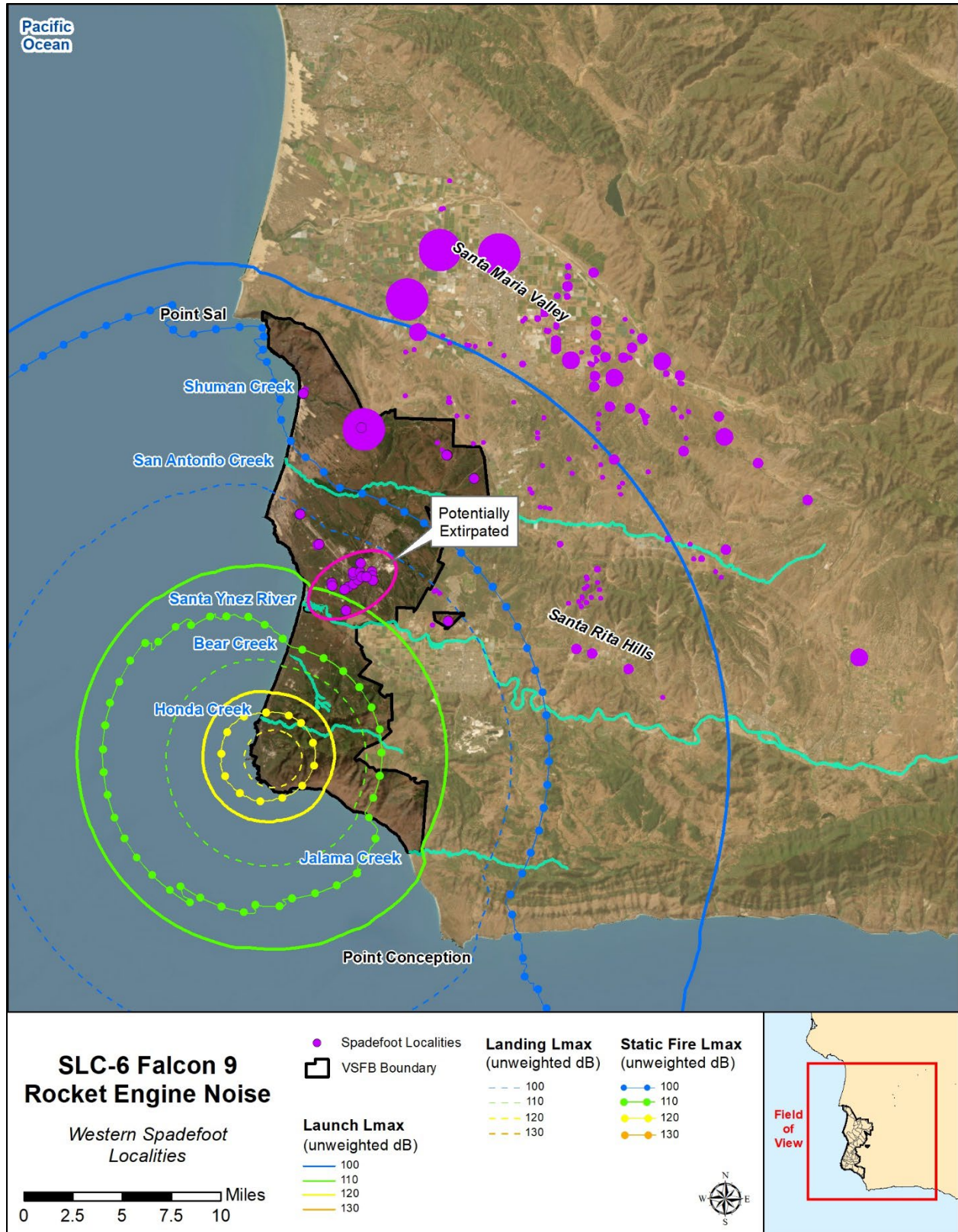


Figure C.0-10. Western spadefoot localities Falcon 9 SLC-6 static fire, launch, and landing rocket engine noise model results.

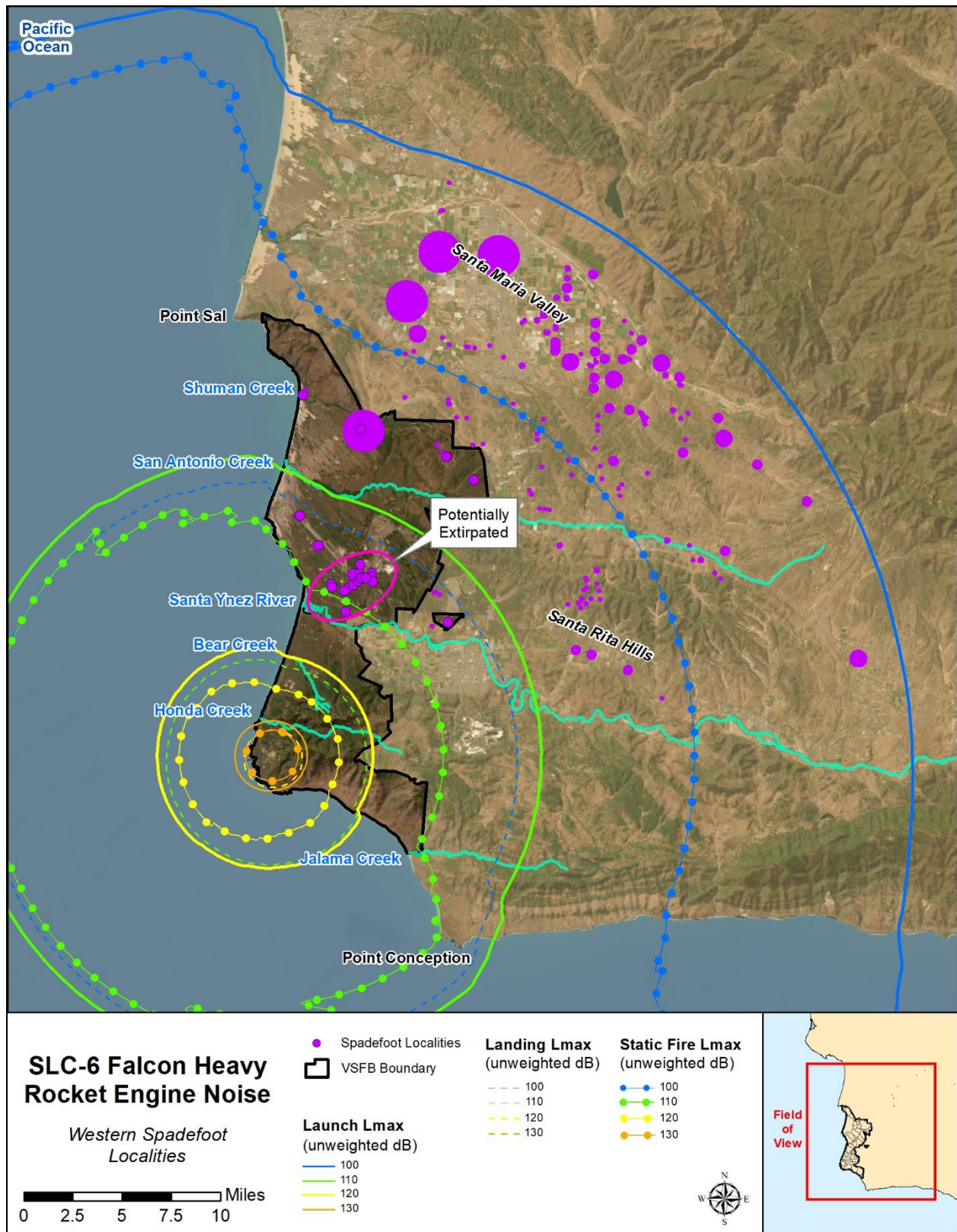


Figure C.0-11. Western spadefoot localities and Falcon Heavy SLC-6 static fire, launch, and landing rocket engine noise model results.

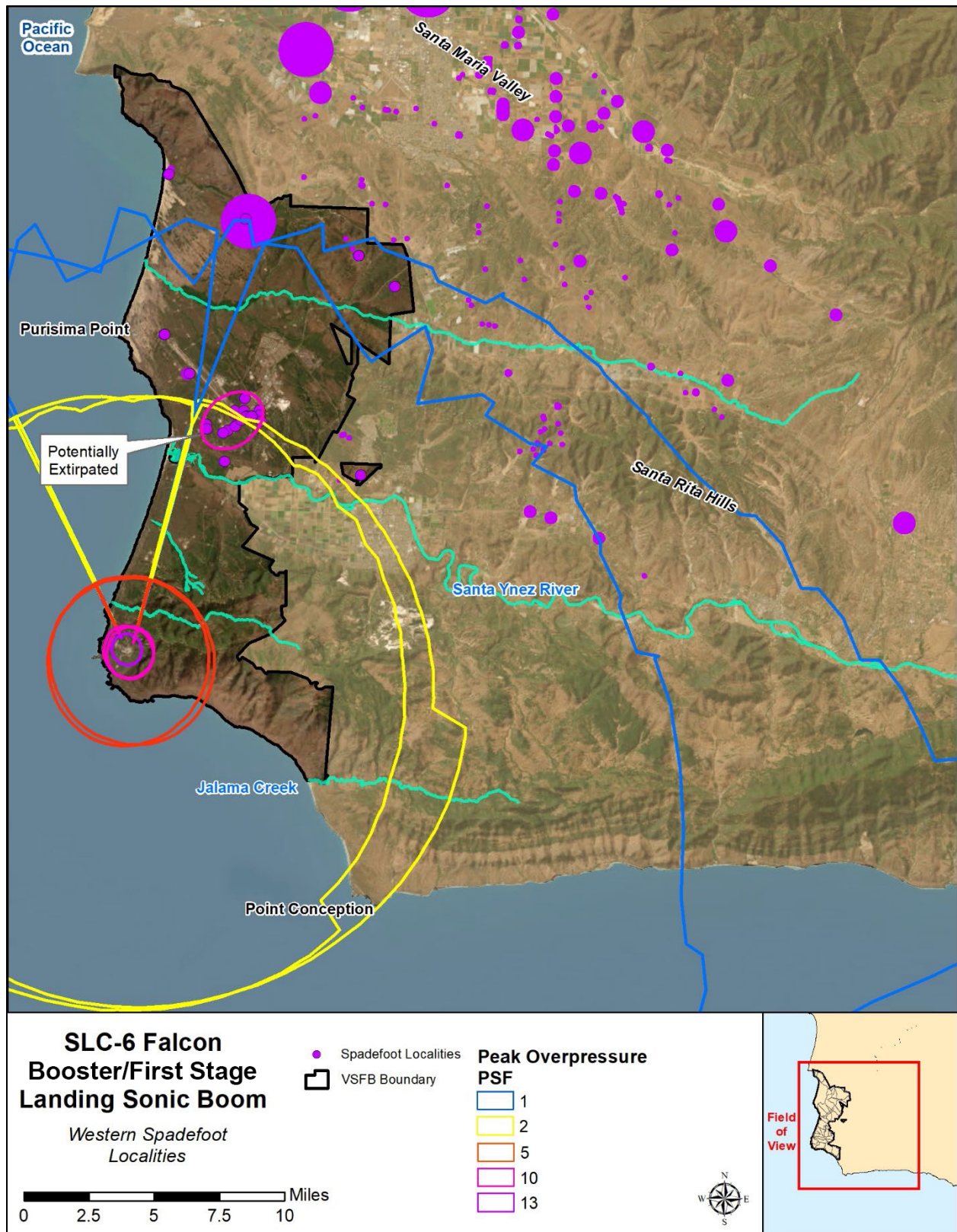


Figure C.0-12. Western spadefoot localities and two sample sonic boom model results for SLC 6 landing events.

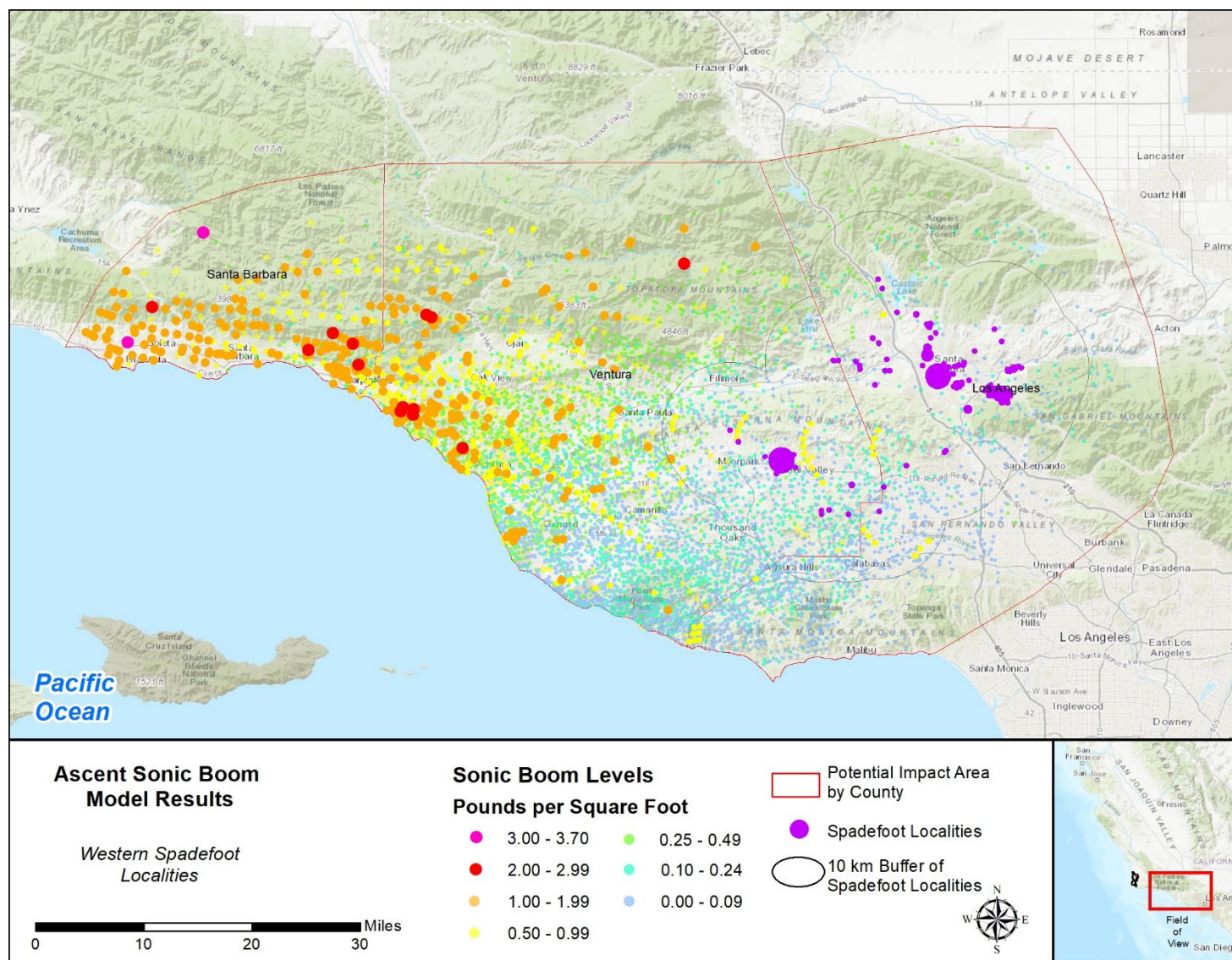


Figure C.0-13. Western spadefoot localities and potential sonic boom impact areas in eastern Santa Barbara, Ventura, and Los Angeles Counties

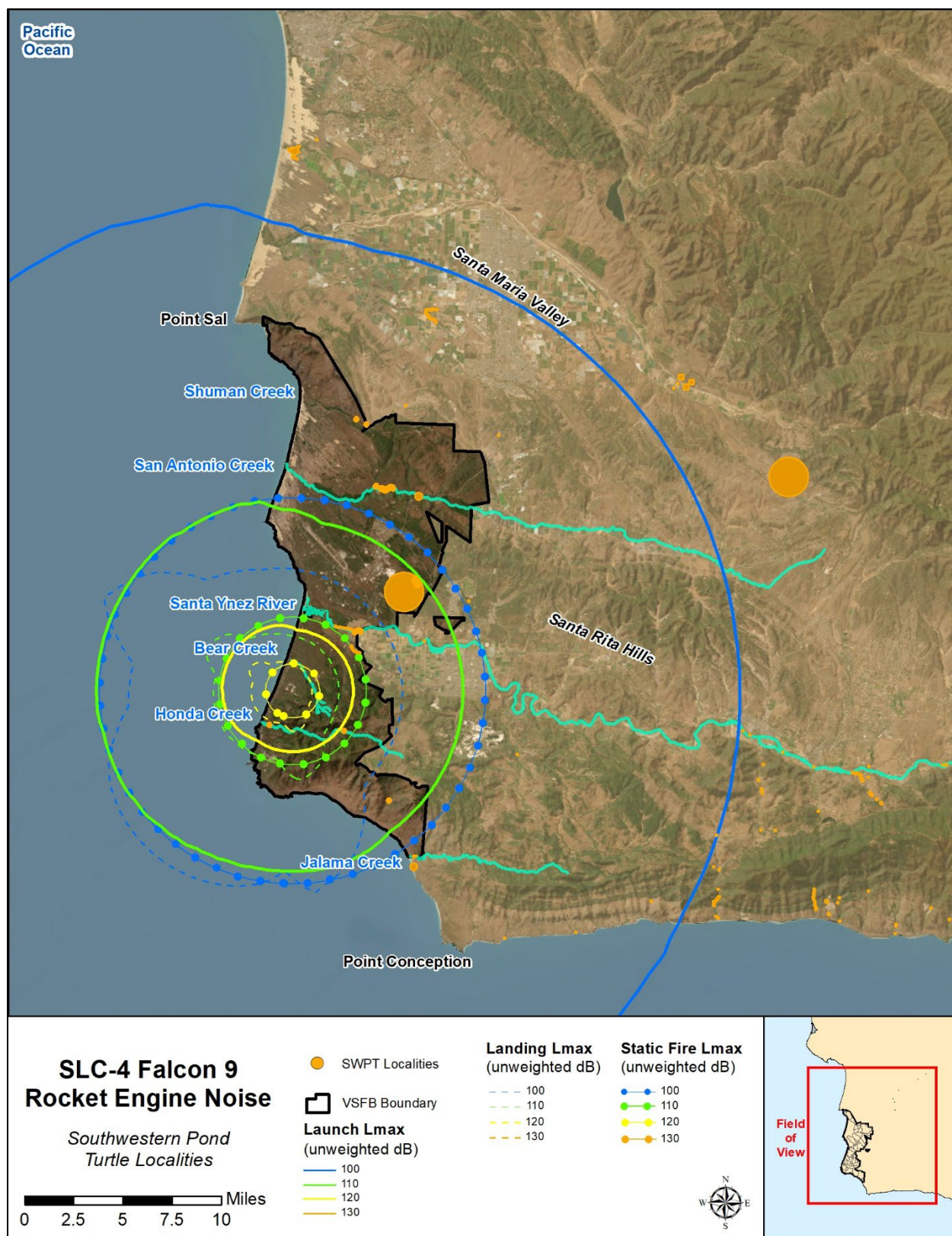


Figure C.0-14. Southwestern pond turtle localities and Falcon 9 SLC-4 static fire, launch, and landing rocket engine noise model results.

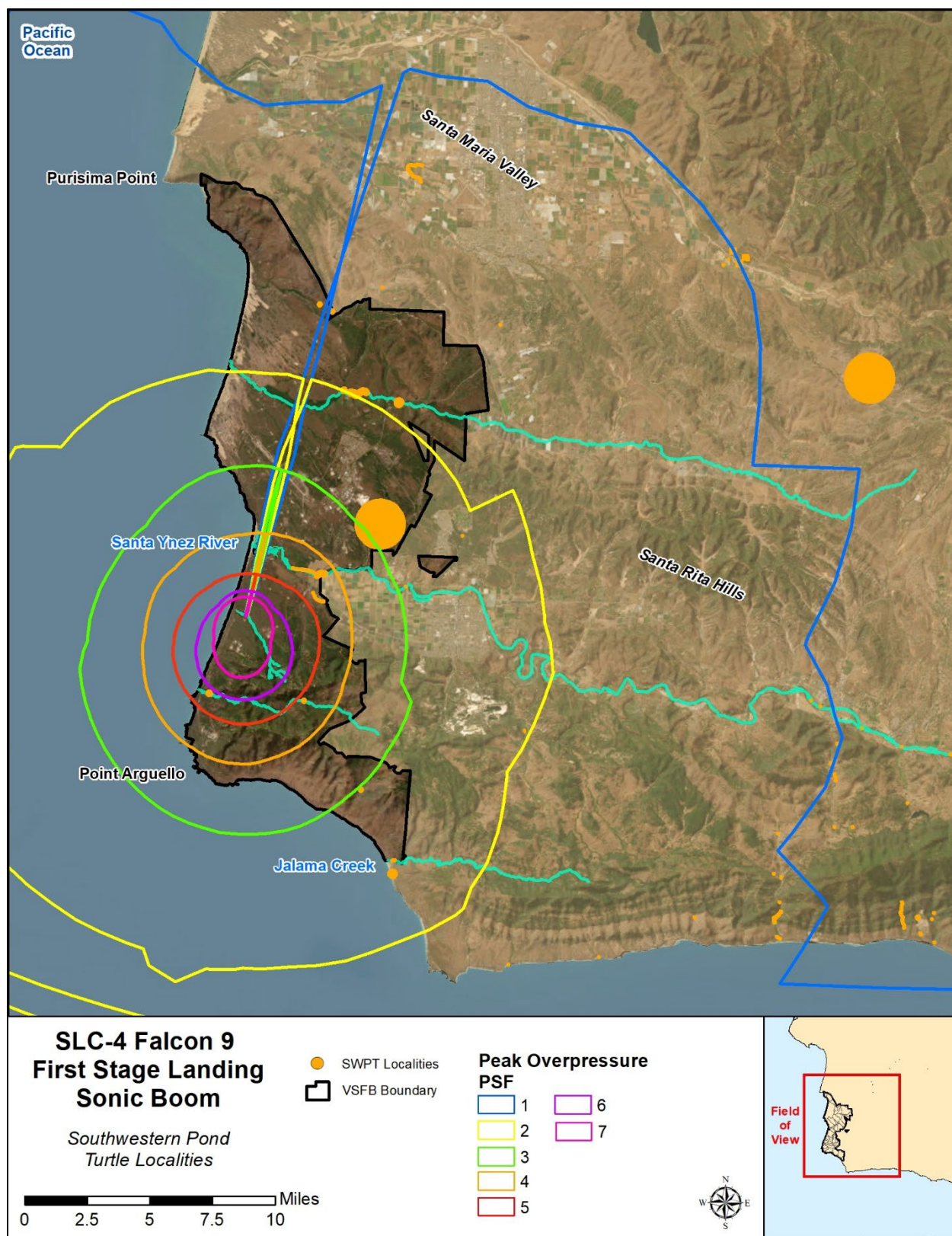


Figure C.0-15. Southwestern pond turtle localities and example SLC-4 landing sonic boom contours.

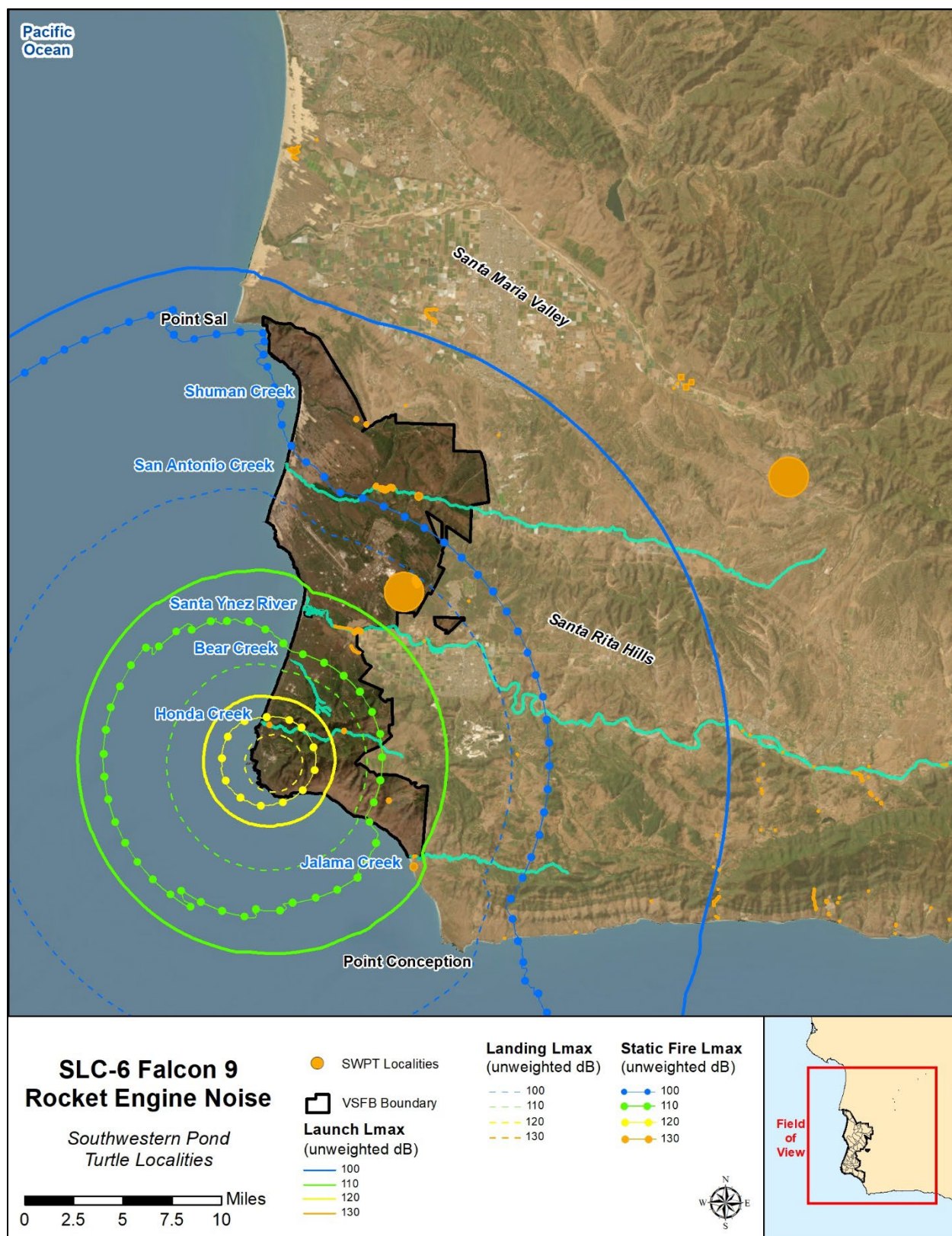


Figure C.0-16. Southwestern pond turtle localities Falcon 9 SLC-6 static fire, launch, and landing rocket engine noise model results.

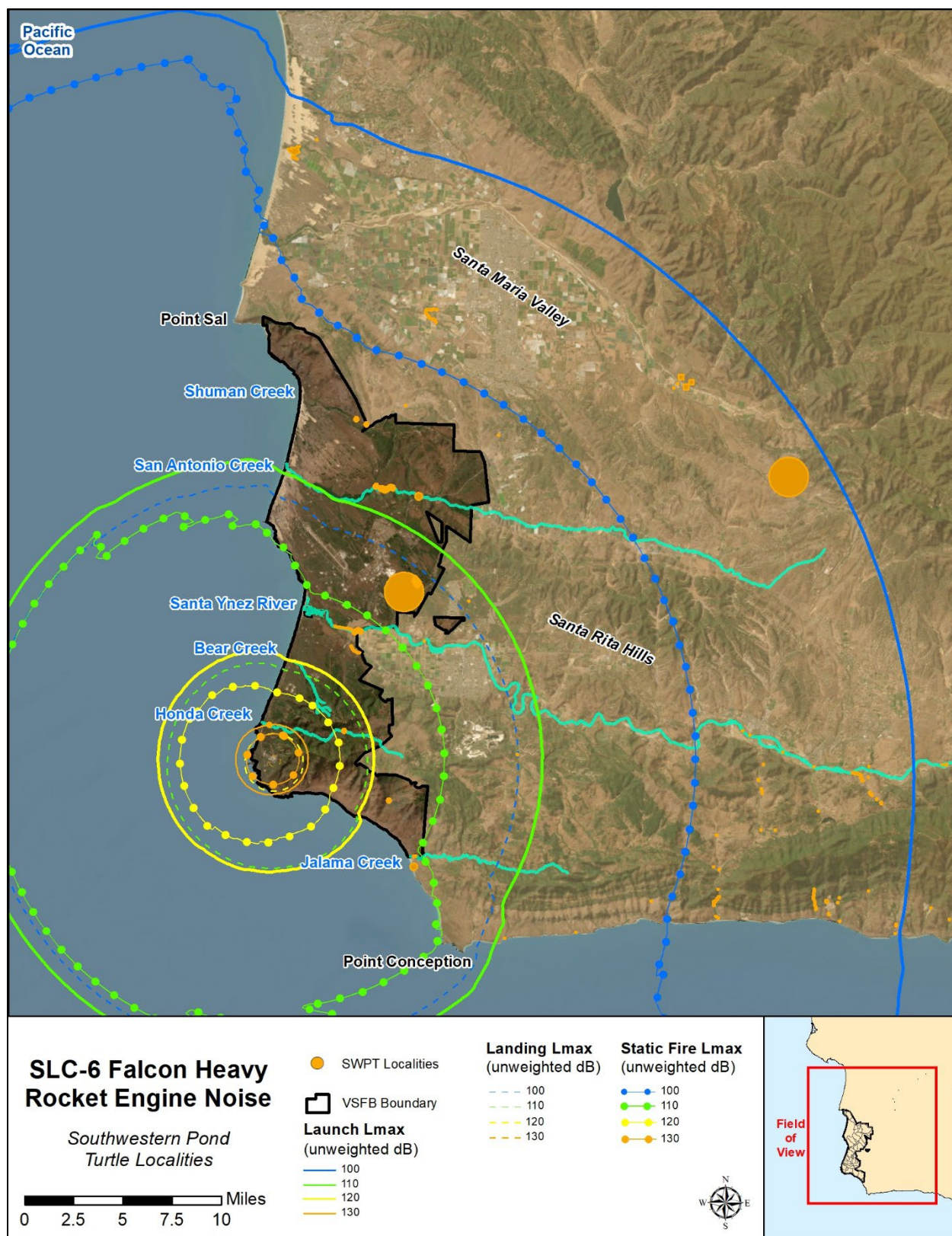


Figure C.0-17. Southwestern pond turtle localities and Falcon Heavy SLC-6 static fire, launch, and landing rocket engine noise model results.

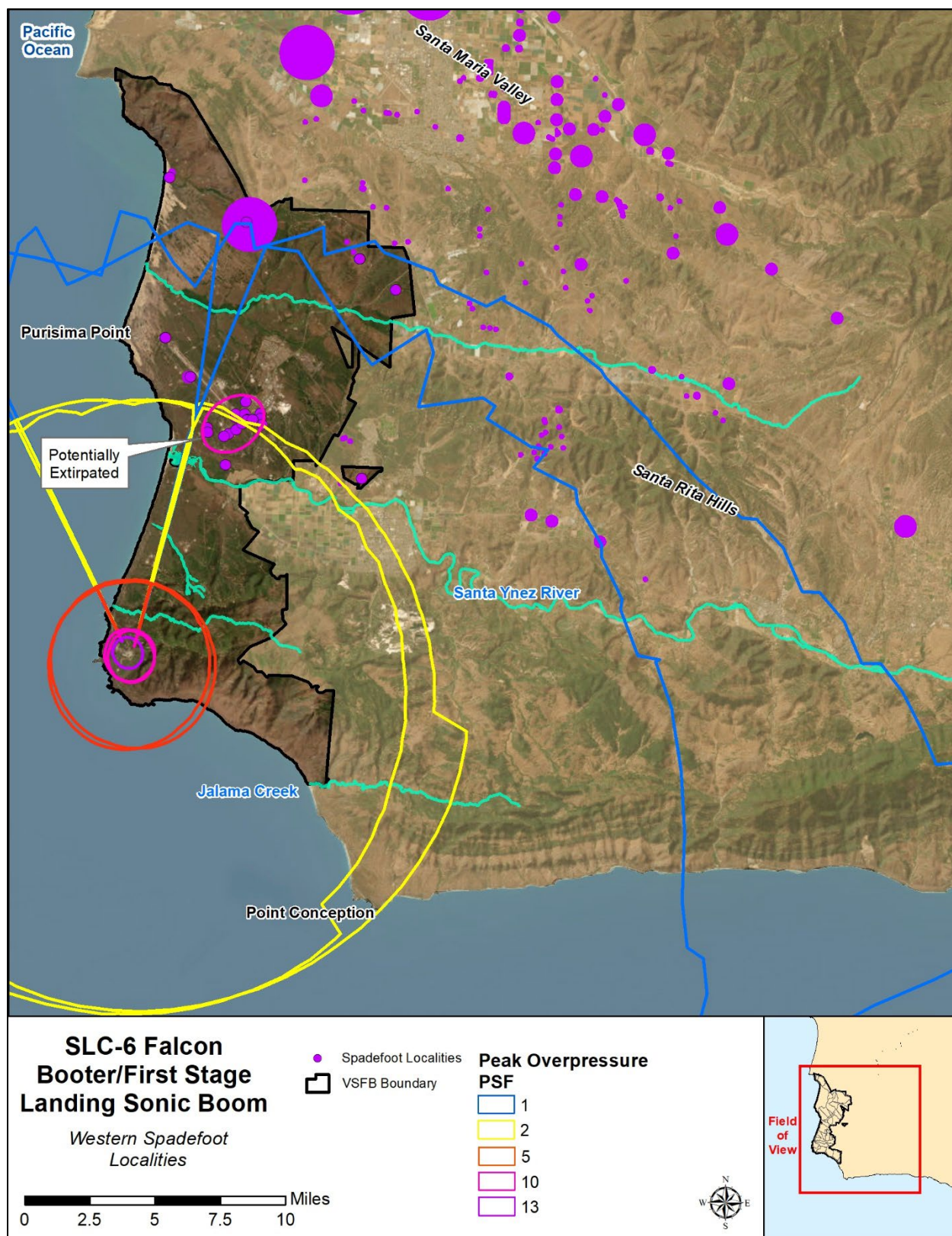


Figure C.0-18. Southwestern pond turtle localities and SLC-6 landing sonic boom.

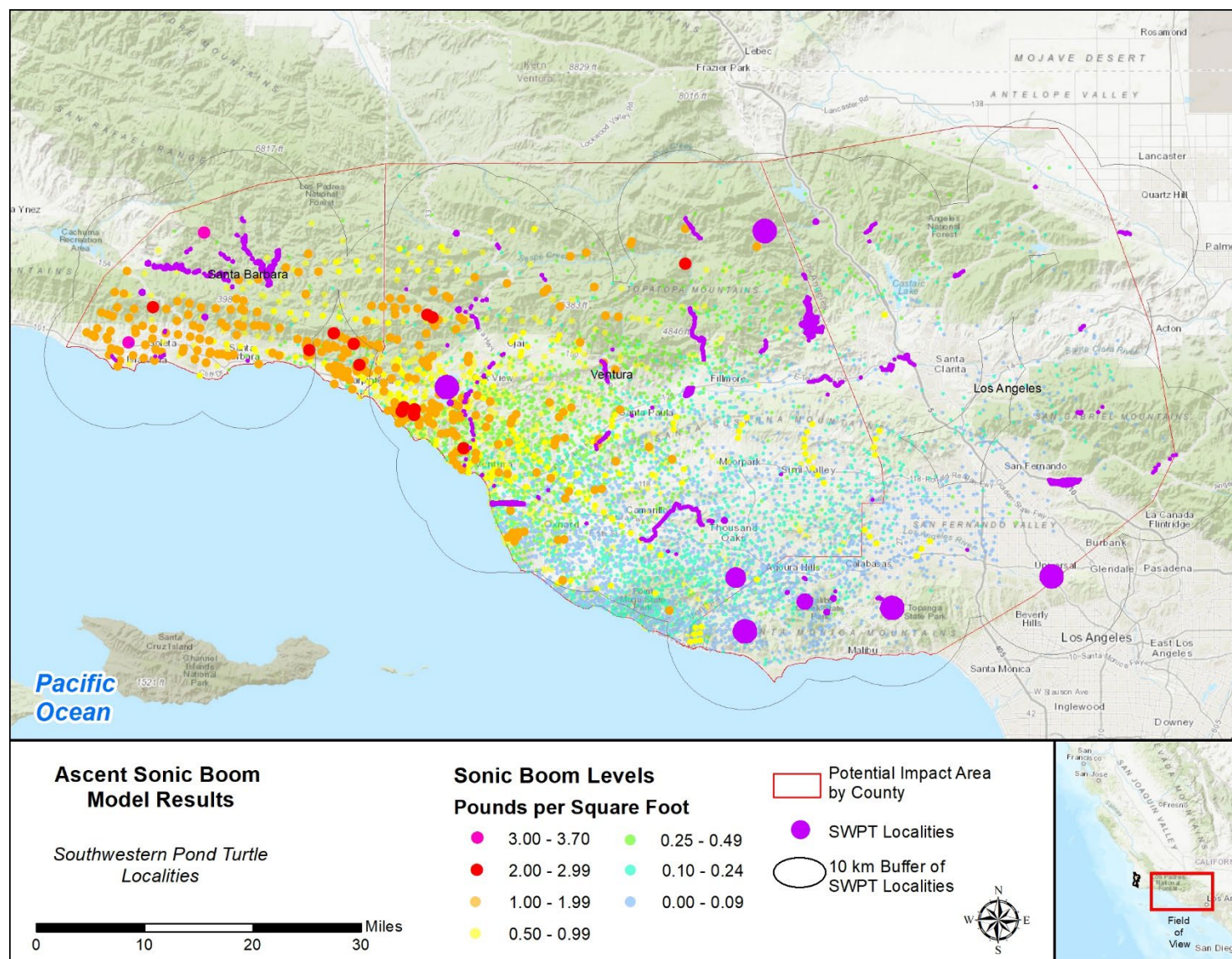


Figure C.0-19. Southwestern pond turtle localities and potential sonic boom impact areas in eastern Santa Barbara, Ventura, and Los Angeles Counties.

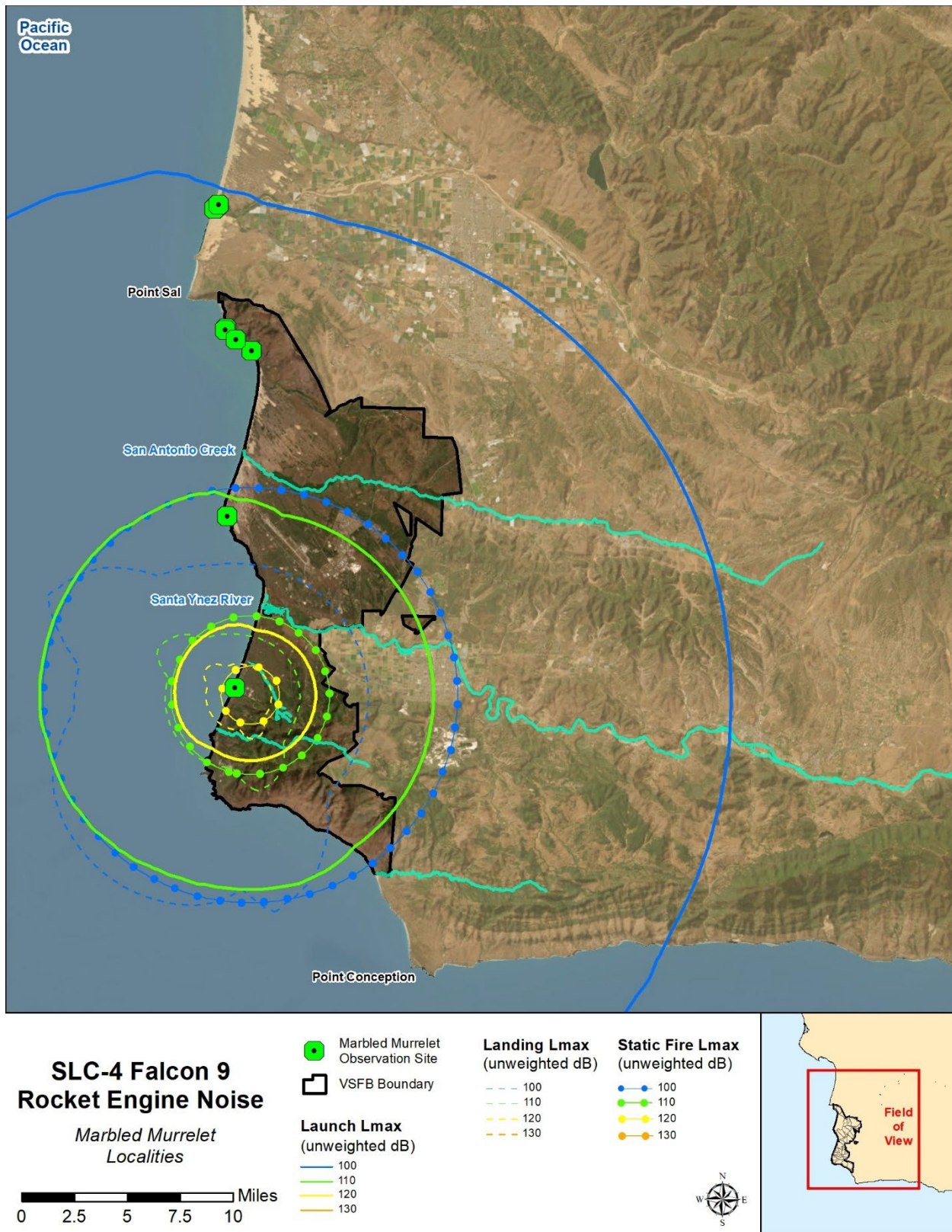


Figure C.0-20. Marbled murrelet localities and Falcon 9 SLC-4 static fire, launch, and landing rocket engine noise model results.

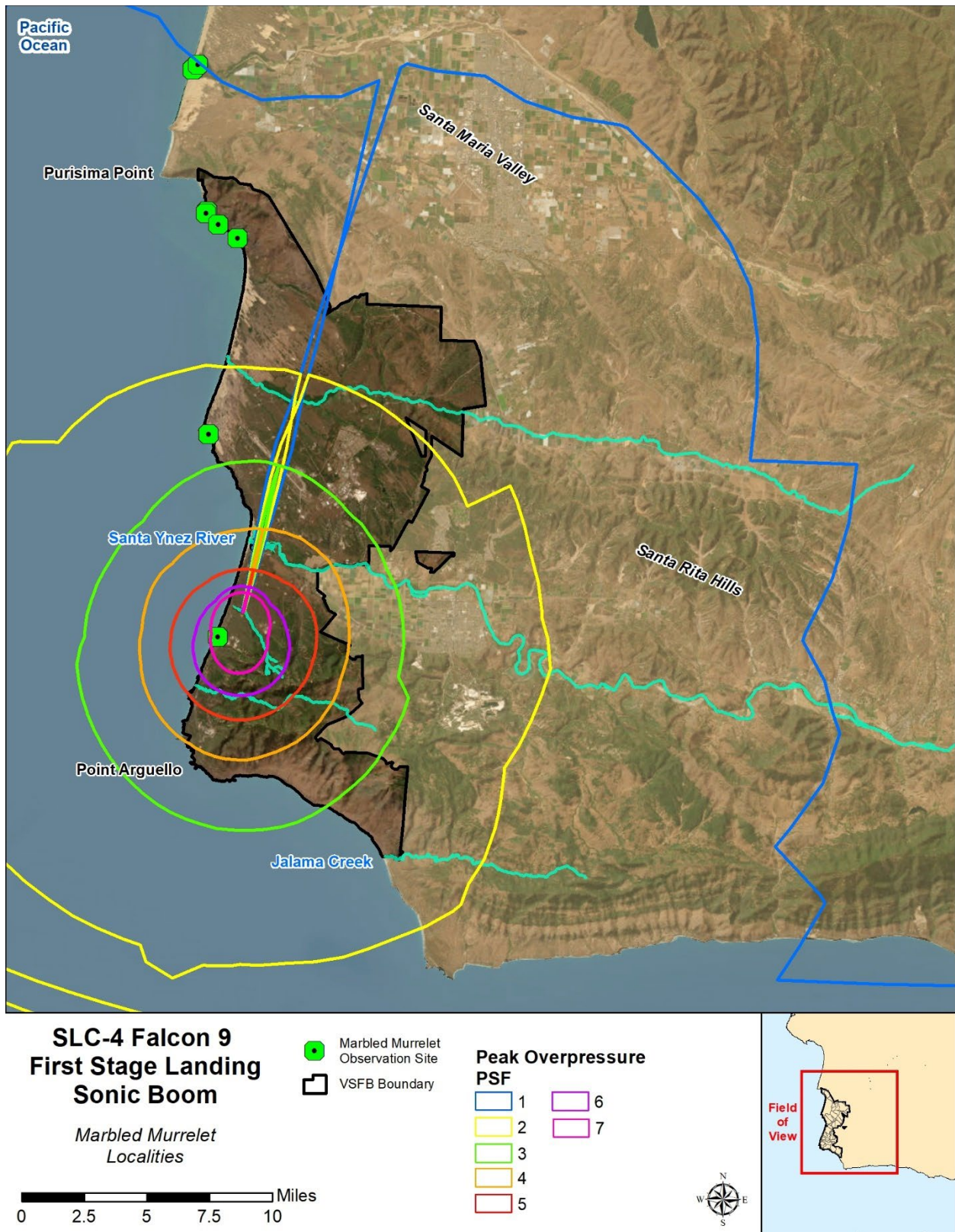


Figure C.0-21. Marbled murrelet localities and example SLC-4 landing sonic boom contours.

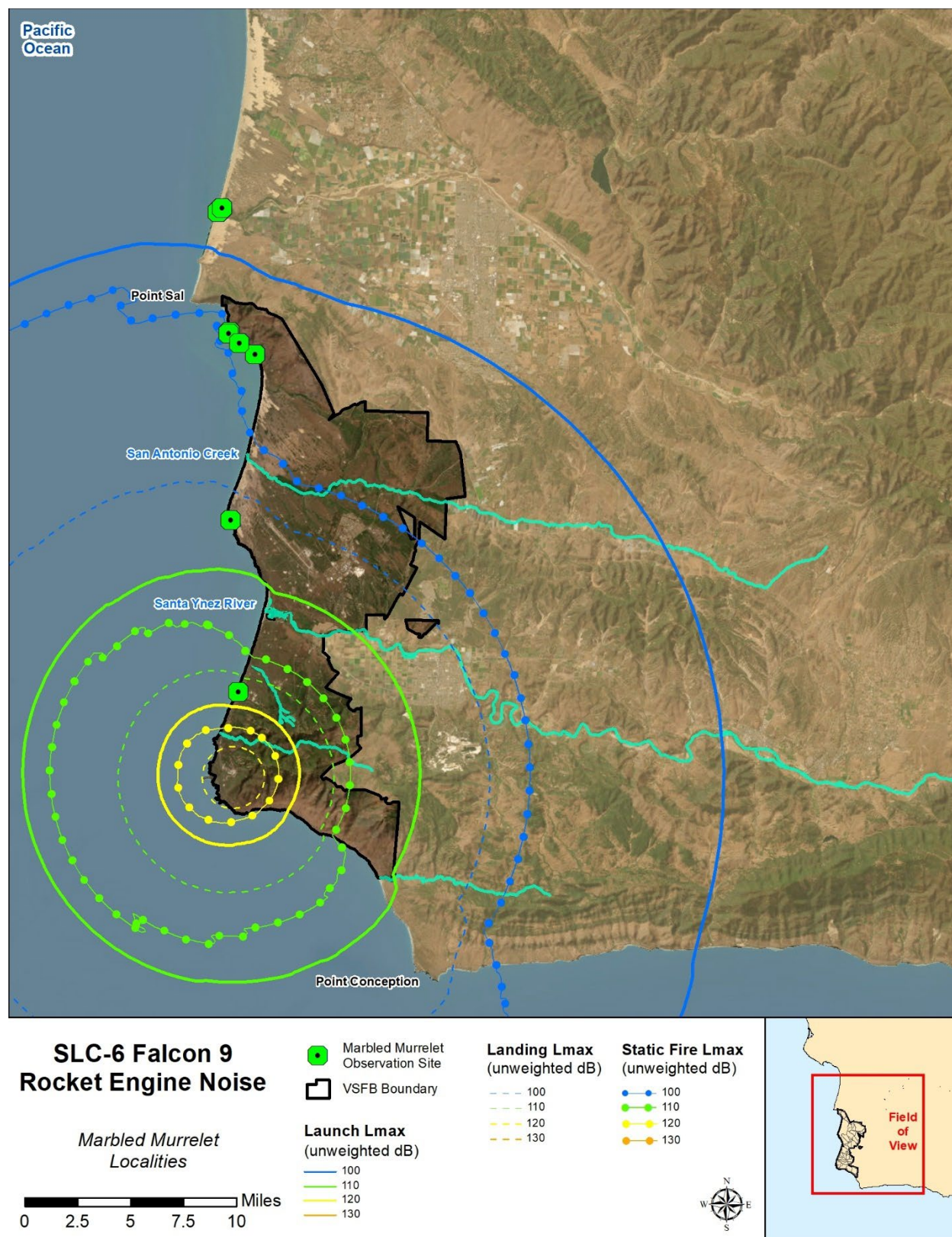


Figure C.0-22. Marbled murrelet localities and Falcon 9 SLC-6 static fire, launch, and landing rocket engine noise model results.

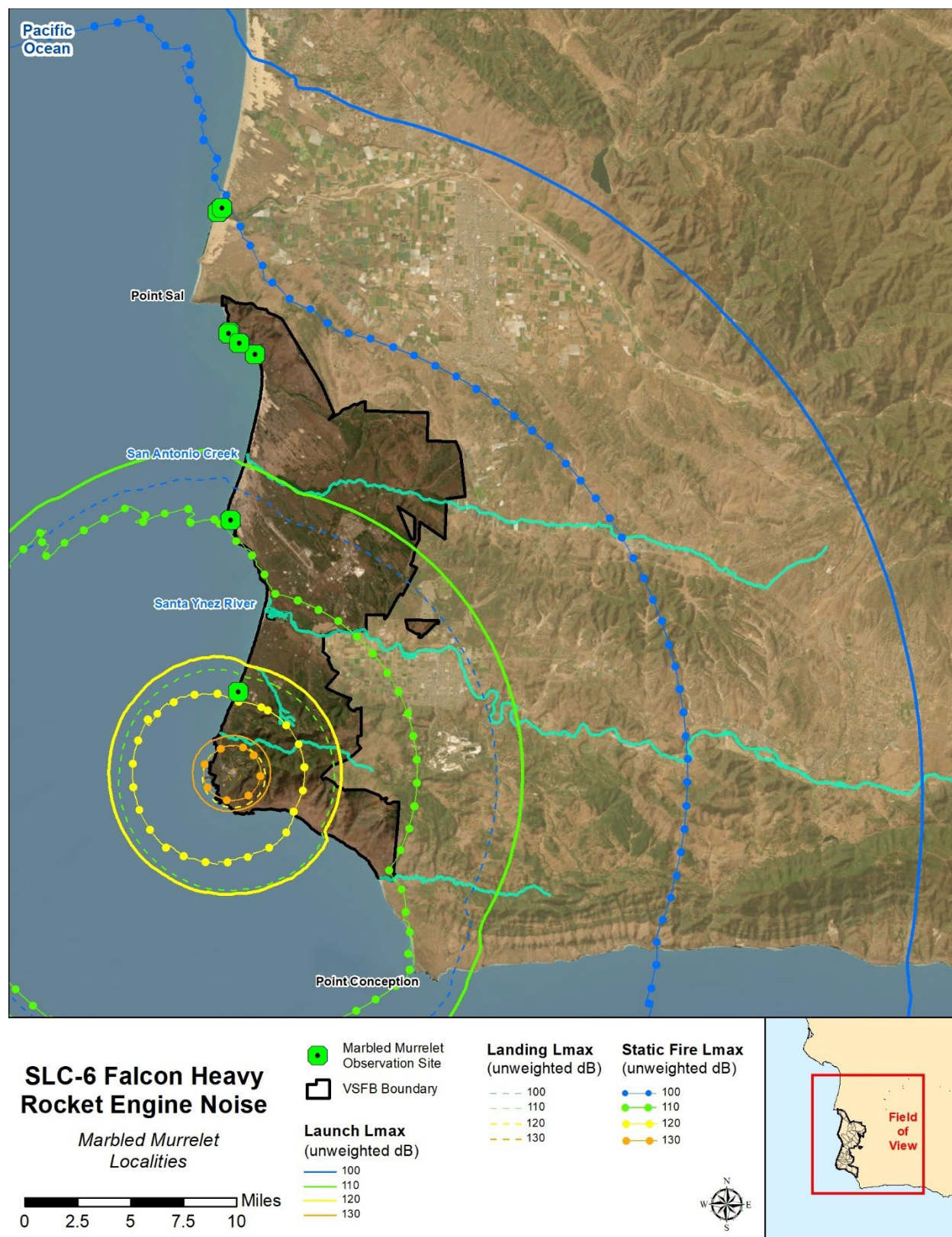


Figure C.0-23. Marbled murrelet localities and Falcon Heavy SLC-6 static fire, launch, and landing rocket engine noise model results.

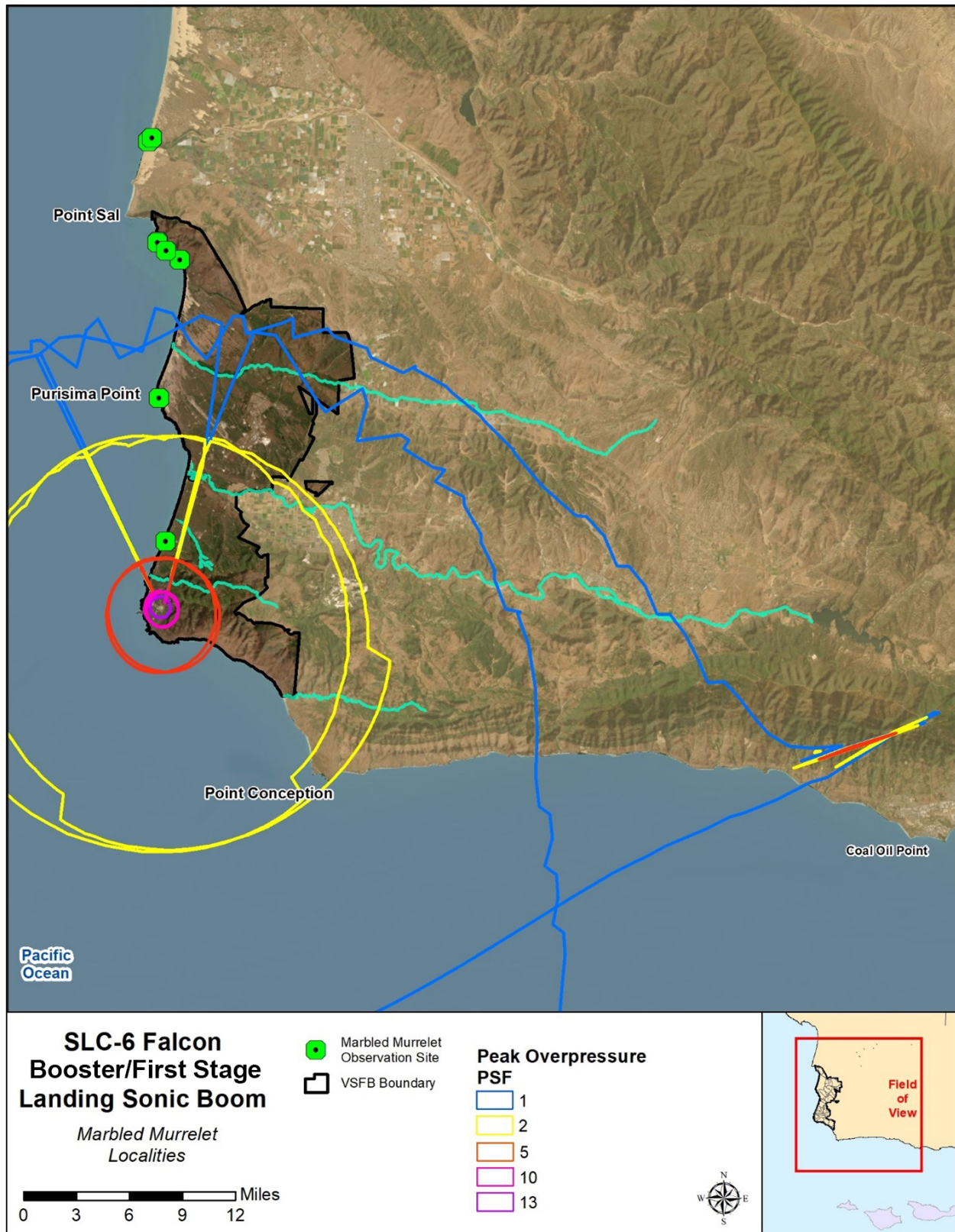


Figure C.0-24. Marbled murrelet localities and SLC-6 landing sonic boom.

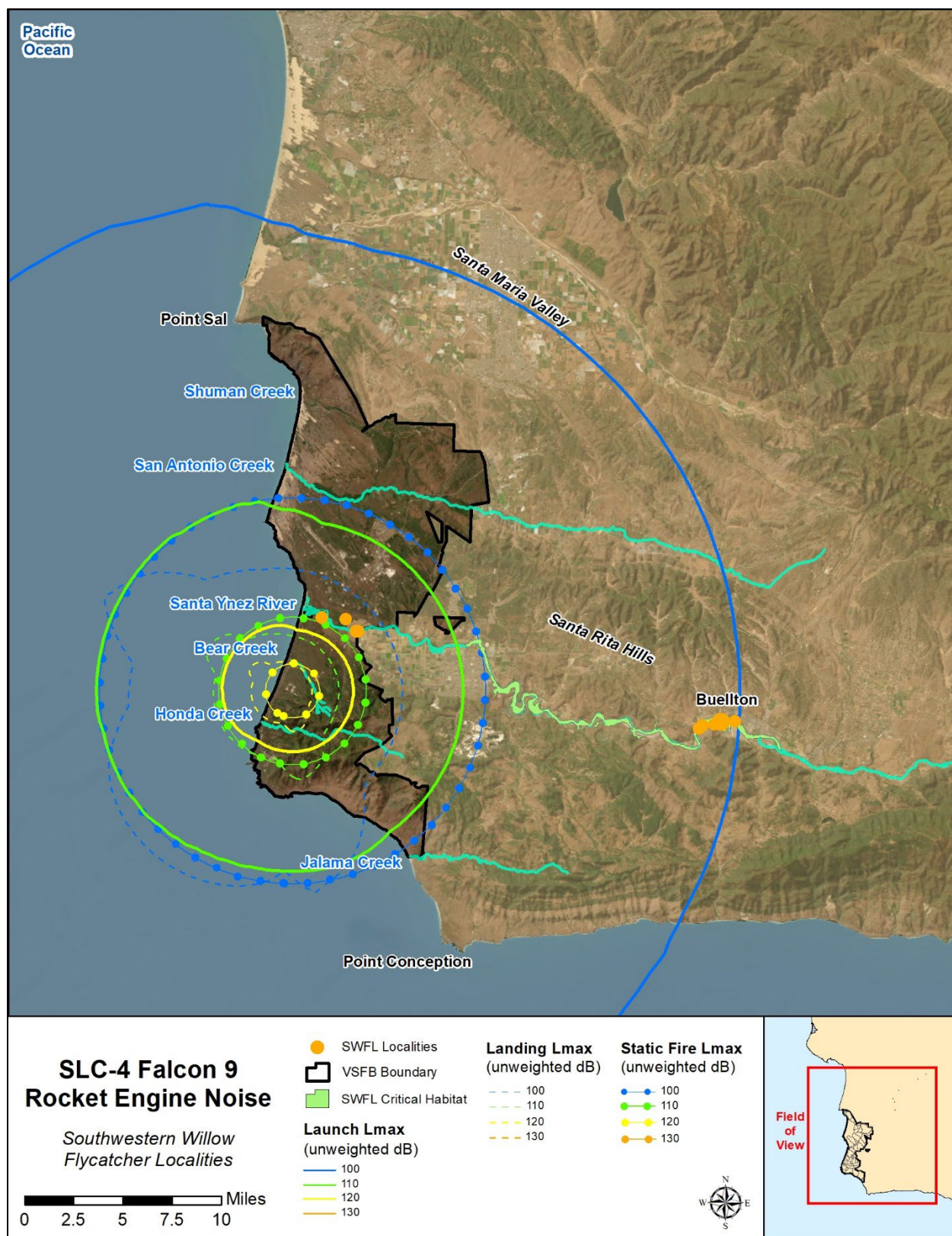


Figure C.0-25. Southwestern willow flycatcher localities and Falcon 9 SLC-4 static fire, launch, and landing rocket engine noise model results.

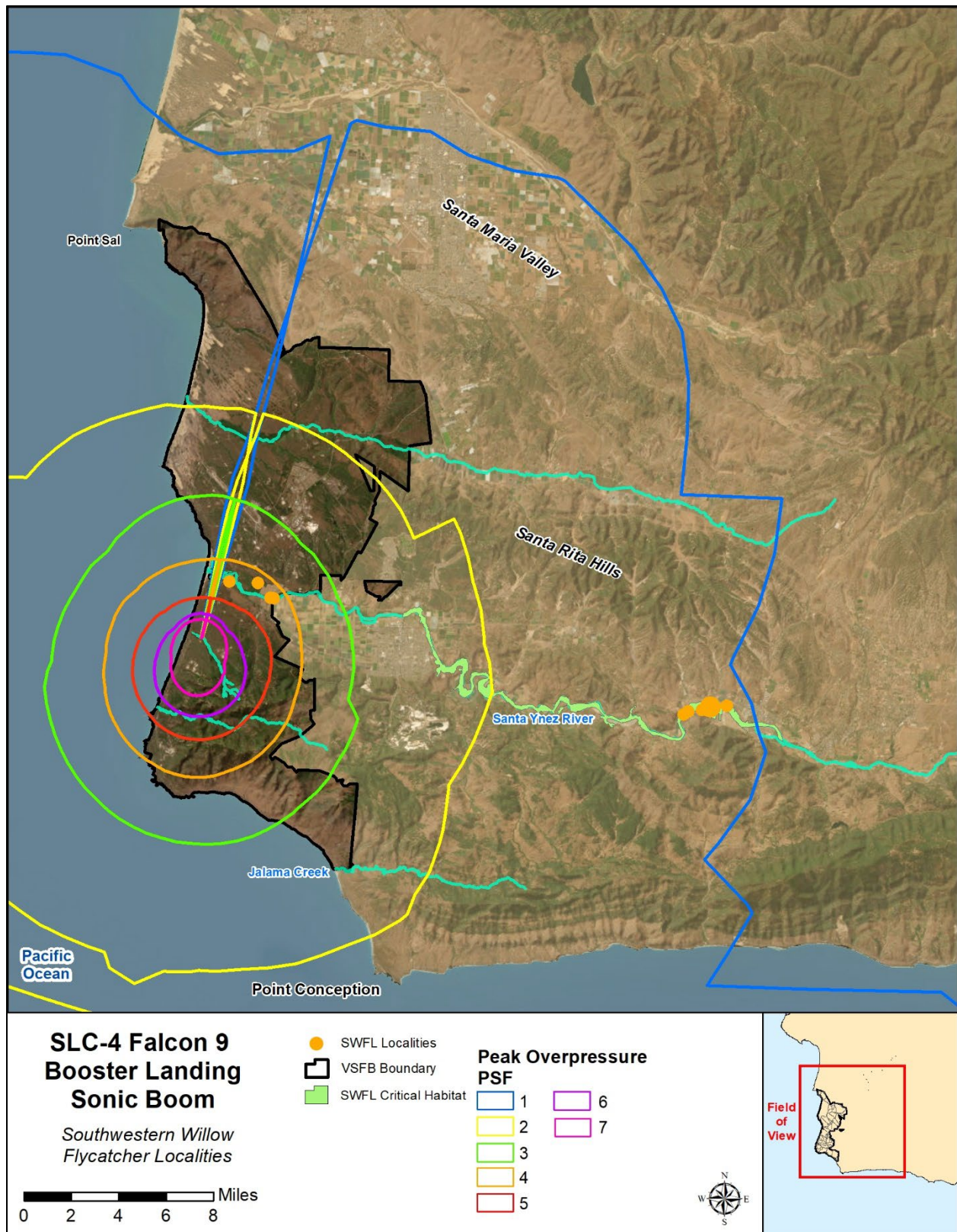


Figure C.0-26. Southwestern willow flycatcher localities and example SLC-4 landing sonic boom contours.

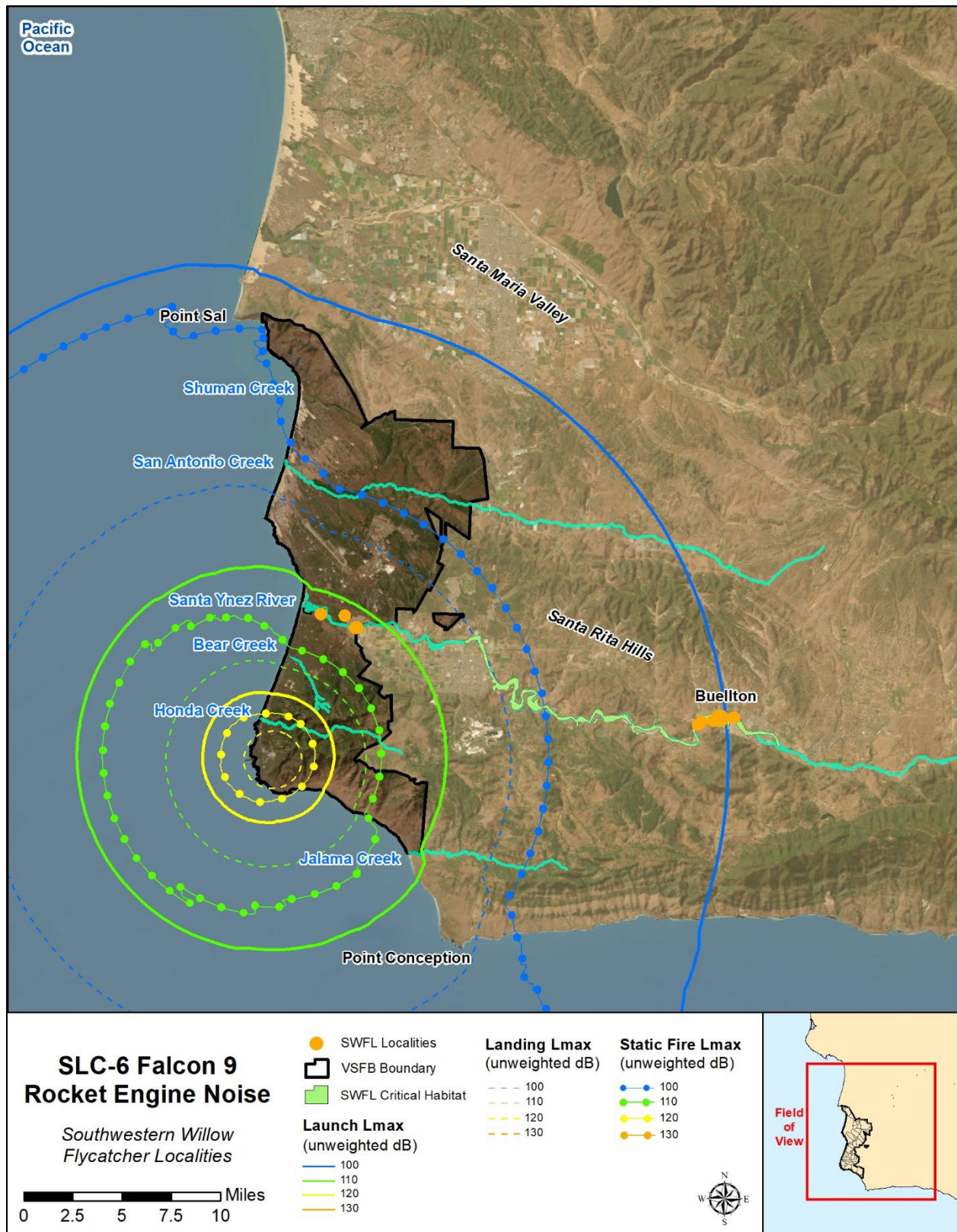


Figure C.0-27. Southwestern willow flycatcher localities Falcon 9 SLC-6 static fire, launch, and landing rocket engine noise model results.

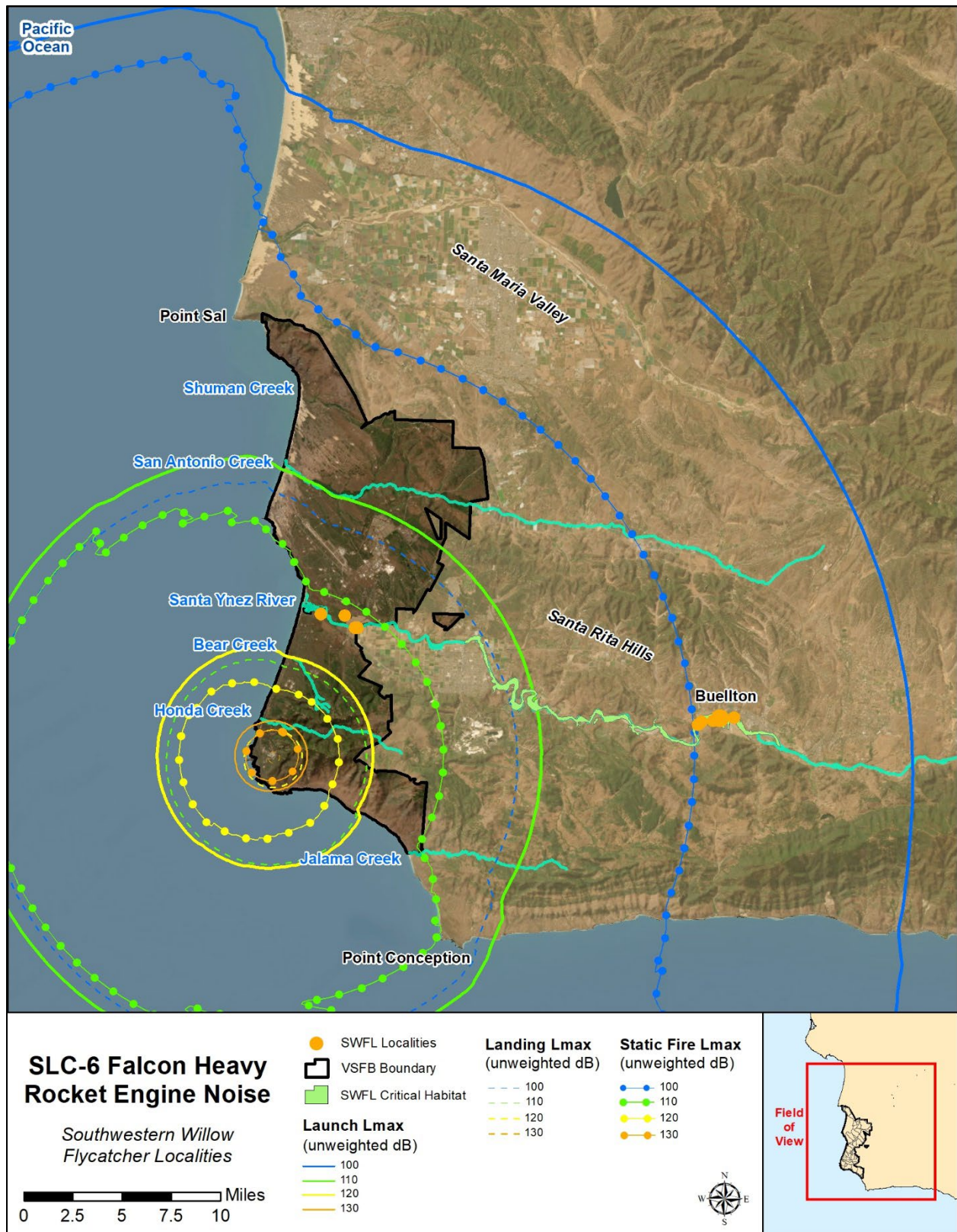


Figure C.0-28. Southwestern willow flycatcher localities and Falcon Heavy SLC-6 static fire, launch, and landing rocket engine noise model results.

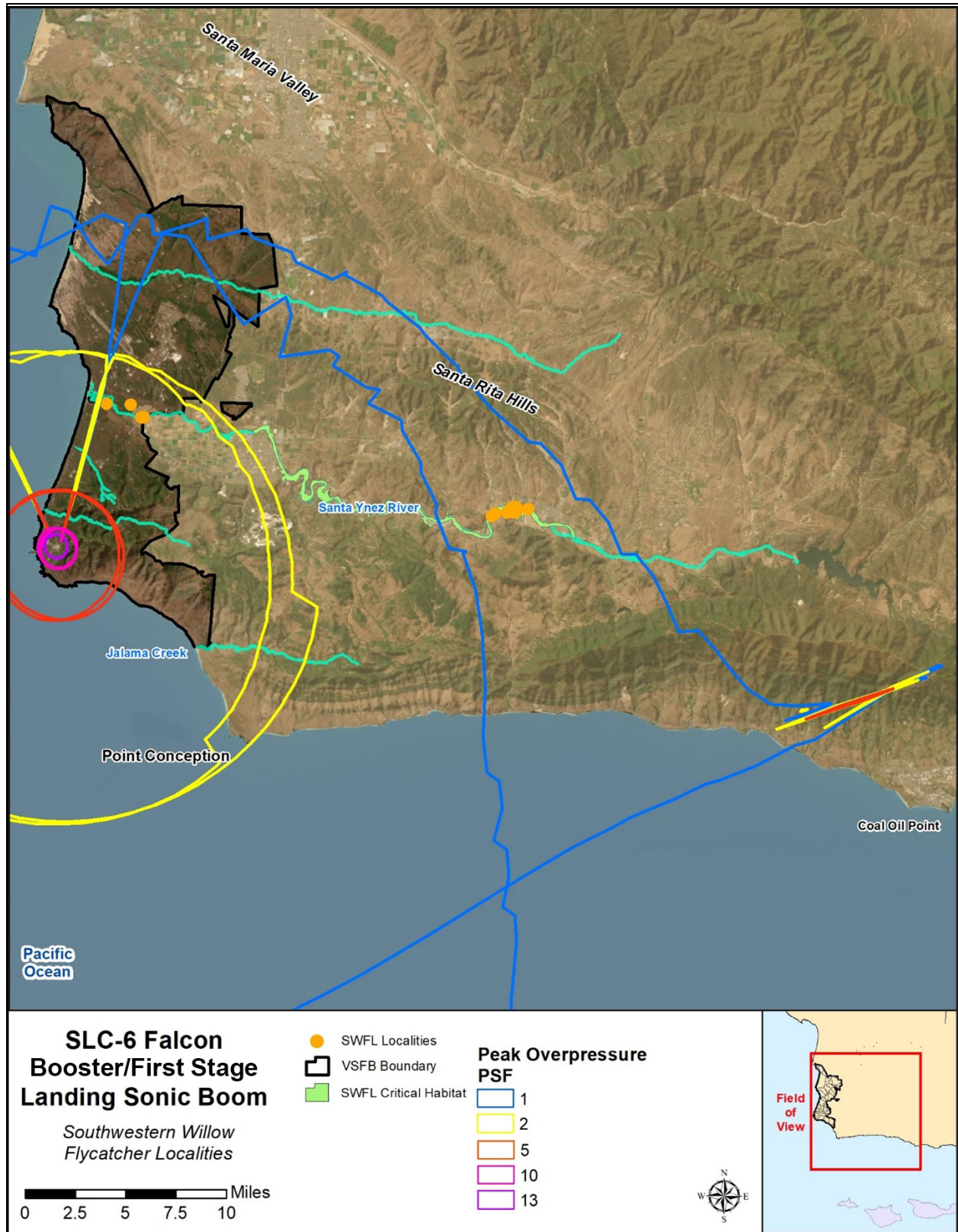


Figure C.0-29. Southwestern willow flycatcher localities and example SLC-6 landing sonic boom contours.

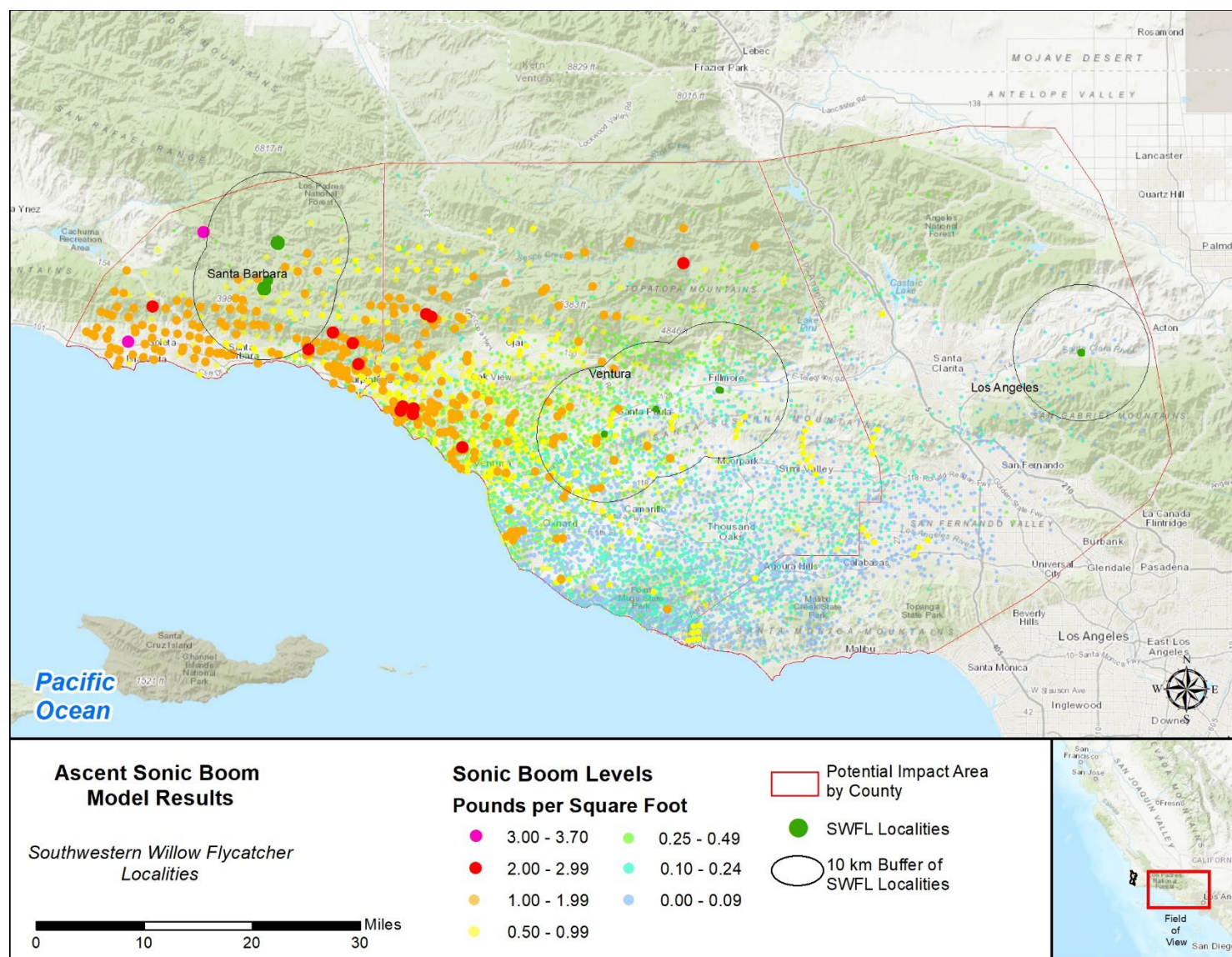


Figure C.0-30. SWFL localities and potential sonic boom impact areas in eastern Santa Barbara, Ventura, and Los Angeles Counties.

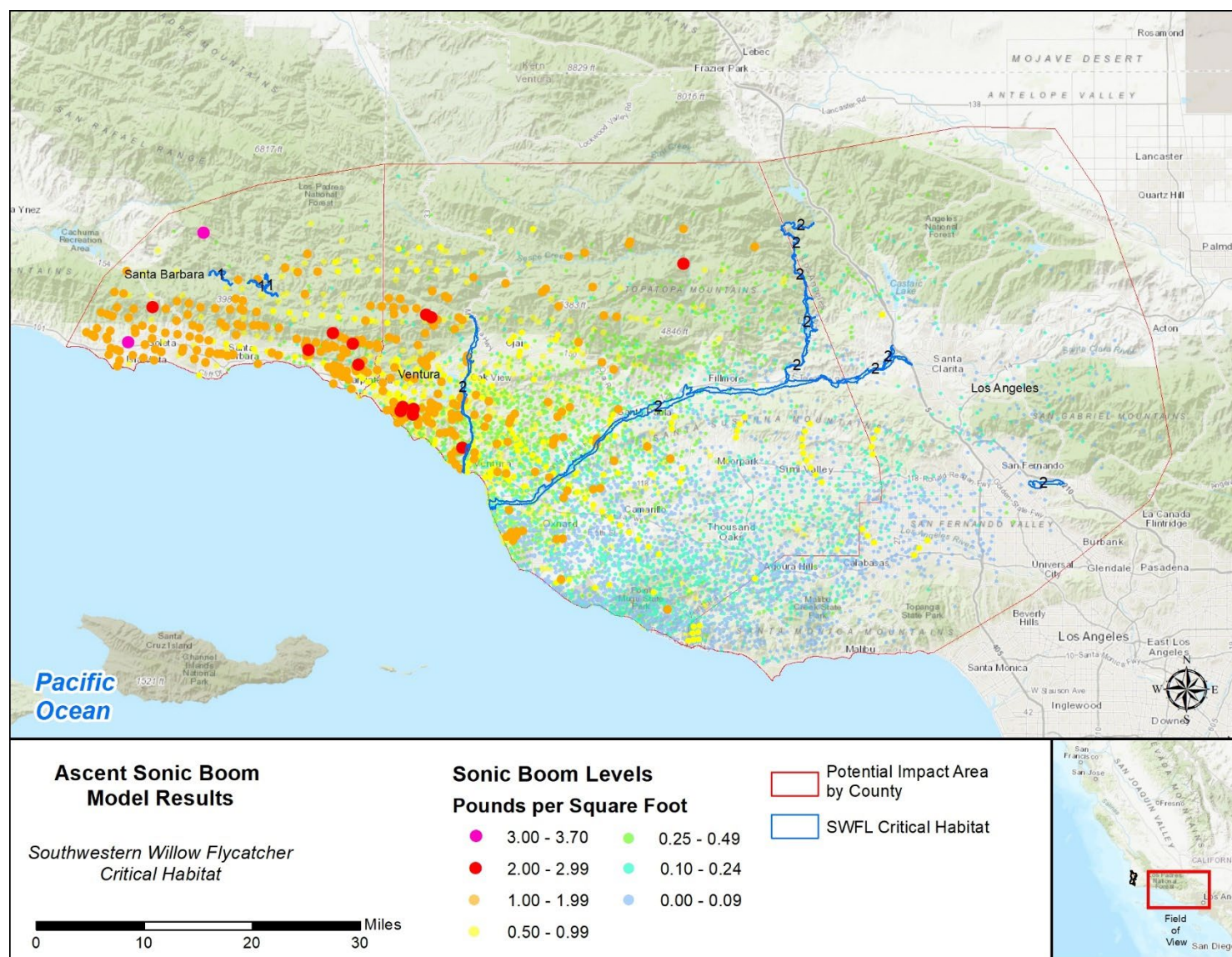


Figure C.0-31. SWFL Critical Habitat and potential sonic boom impact areas in eastern Santa Barbara, Ventura, and Los Angeles Counties.

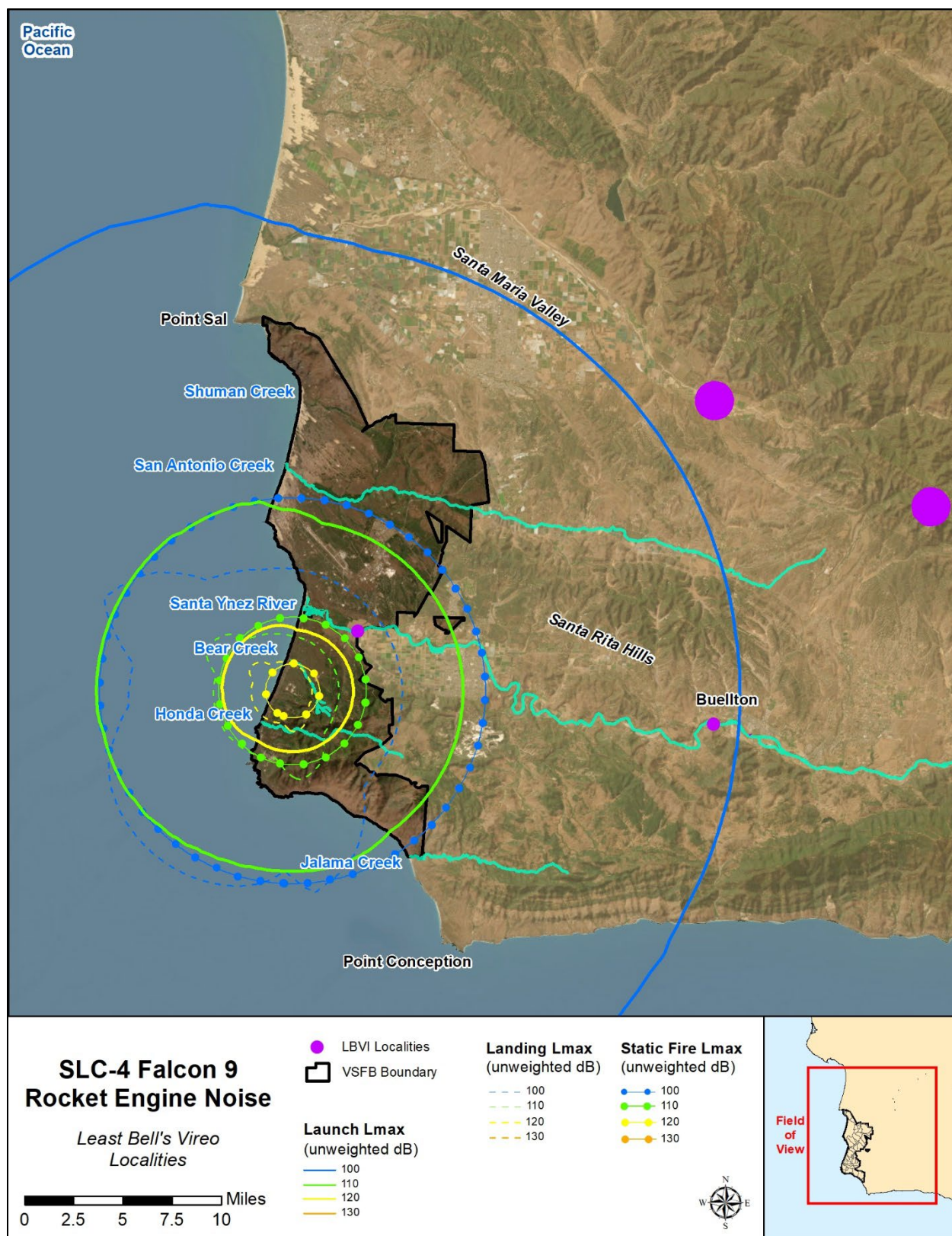


Figure C.0-32. Least Bell's vireo localities and Falcon 9 SLC-4 static fire, launch, and landing rocket engine noise model results.

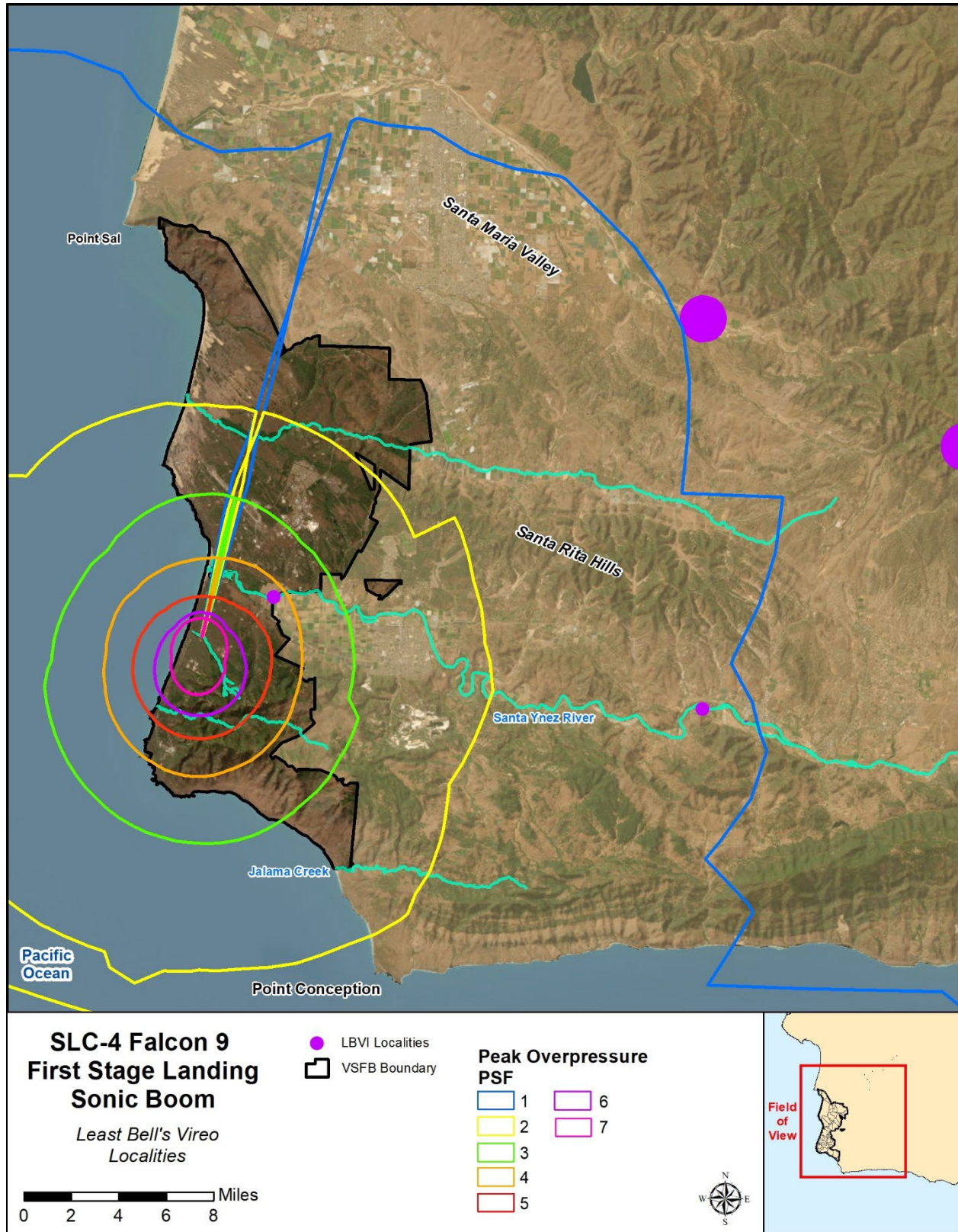


Figure C.0-33. Least Bell's vireo localities and example SLC-4 landing sonic boom contours.

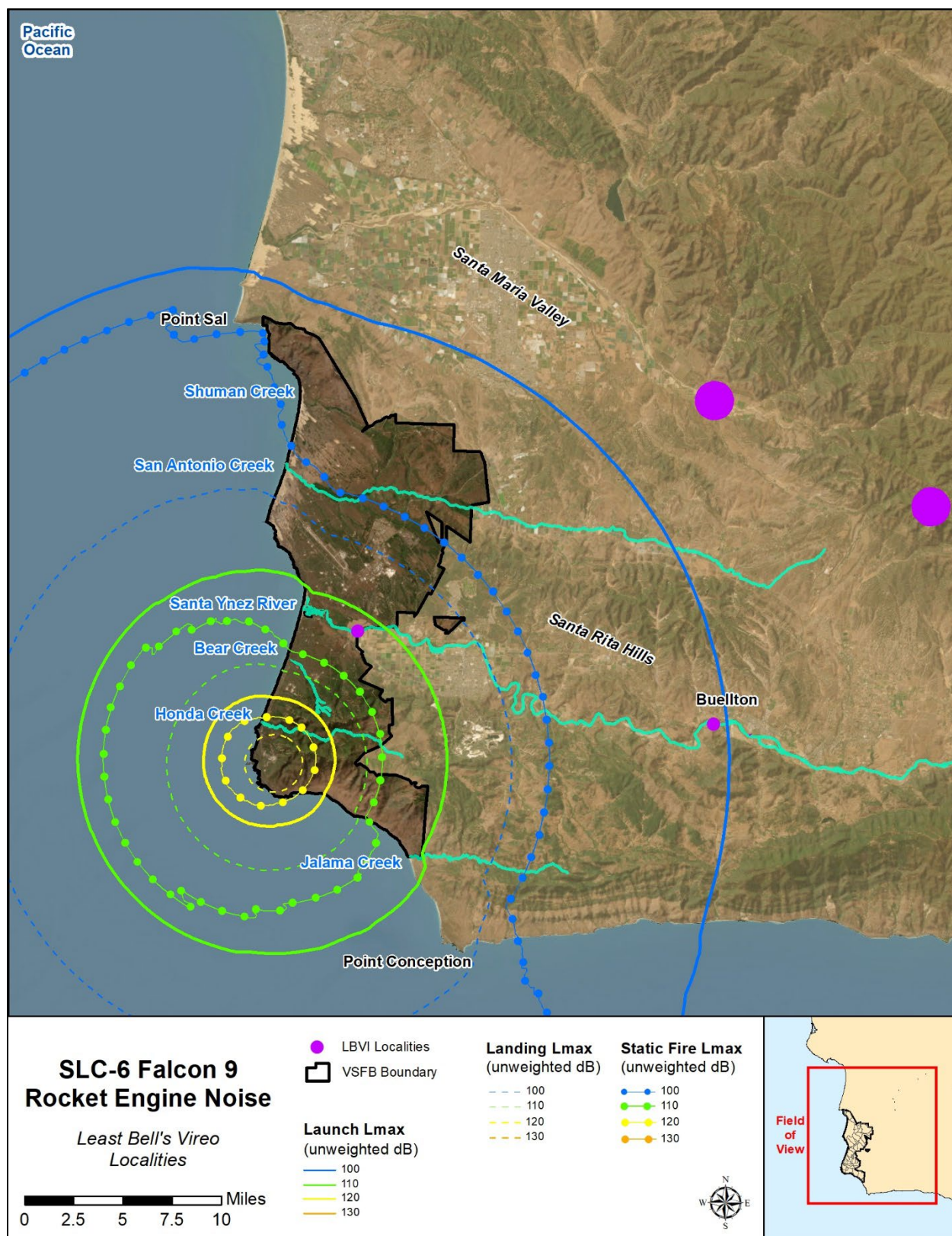


Figure C.0-34. Least Bell's vireo localities Falcon 9 SLC-6 static fire, launch, and landing rocket engine noise model results.

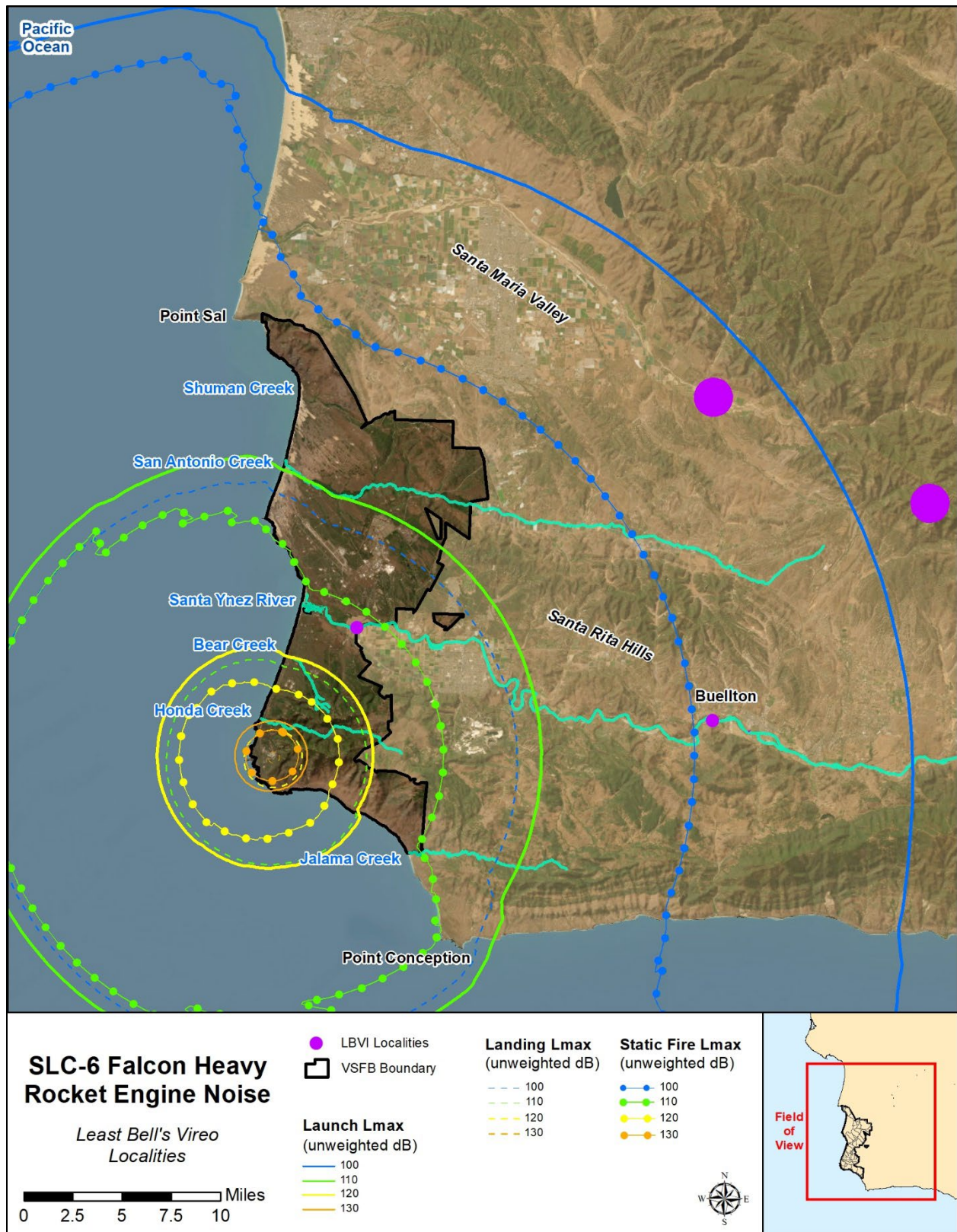


Figure C.0-35. Least Bell's vireo localities and Falcon Heavy SLC-6 static fire, launch, and landing rocket engine noise model results.

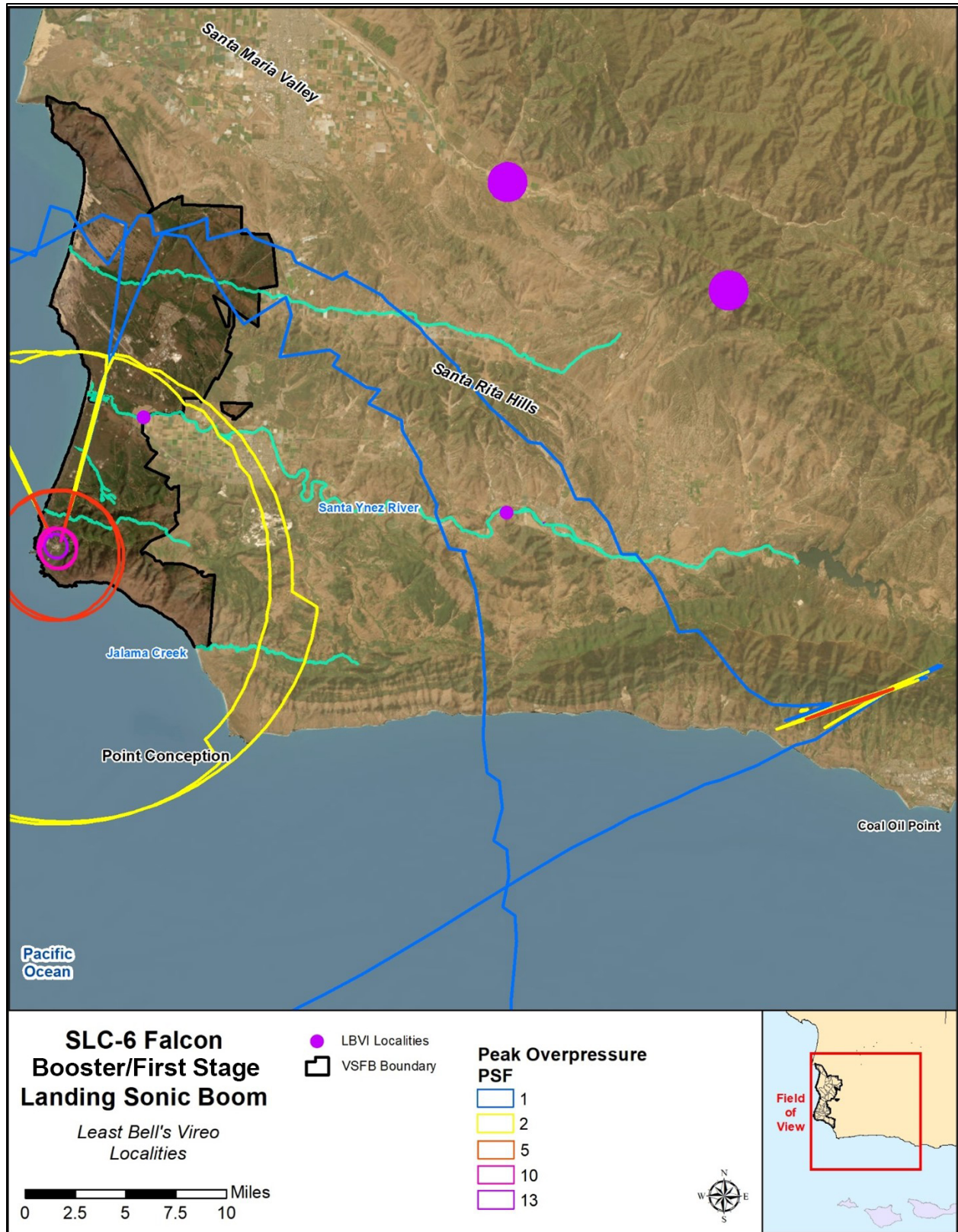


Figure C.0-36. Least Bell's vireo localities and example SLC-6 landing sonic boom contours.

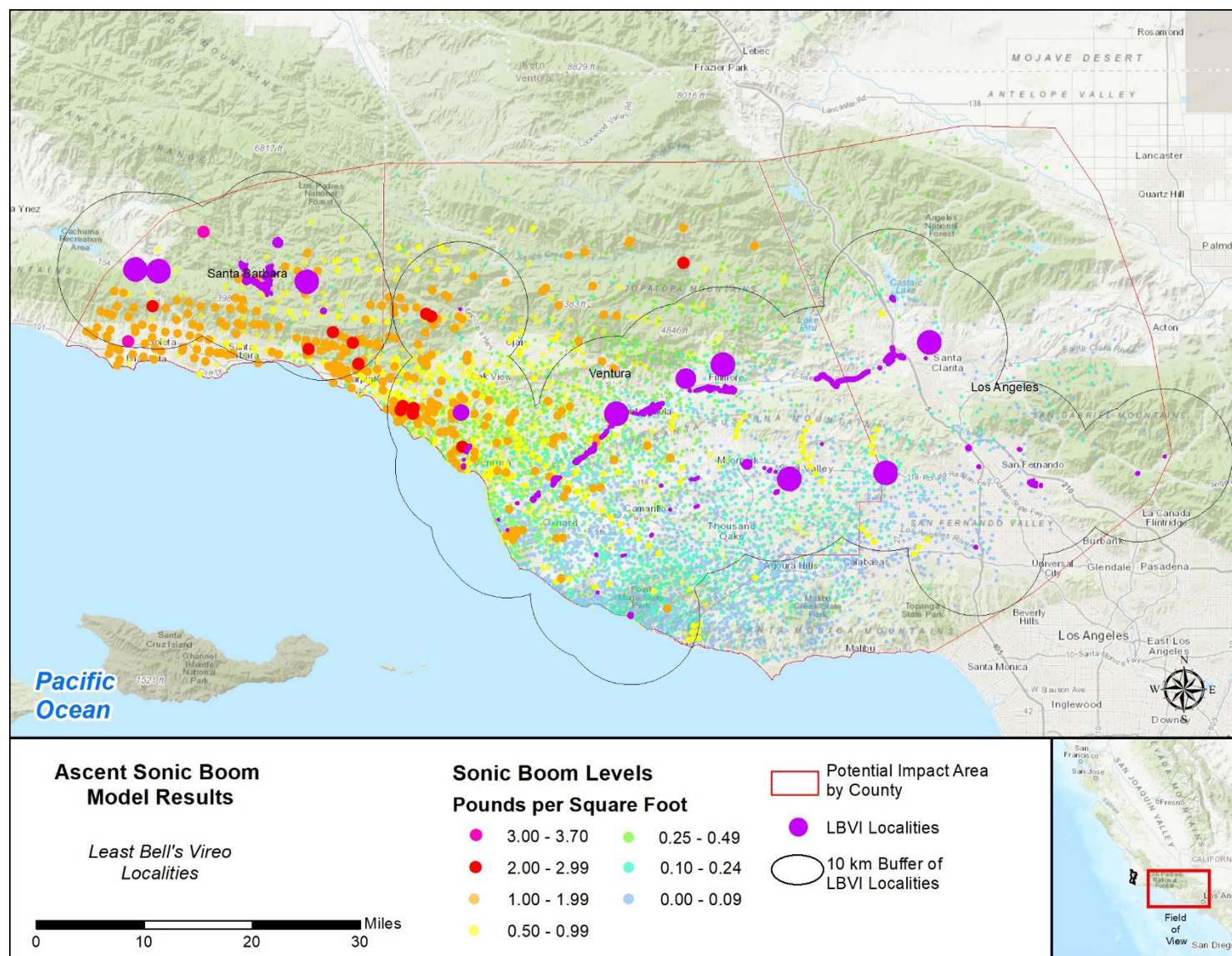


Figure C.0-37. LBVI localities and potential sonic boom impact areas in eastern Santa Barbara, Ventura, and Los Angeles Counties.

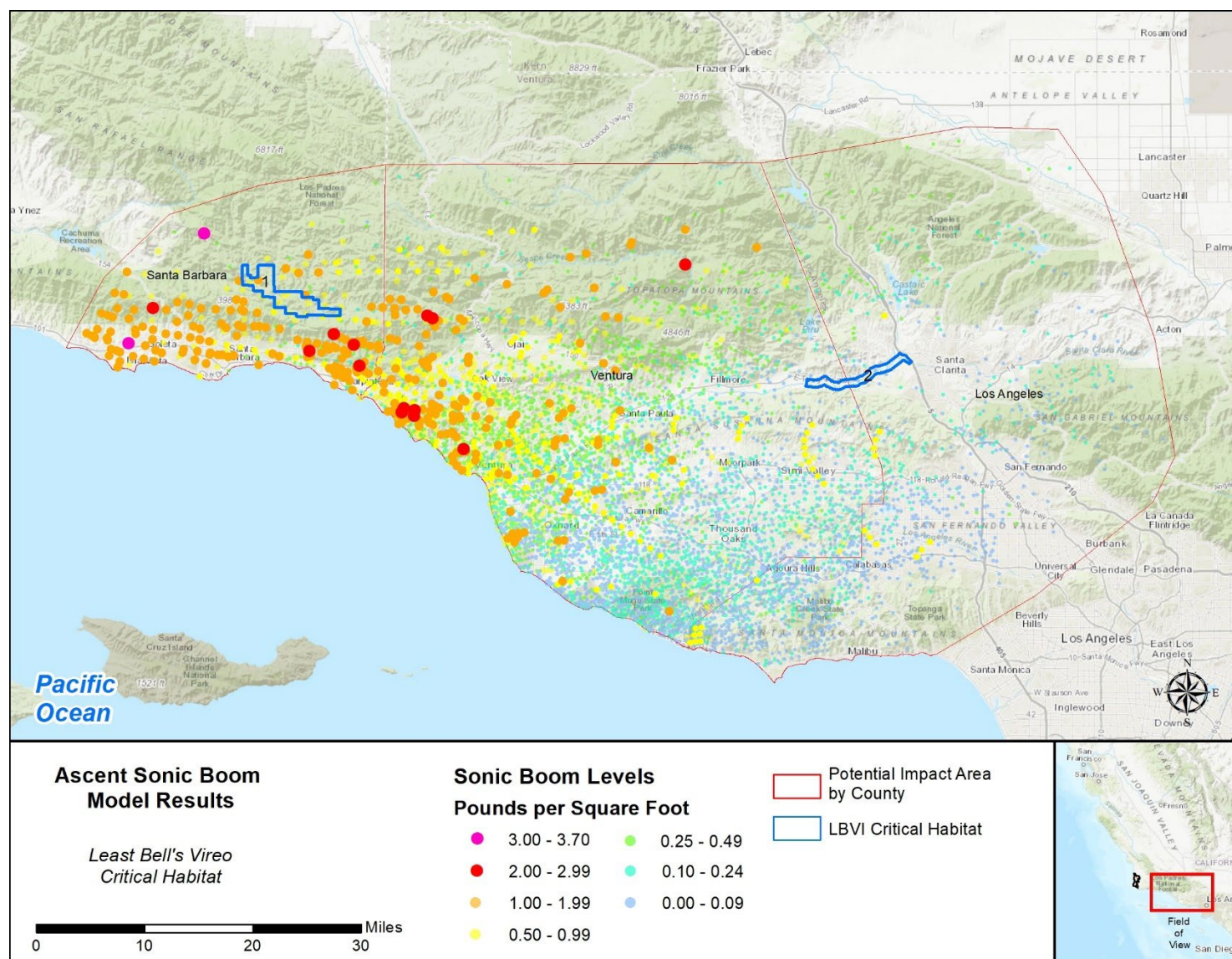


Figure C.0-38. LBVI Critical Habitat and potential sonic boom impact areas in eastern Santa Barbara, Ventura, and Los Angeles Counties.

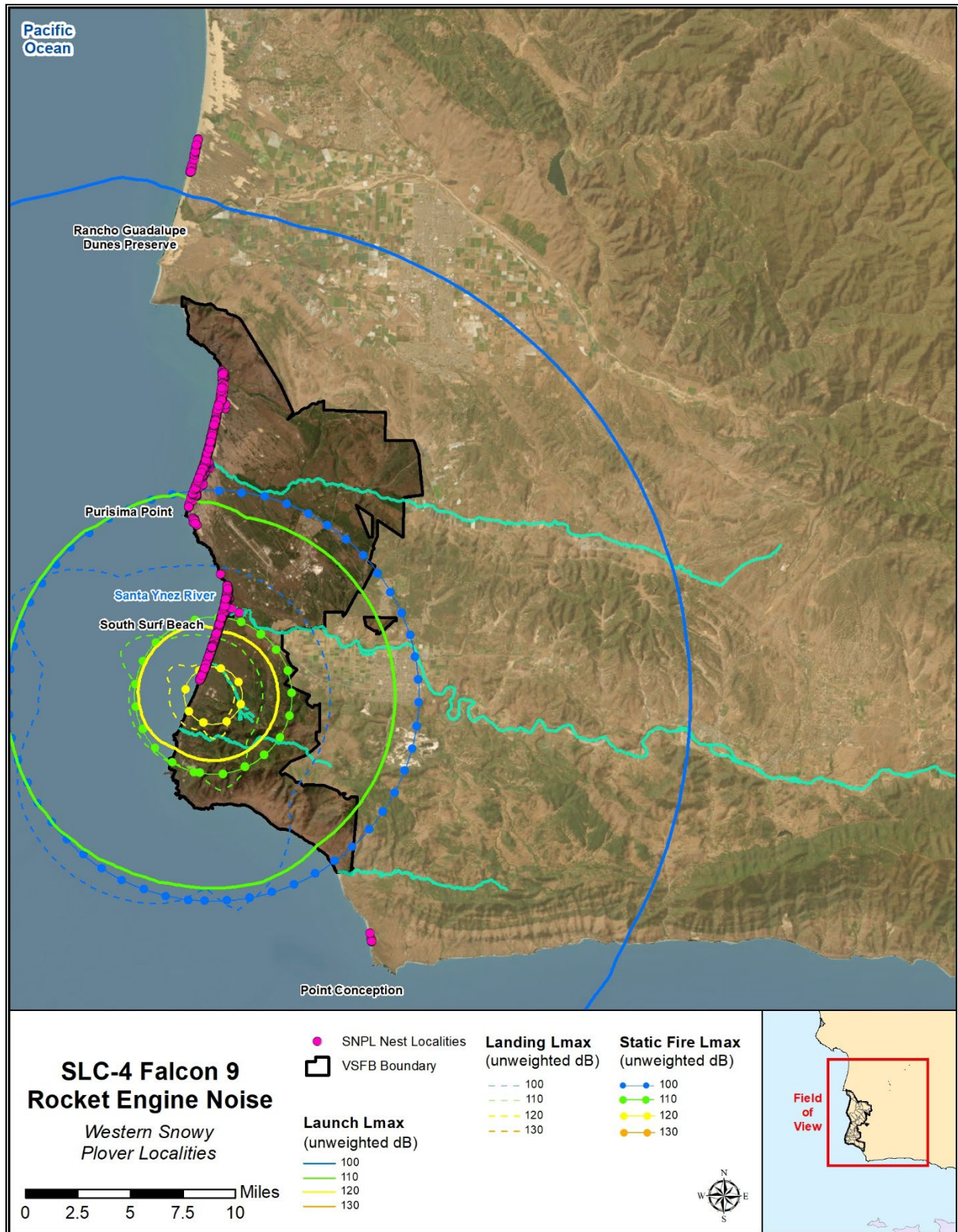


Figure C.0-39. Western snowy plover nesting localities and Falcon 9 SLC-4 static fire, launch, and landing rocket engine noise model results.

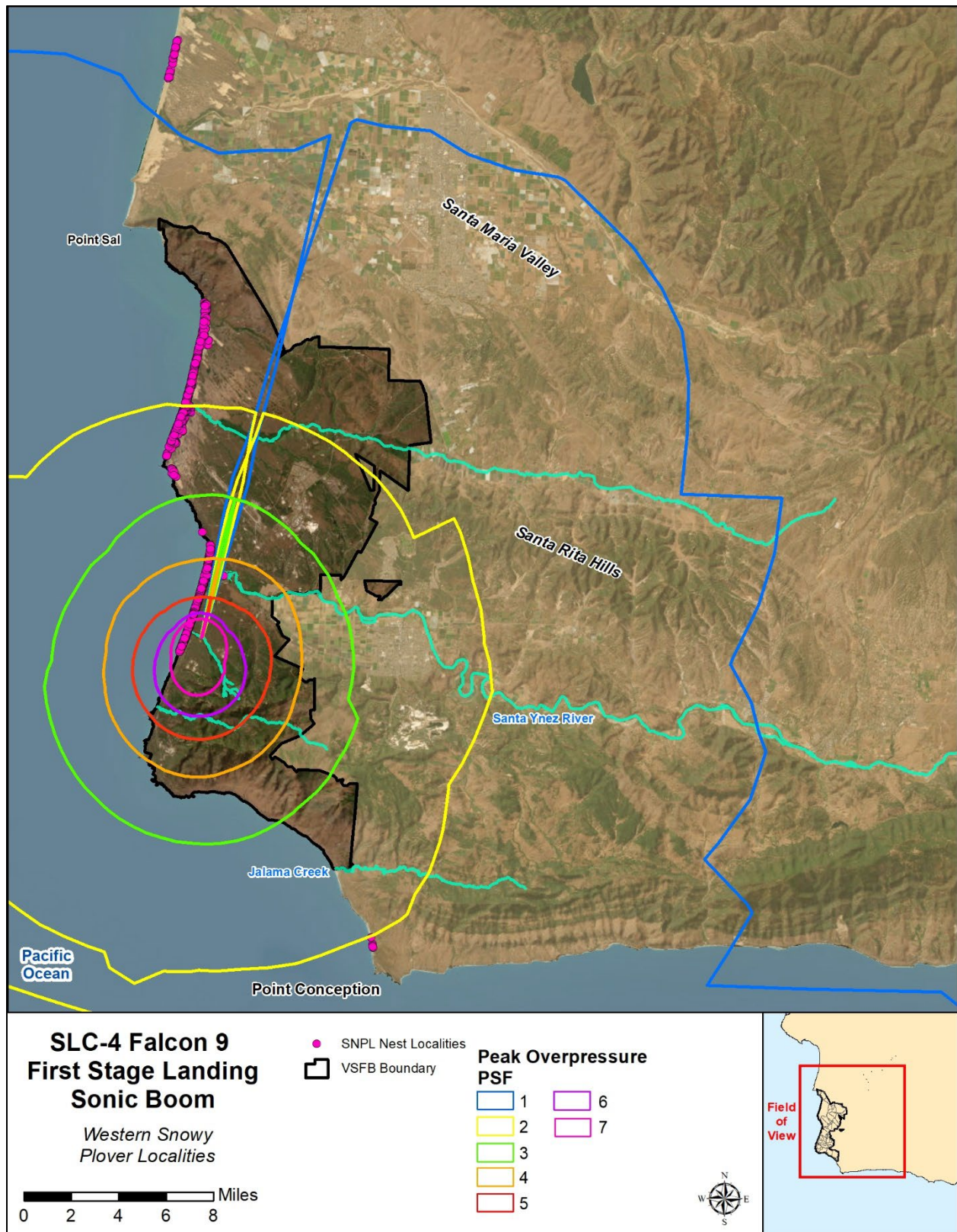


Figure C.0-40. Western snowy plover nesting records and example SLC-4 landing sonic boom contours.

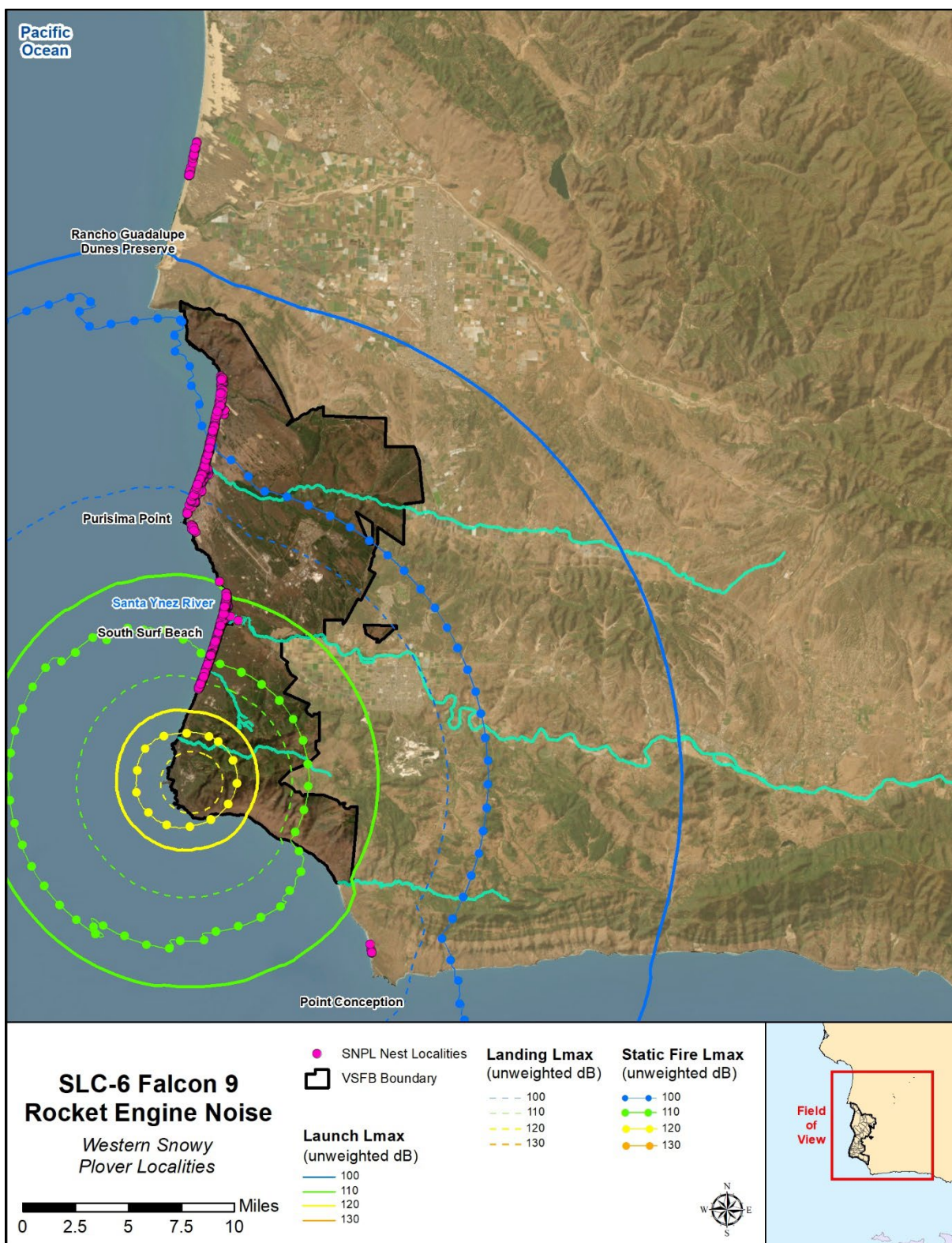


Figure C.0-41. Western snowy plover nesting localities and Falcon 9 SLC-6 static fire, launch, and landing rocket engine noise model results.

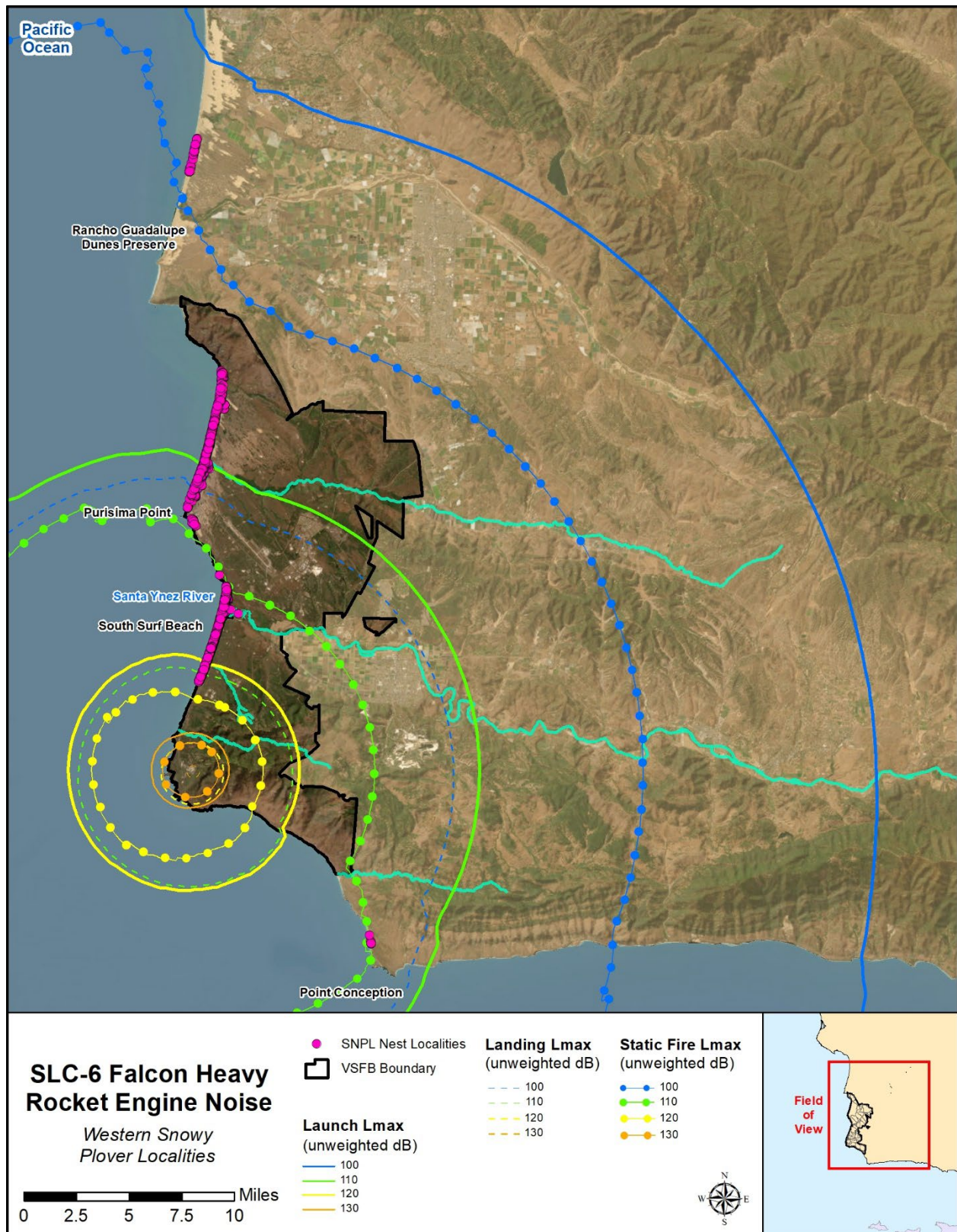


Figure C.0-42. Western snowy plover nesting localities and Falcon Heavy SLC-6 static fire, launch, and landing rocket engine noise model results.

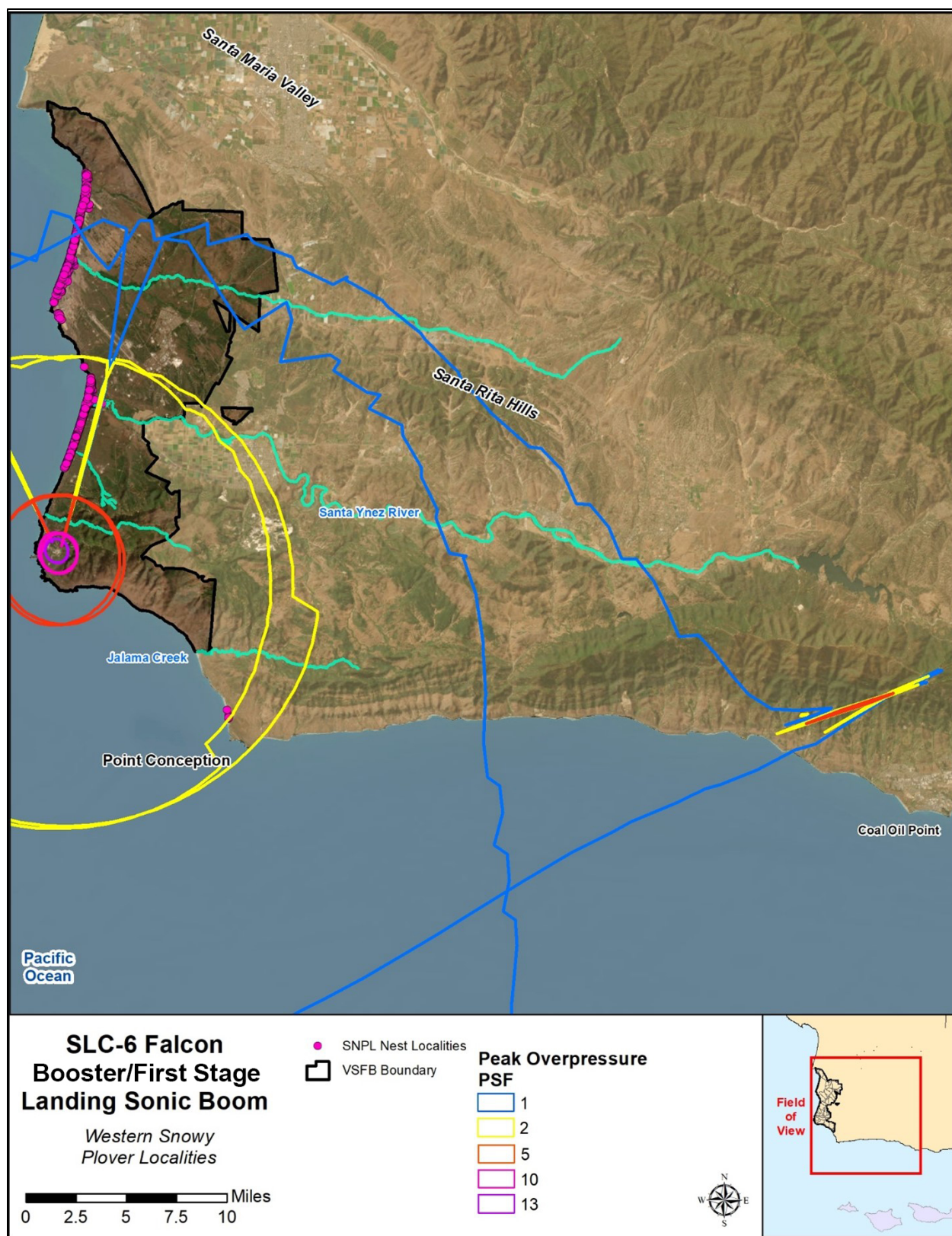


Figure C.0-43. Western snowy plover nesting records and two sample sonic boom model results for SLC 6 landing events.



Figure C.0-44. Critical Habitat for the western snowy plover and example SLC-4 Falcon 9 launch sonic boom model results.

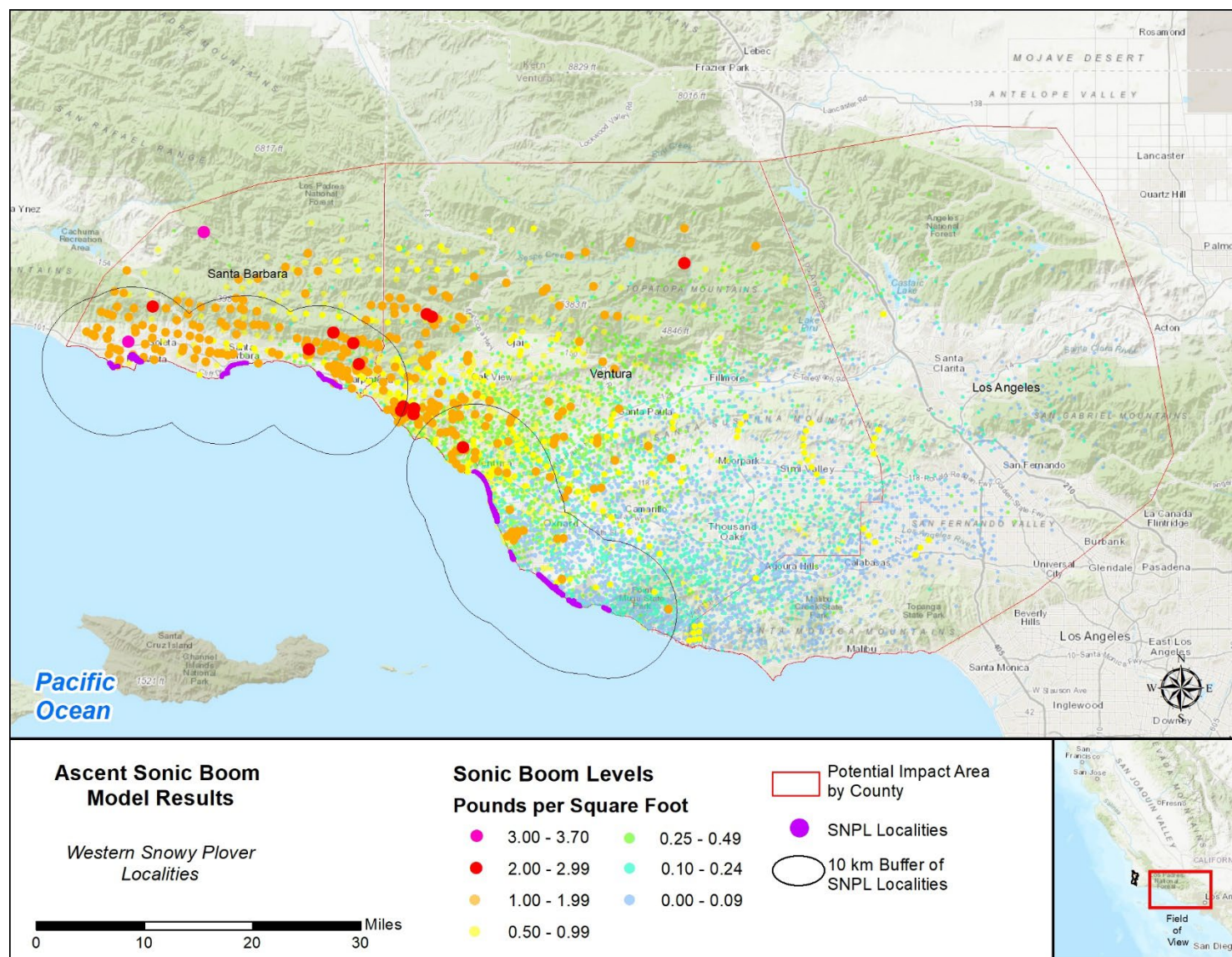


Figure C.0-45. SNPL localities and potential sonic boom impact areas in eastern Santa Barbara, Ventura, and Los Angeles Counties.

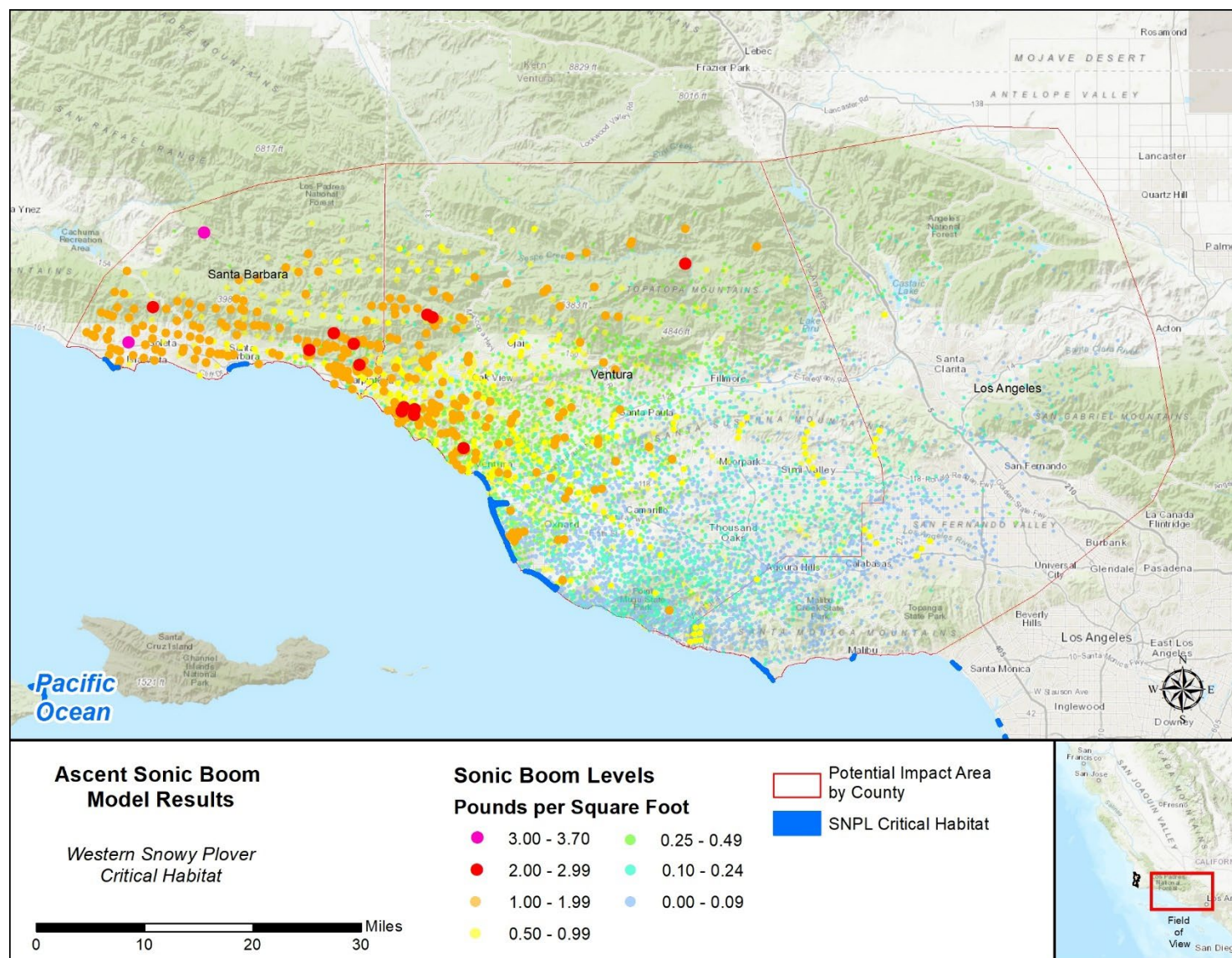


Figure C.0-46. SNPL Critical Habitat and potential sonic boom impact areas in eastern Santa Barbara, Ventura, and Los Angeles Counties.

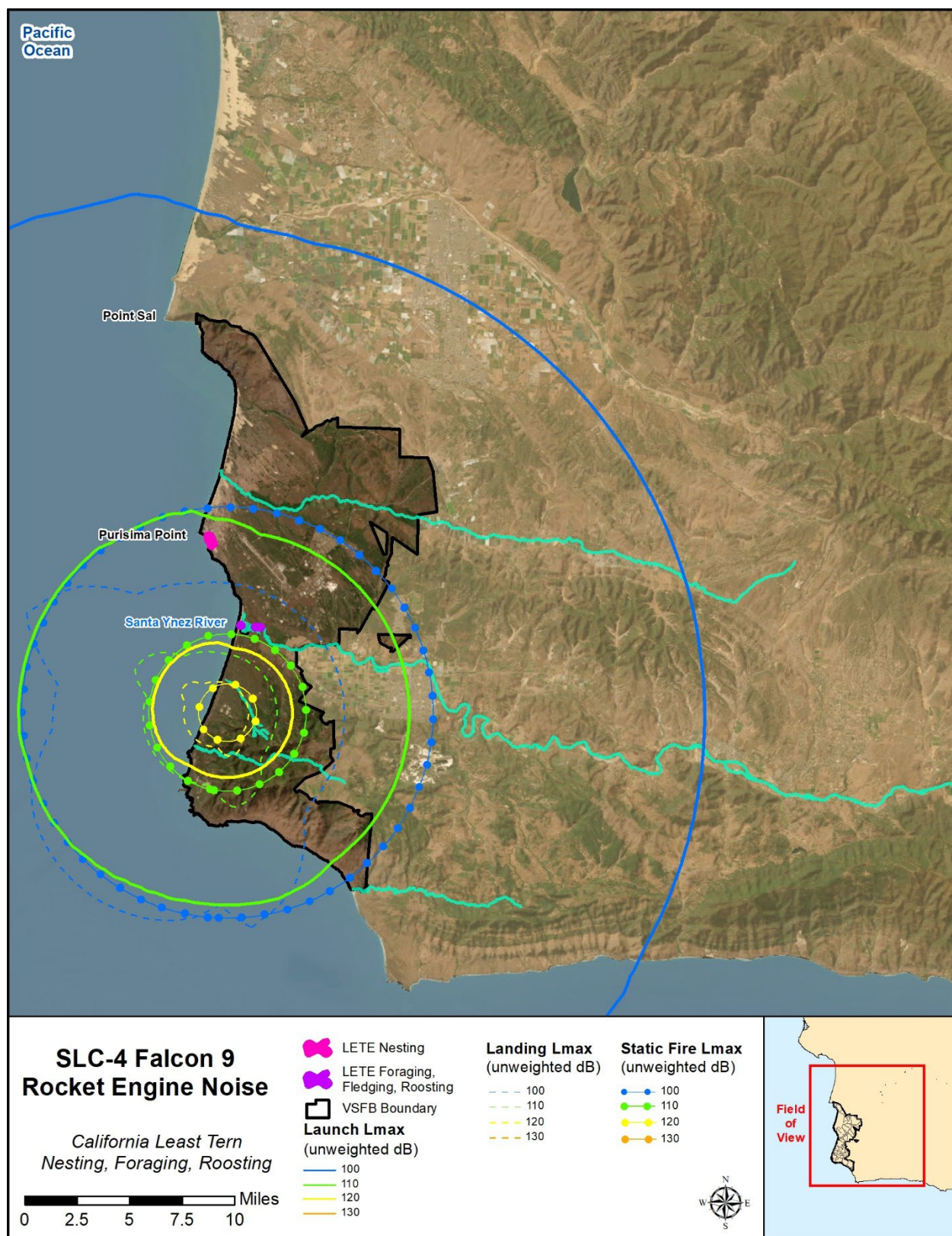


Figure C.0-47. California least tern foraging, roosting, and nesting areas and Falcon 9 SLC-4 static fire, launch, and landing rocket engine noise model results.

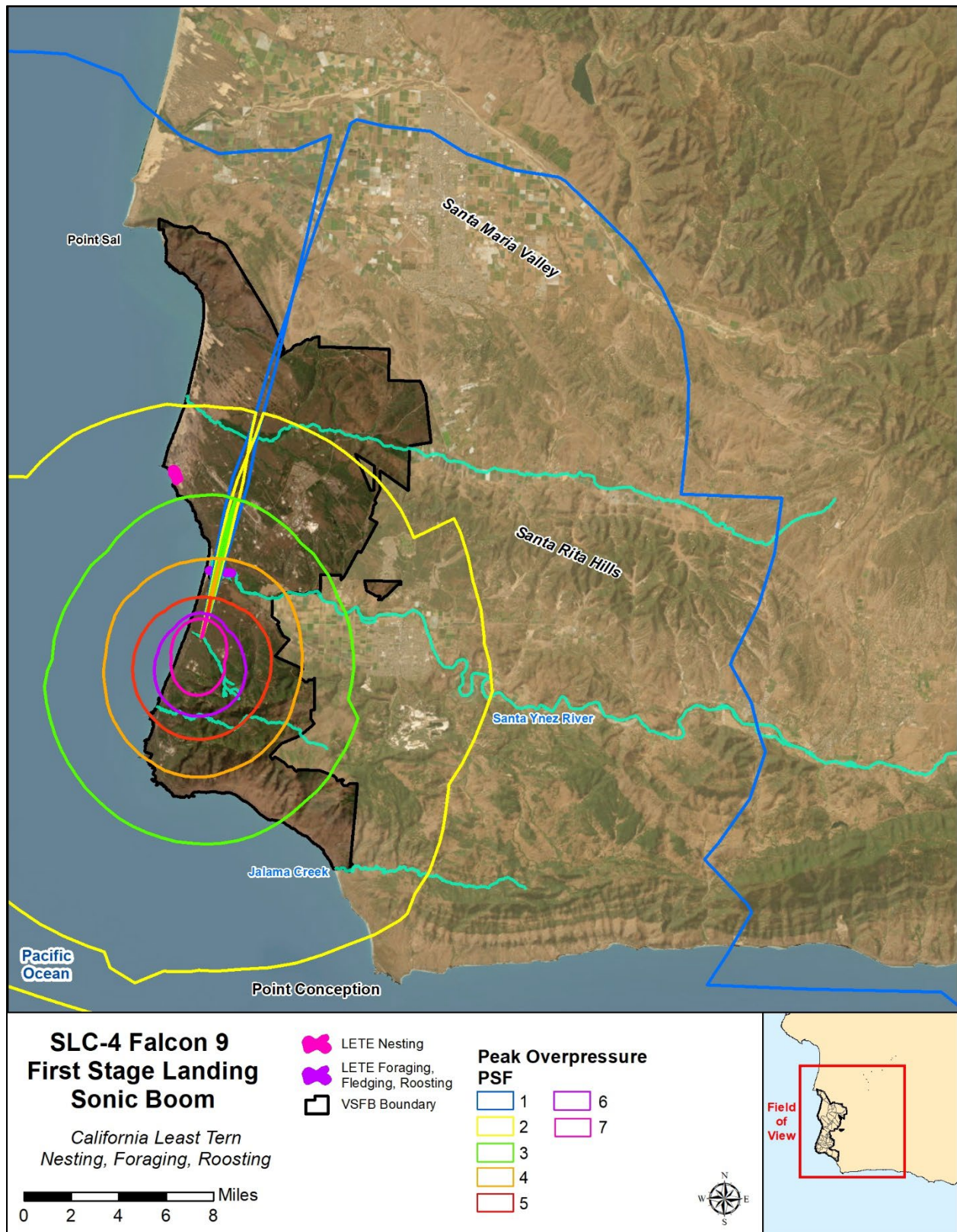


Figure C.0-48. California least tern foraging, roosting, and example SLC-4 landing sonic boom contours.

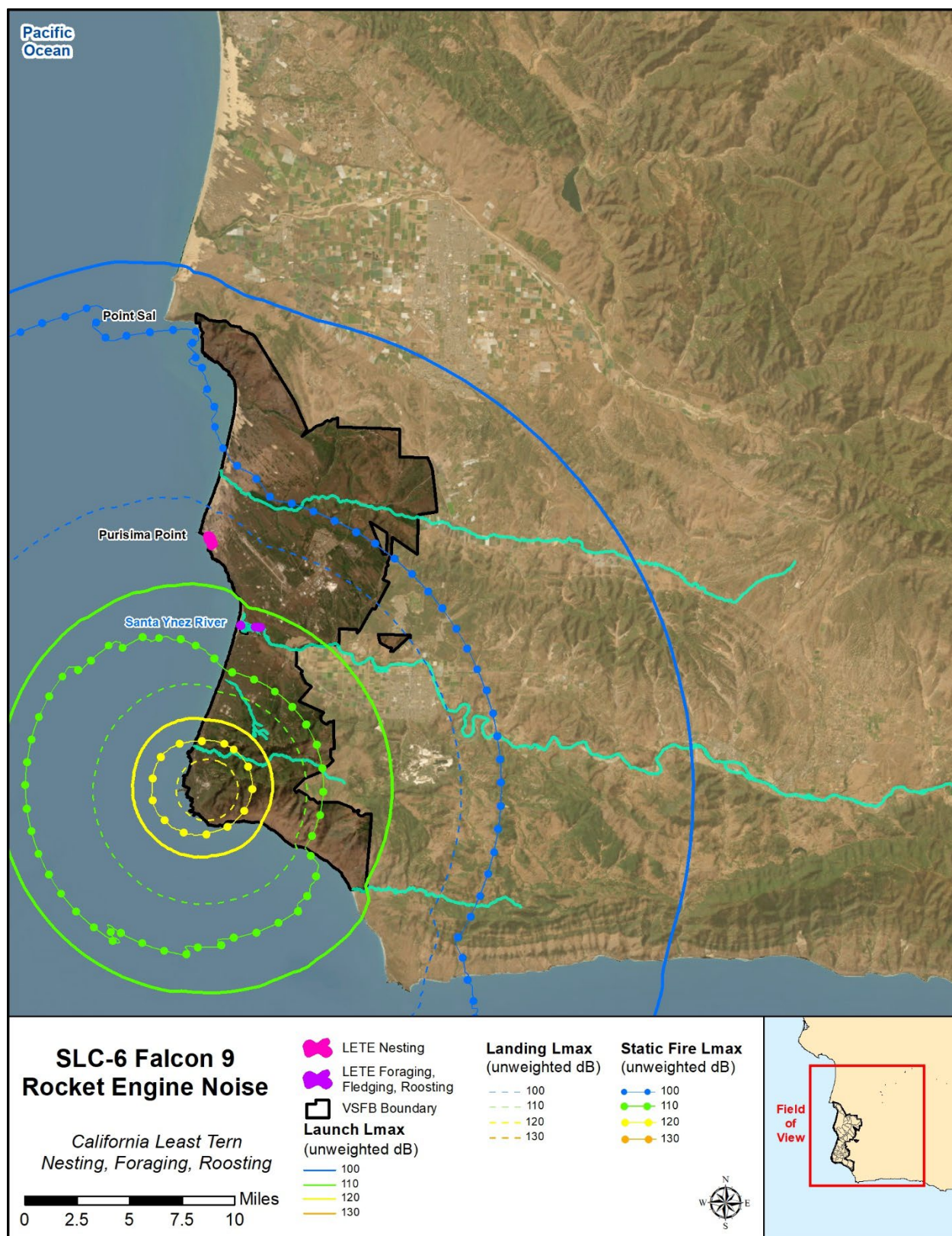


Figure C.0-49. California least tern nesting, foraging, and roosting areas, and Falcon 9 SLC-6 static fire, launch, and landing rocket engine noise model results.

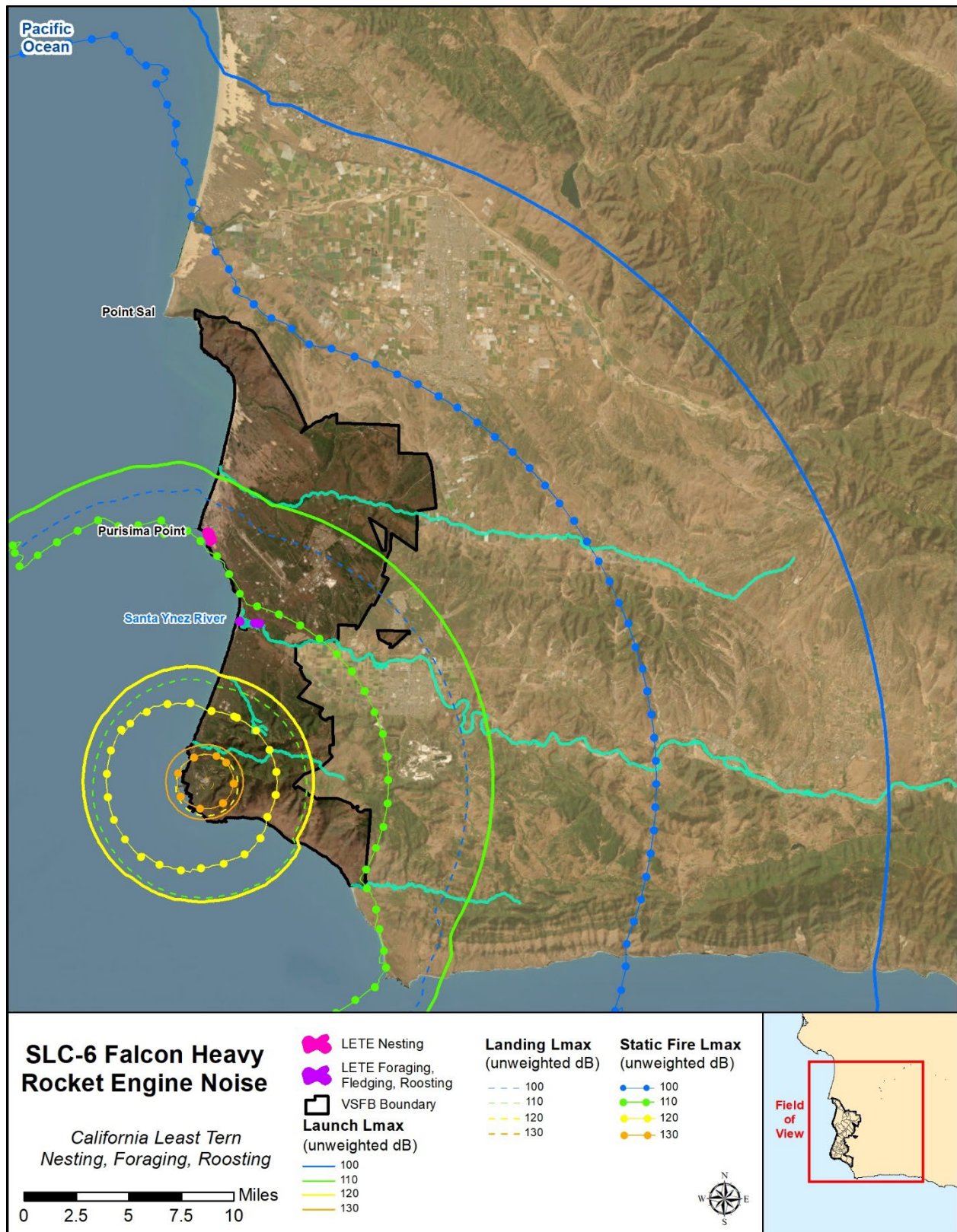


Figure C.0-50. California least tern nesting, foraging, and roosting areas, and Falcon Heavy SLC-6 static fire, launch, and landing rocket engine noise model results.

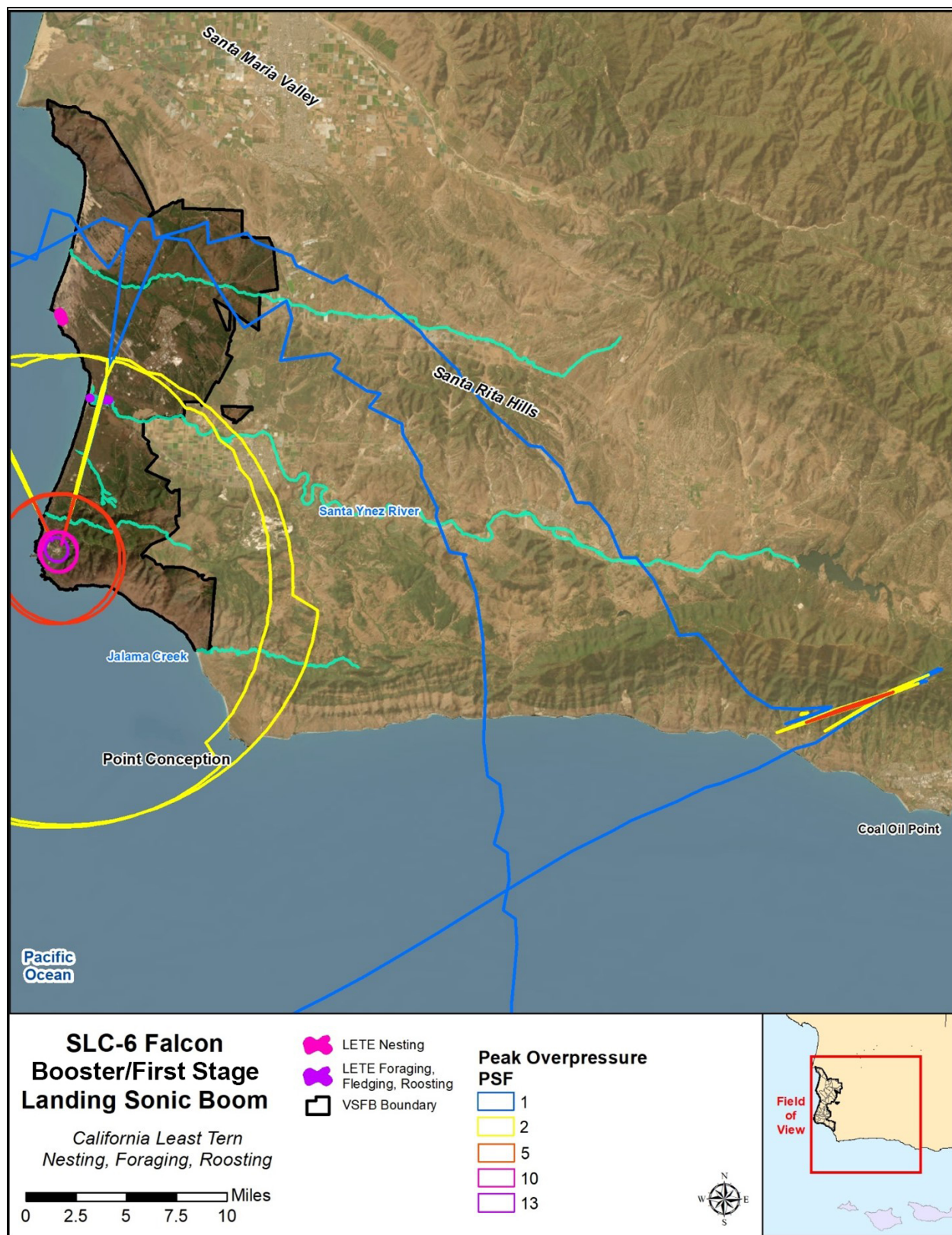


Figure C.0-51. California least tern nesting, foraging, and roosting areas, and two sample sonic boom model results for SLC 6 landing events.

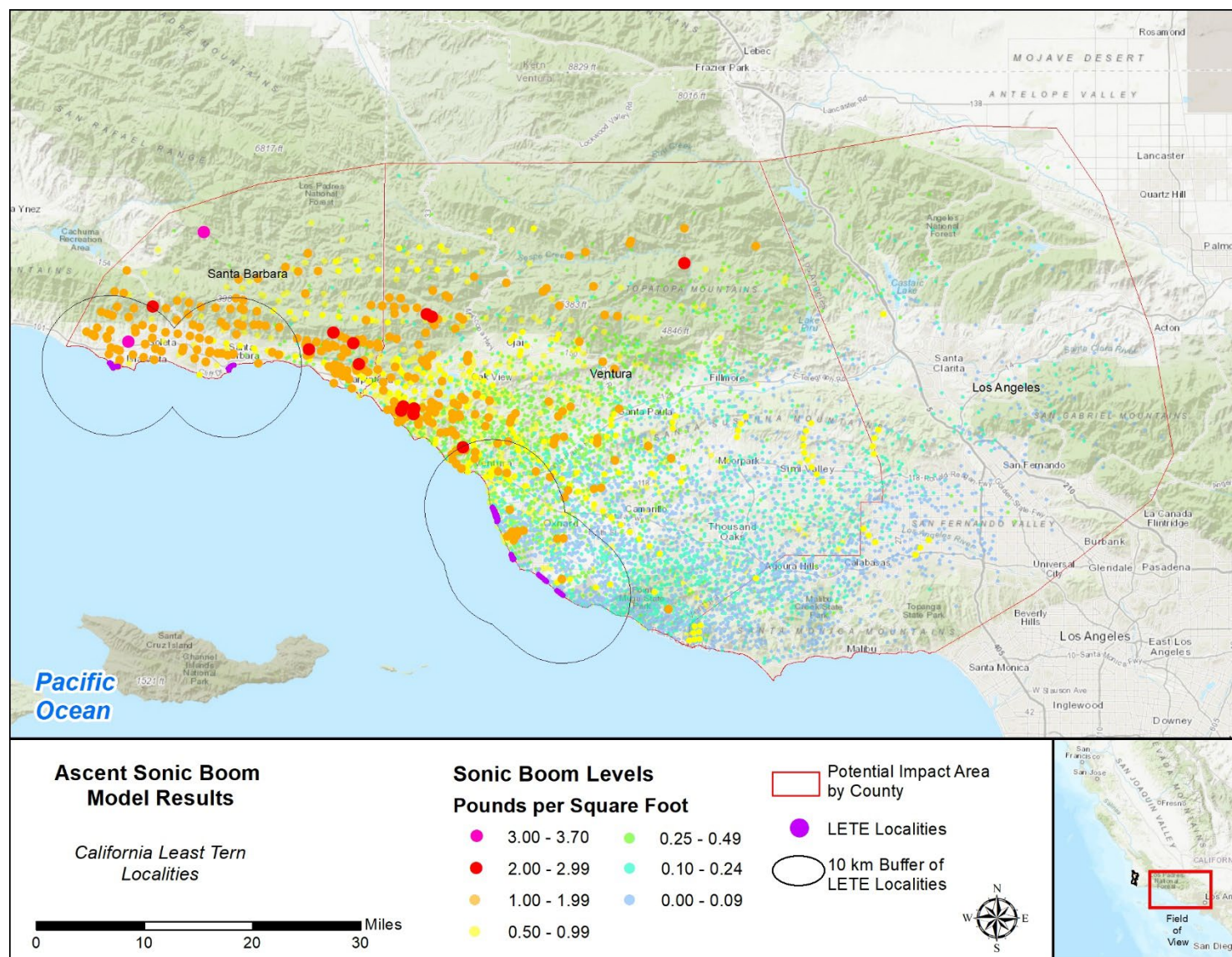
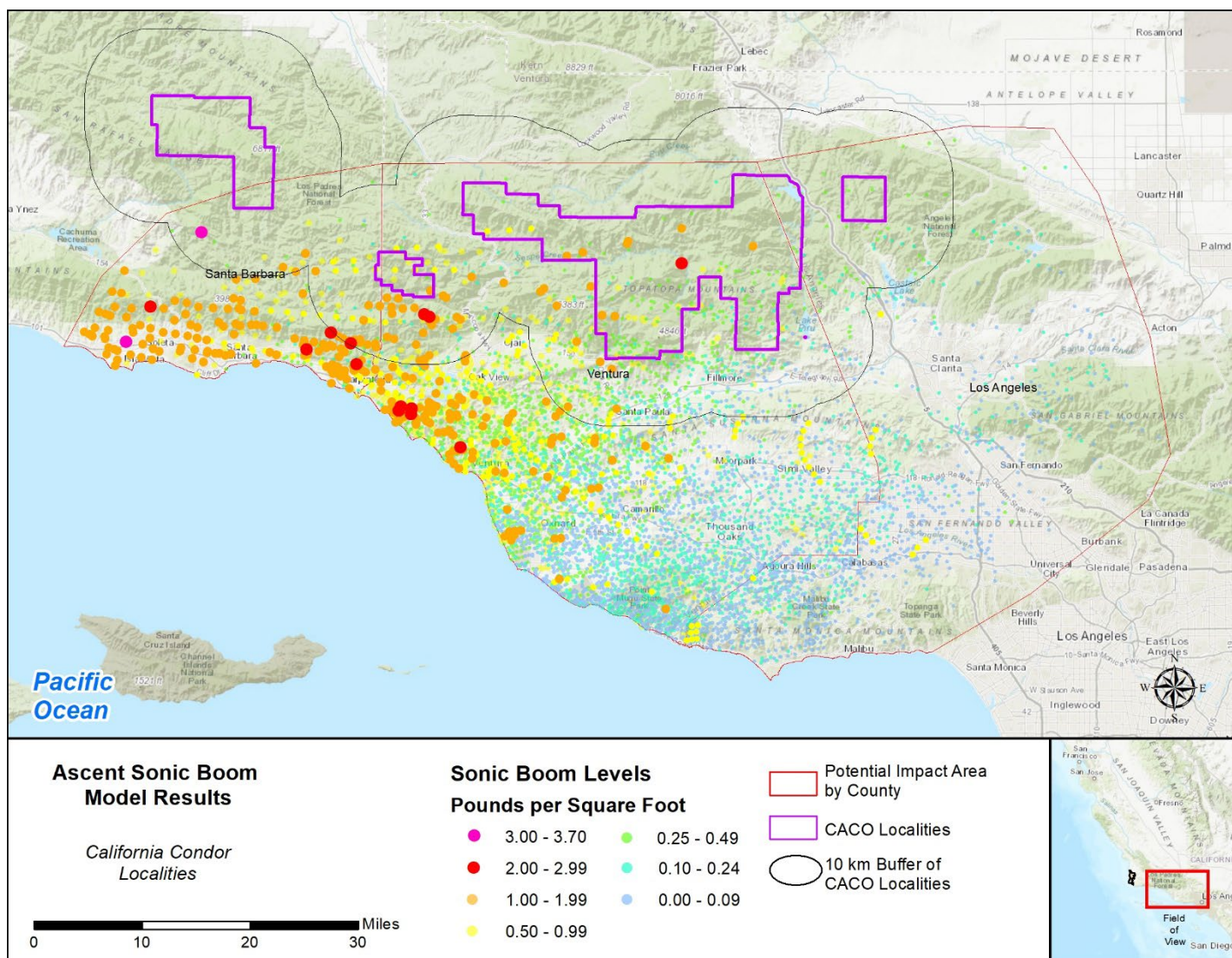


Figure C.0-52. LETE localities and potential sonic boom impact areas in eastern Santa Barbara, Ventura, and Los Angeles Counties.



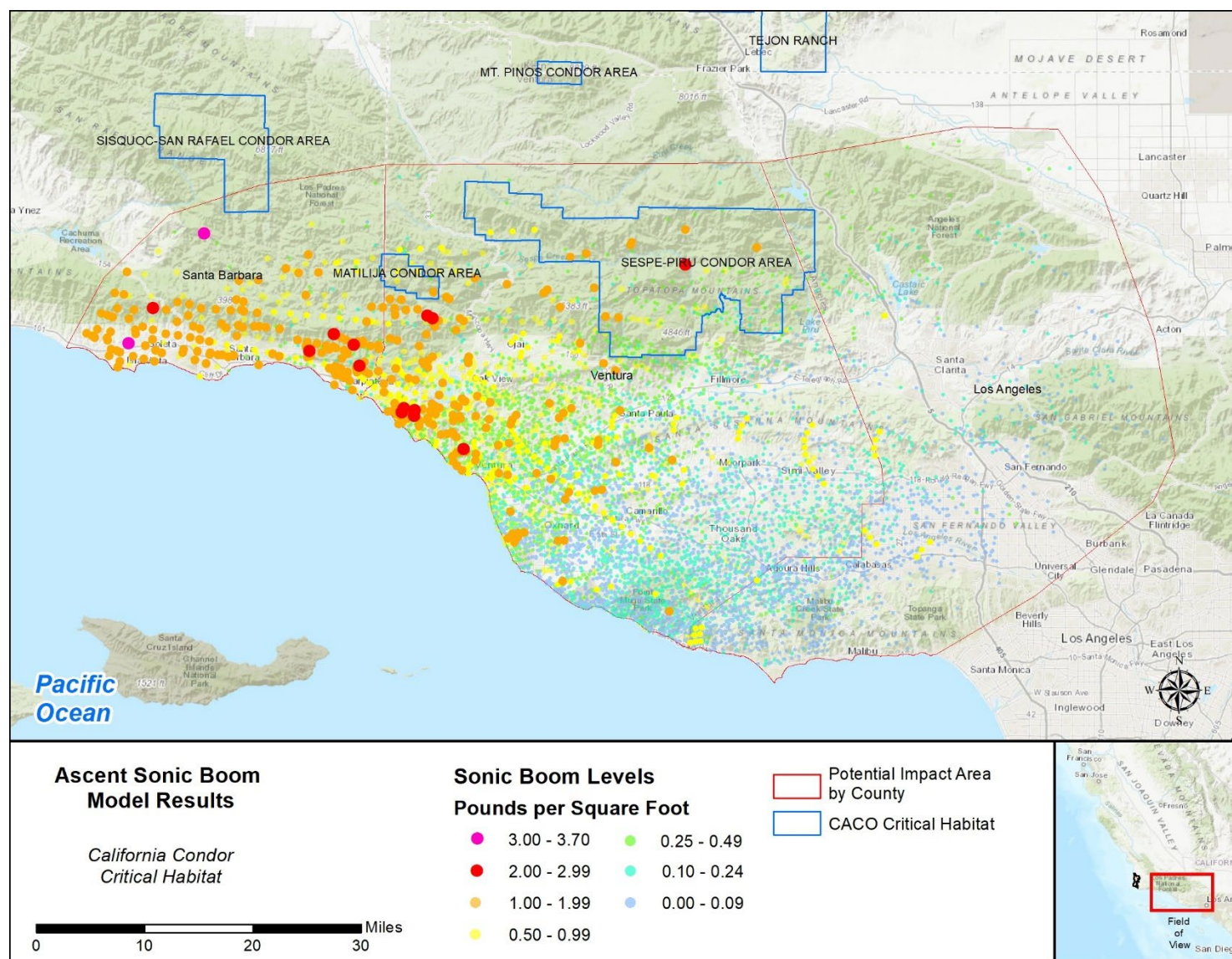


Figure C.0-54. California condor critical habitat and potential sonic boom impact areas in eastern Santa Barbara, Ventura, and Los Angeles Counties (note: CACO = California condor).

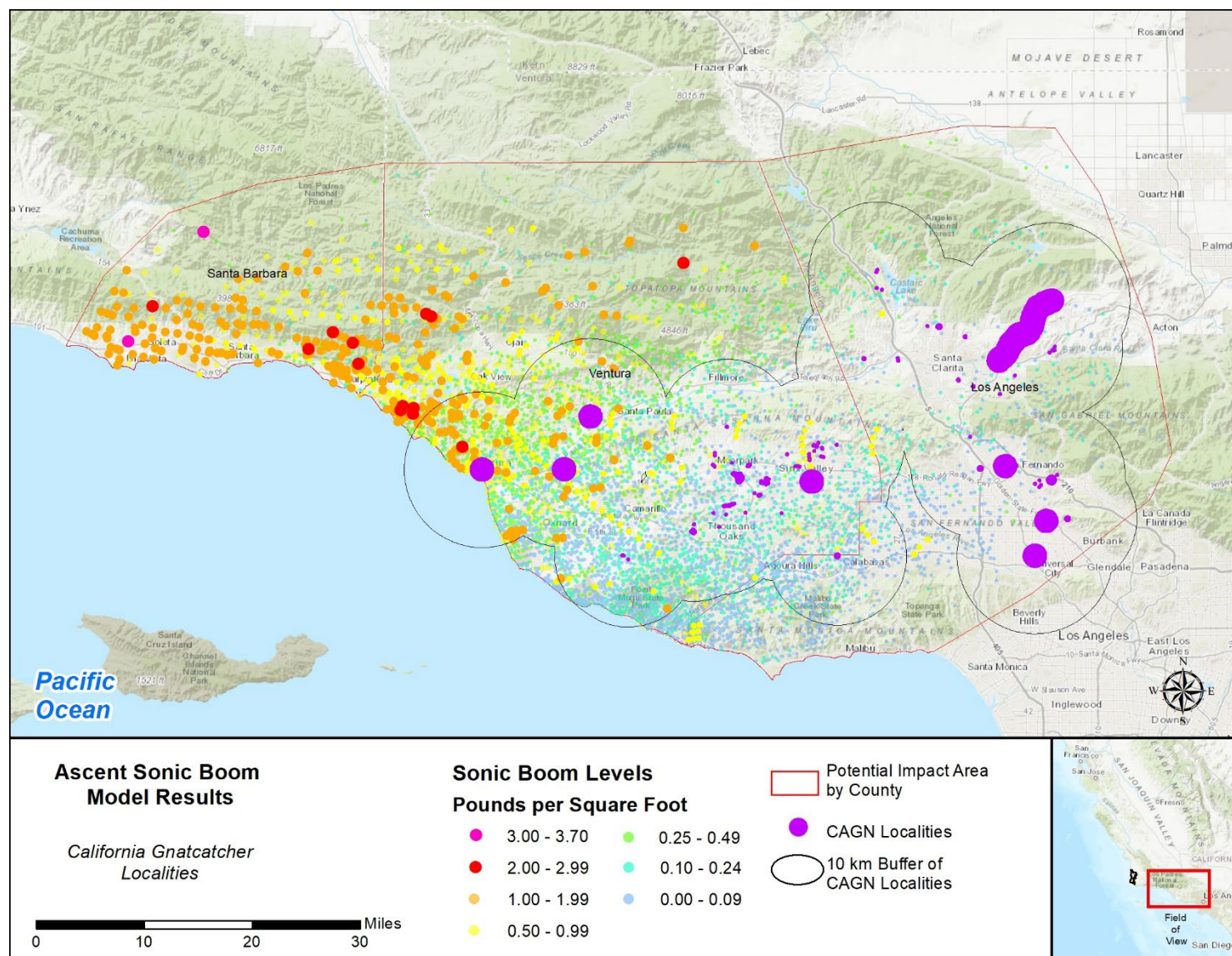


Figure C.0-55. CAGN localities and potential sonic boom impact areas in eastern Santa Barbara, Ventura, and Los Angeles Counties.

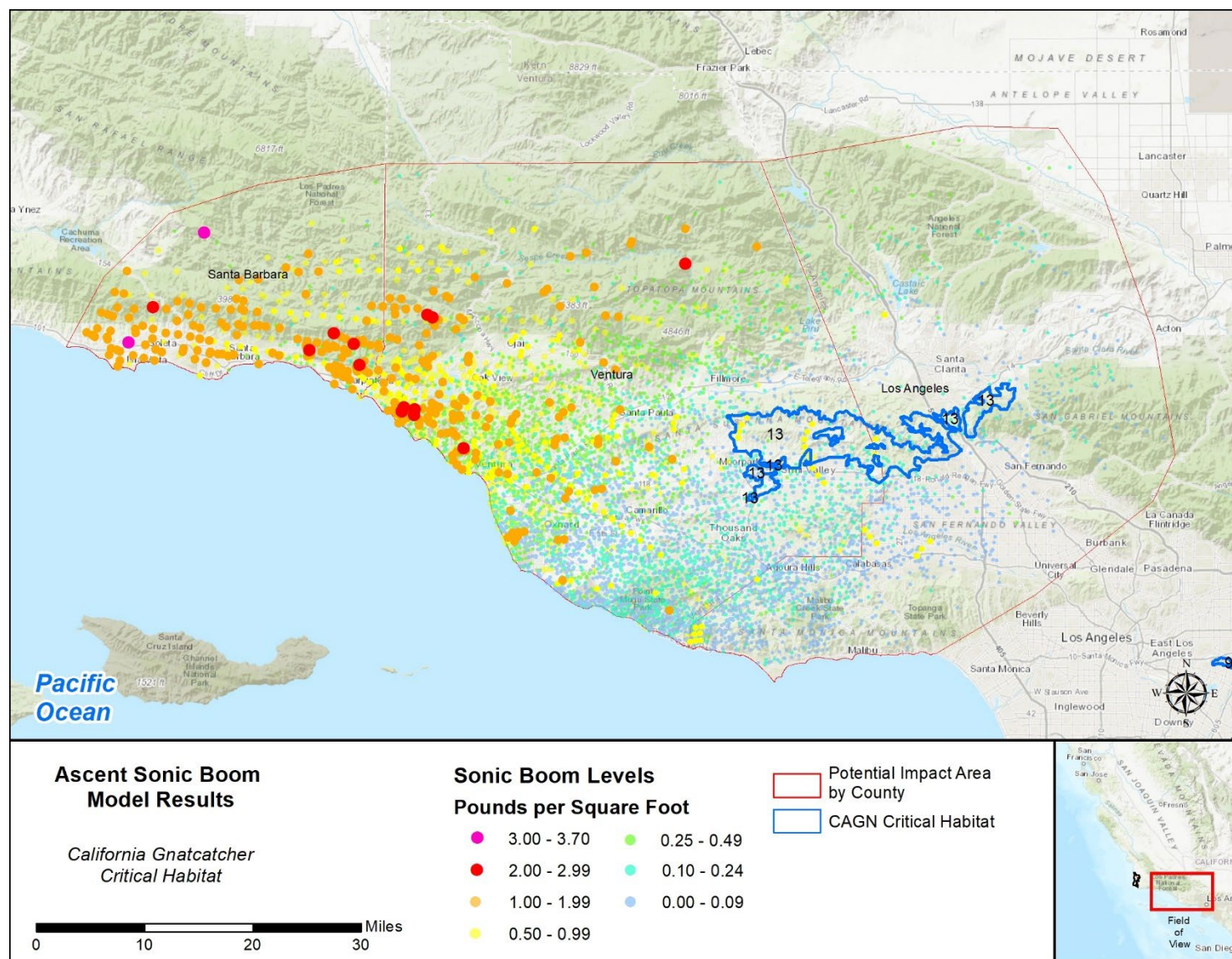


Figure C.0-56. CAGN Critical Habitat and potential sonic boom impact areas in eastern Santa Barbara, Ventura, and Los Angeles Counties.

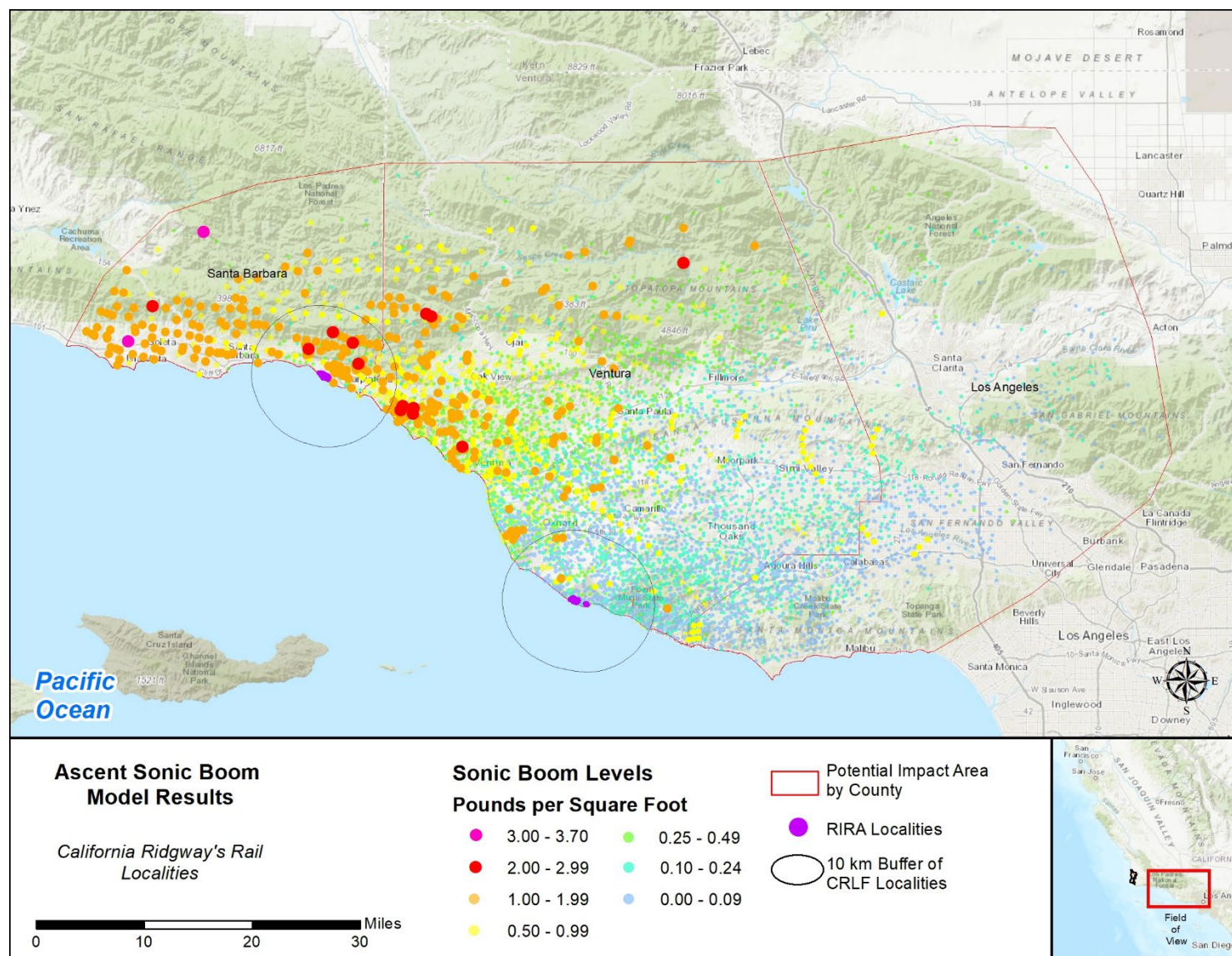


Figure C.0-57. RIRA localities and potential sonic boom impact areas in eastern Santa Barbara, Ventura, and Los Angeles Counties.

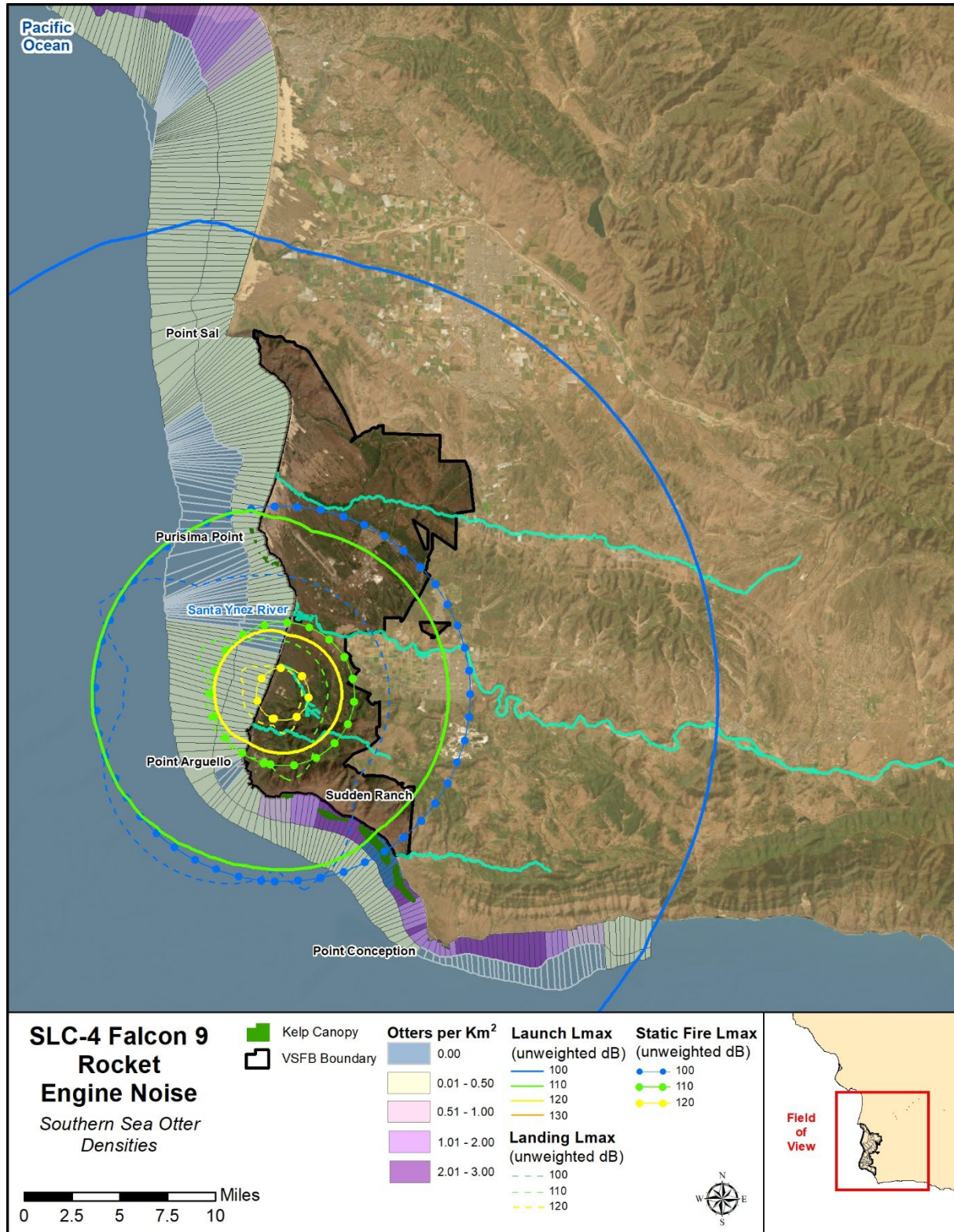


Figure C.0-58. Southern sea otter densities and areas and Falcon 9 SLC-4 static fire, launch, and landing rocket engine noise model results (USGS 2020).

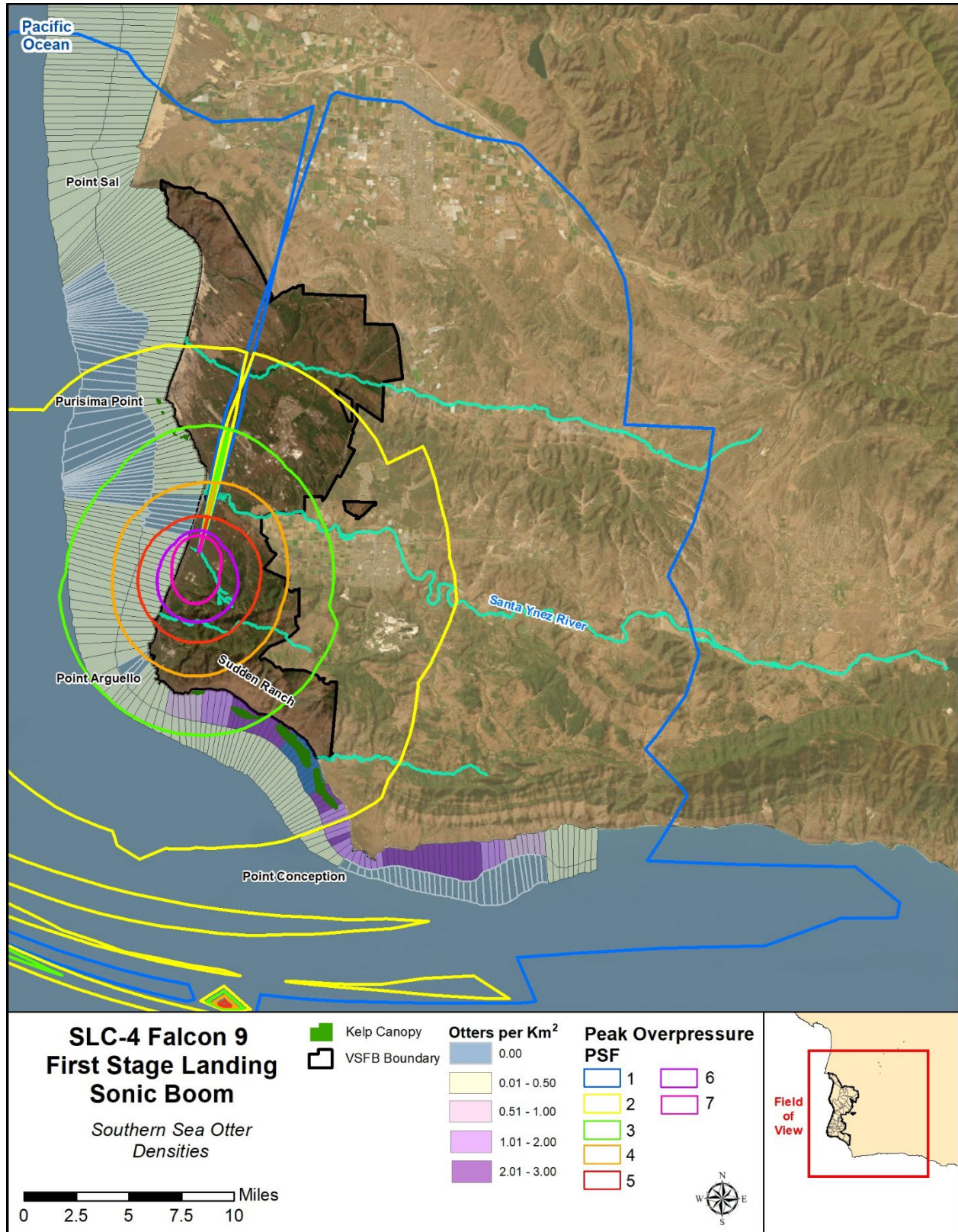


Figure C.0-59. Southern sea otter densities and example SLC-4 landing sonic boom contours (USGS 2020).

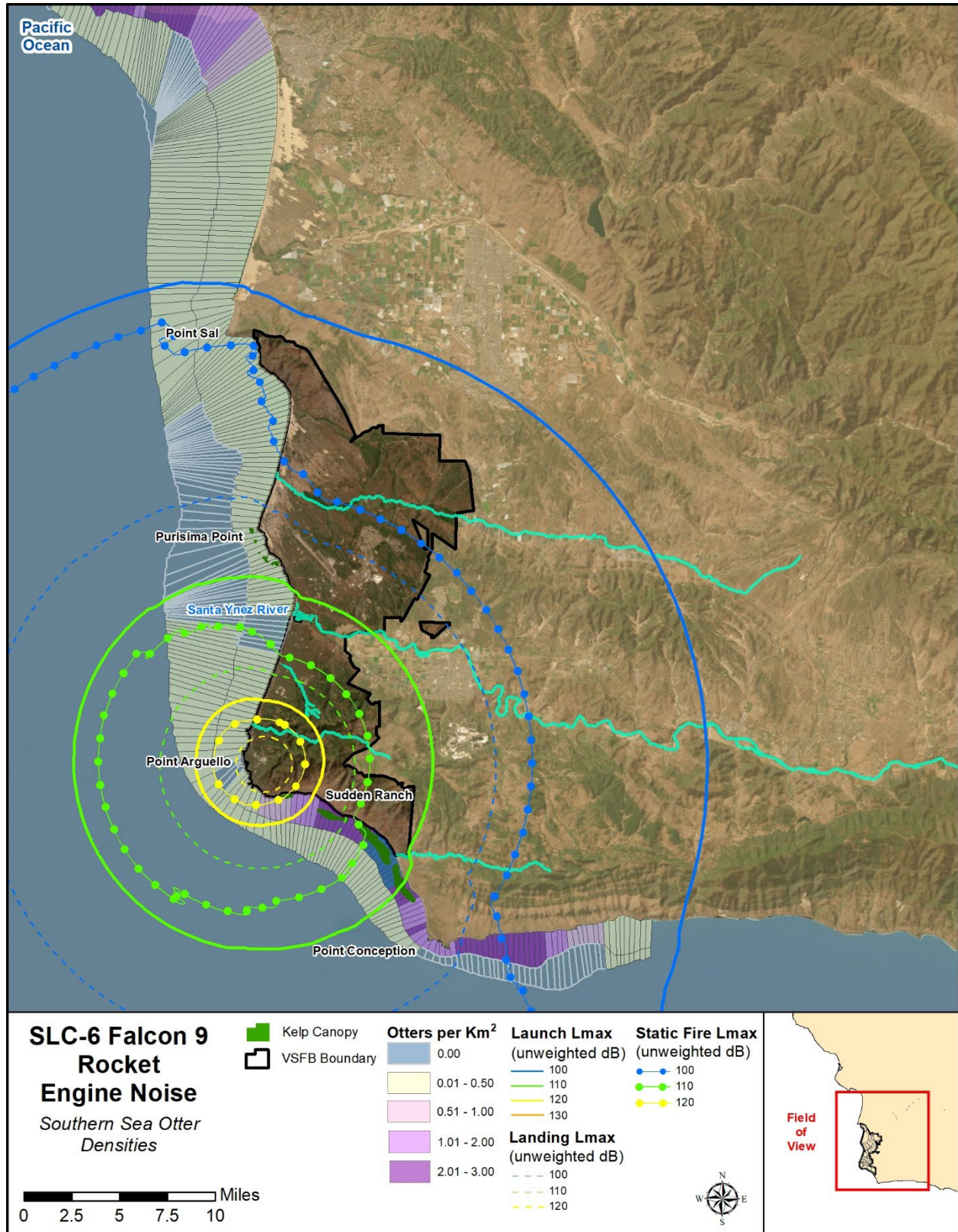


Figure C.0-60. Southern sea otter densities and Falcon 9 SLC-6 static fire, launch, and landing rocket engine noise model results (USGS 2020).

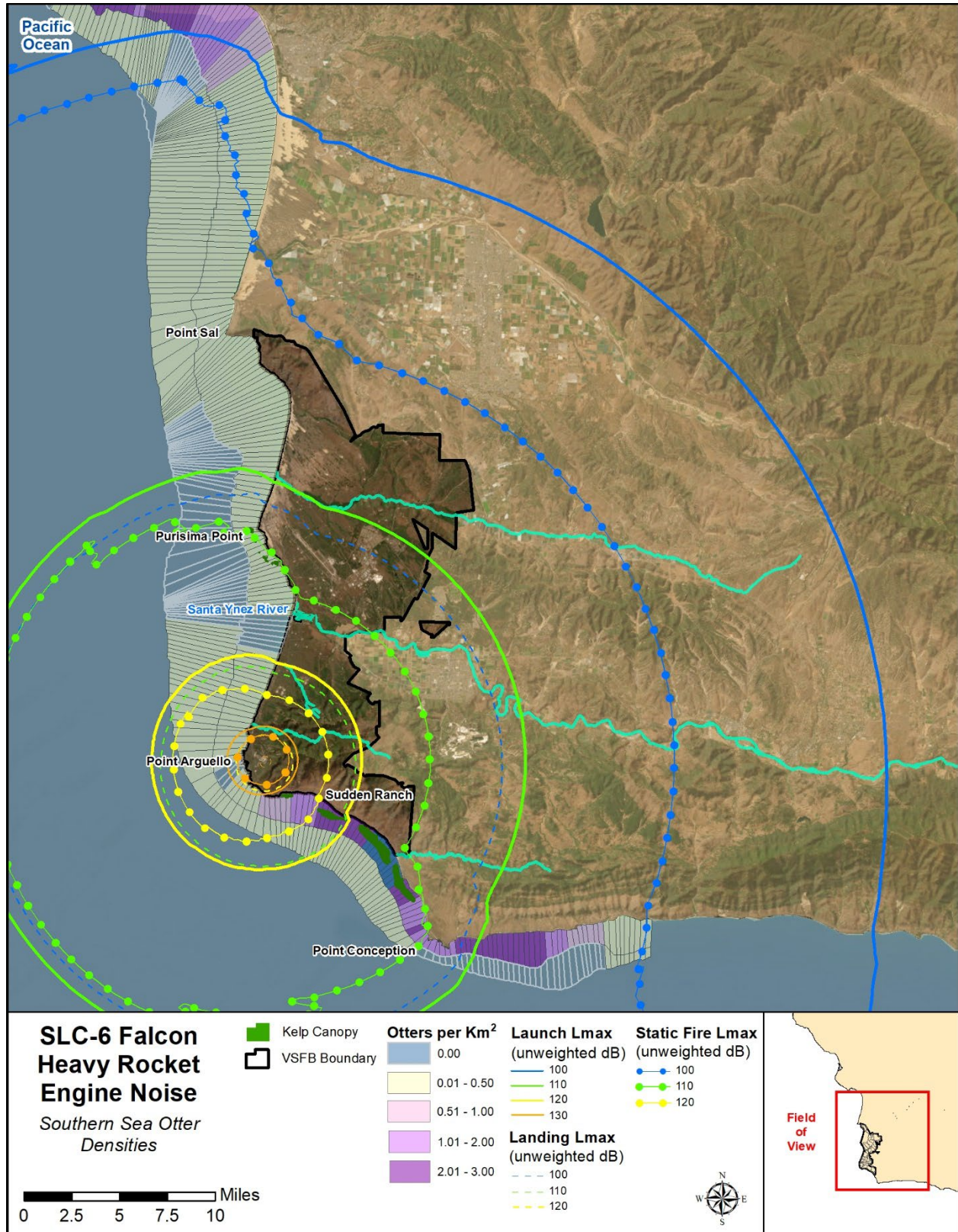


Figure C.0-61. Southern sea otter densities and Falcon Heavy SLC-6 static fire, launch, and landing rocket engine noise model results (USGS 2020).

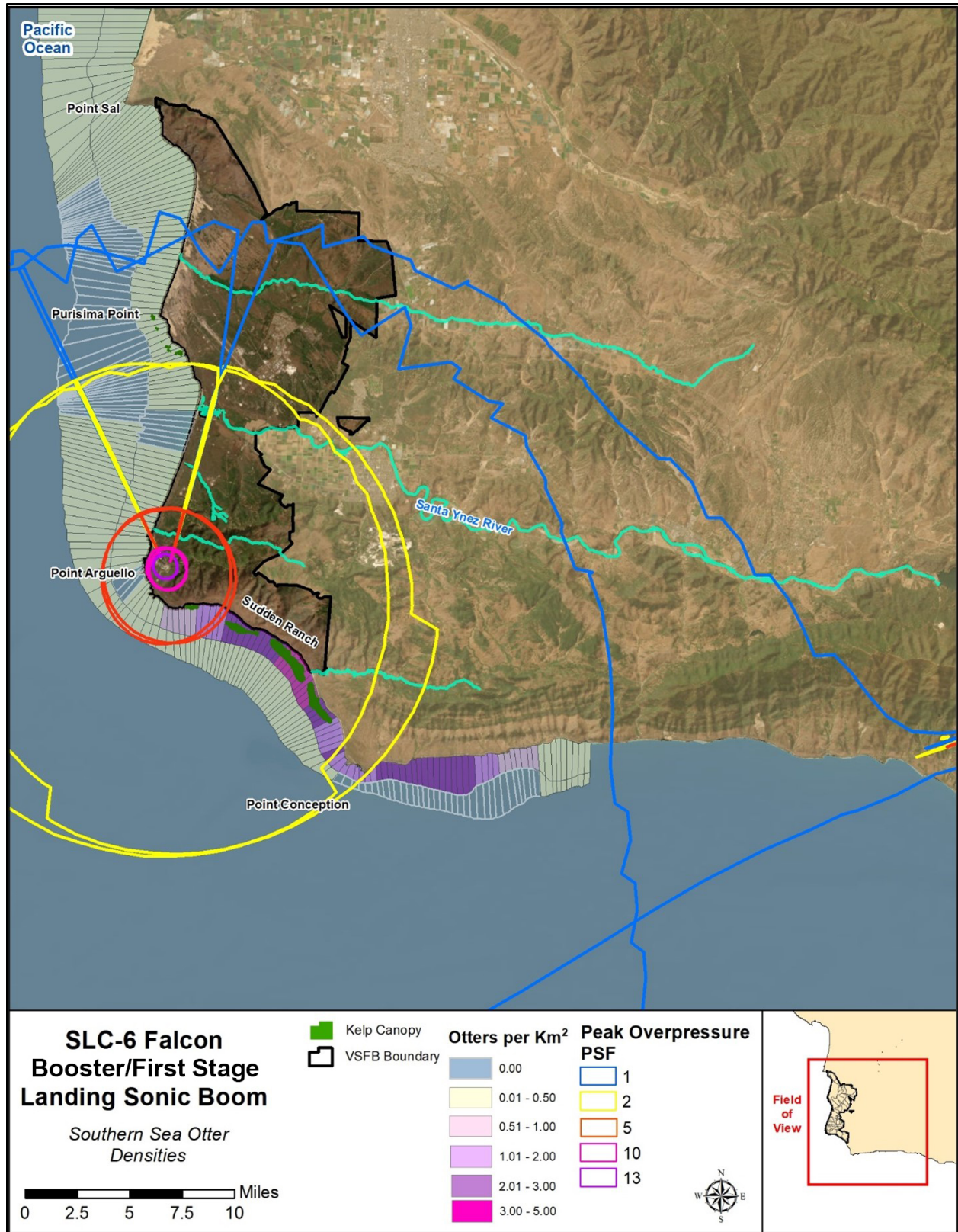


Figure C.0-62. Southern sea otter densities and example SLC-6 landing sonic boom contours (USGS 2020).

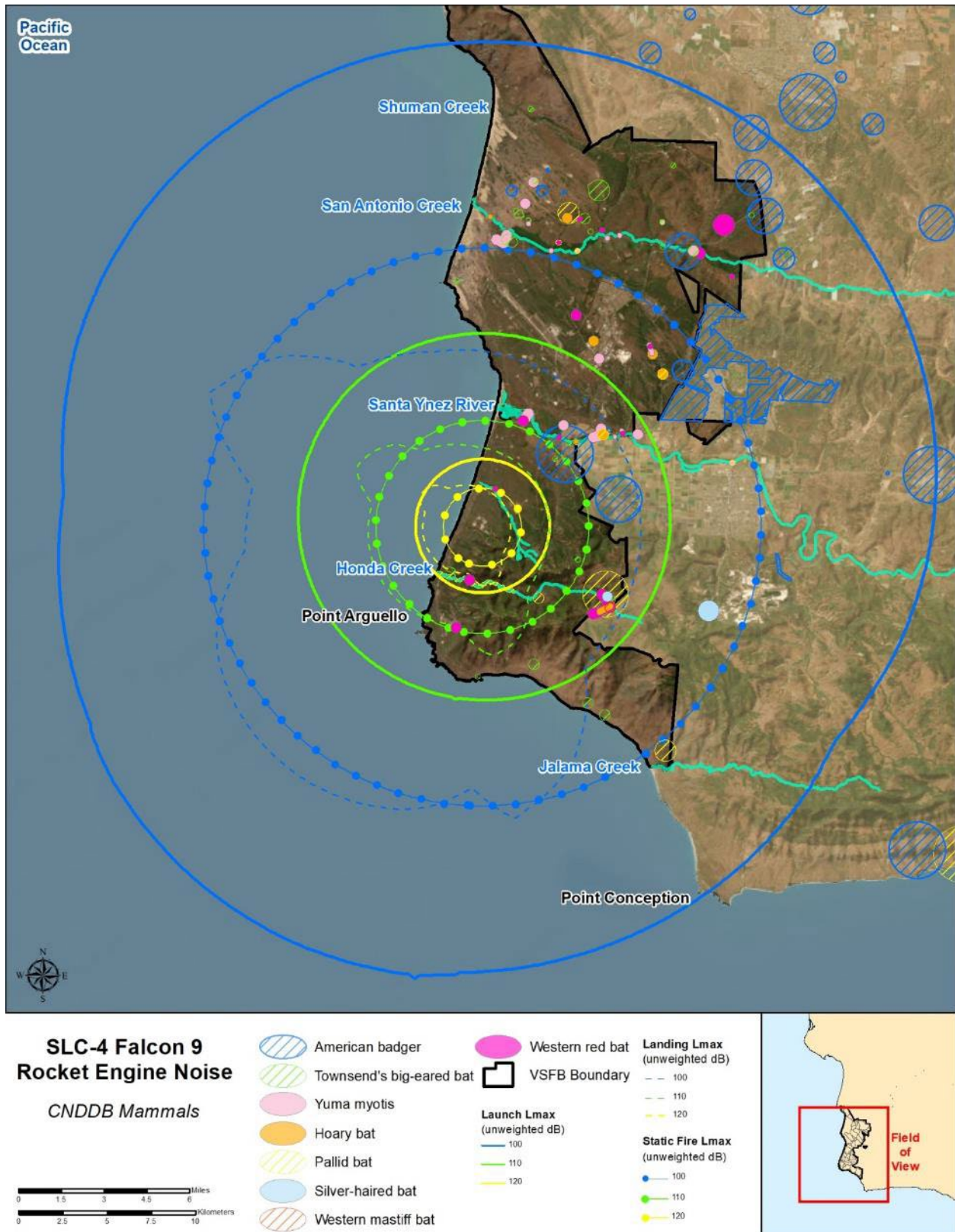


Figure C.0-63. Special status mammal CNDDB localities and Falcon 9 SLC-4 static fire, launch, and landing rocket engine noise model results.

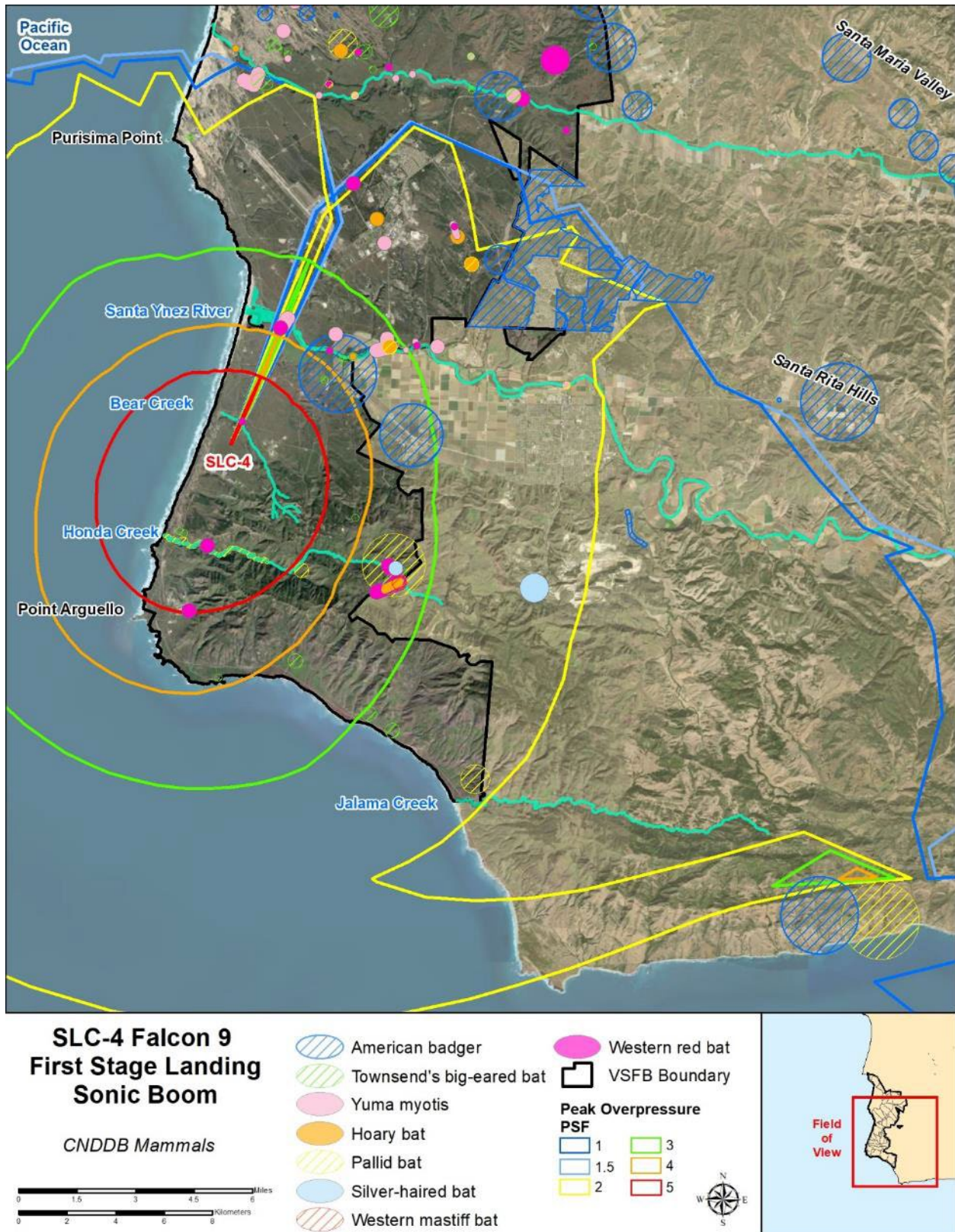


Figure C.0-64. Special status mammal CNDDDB localities and example SLC-4 landing sonic boom contours.

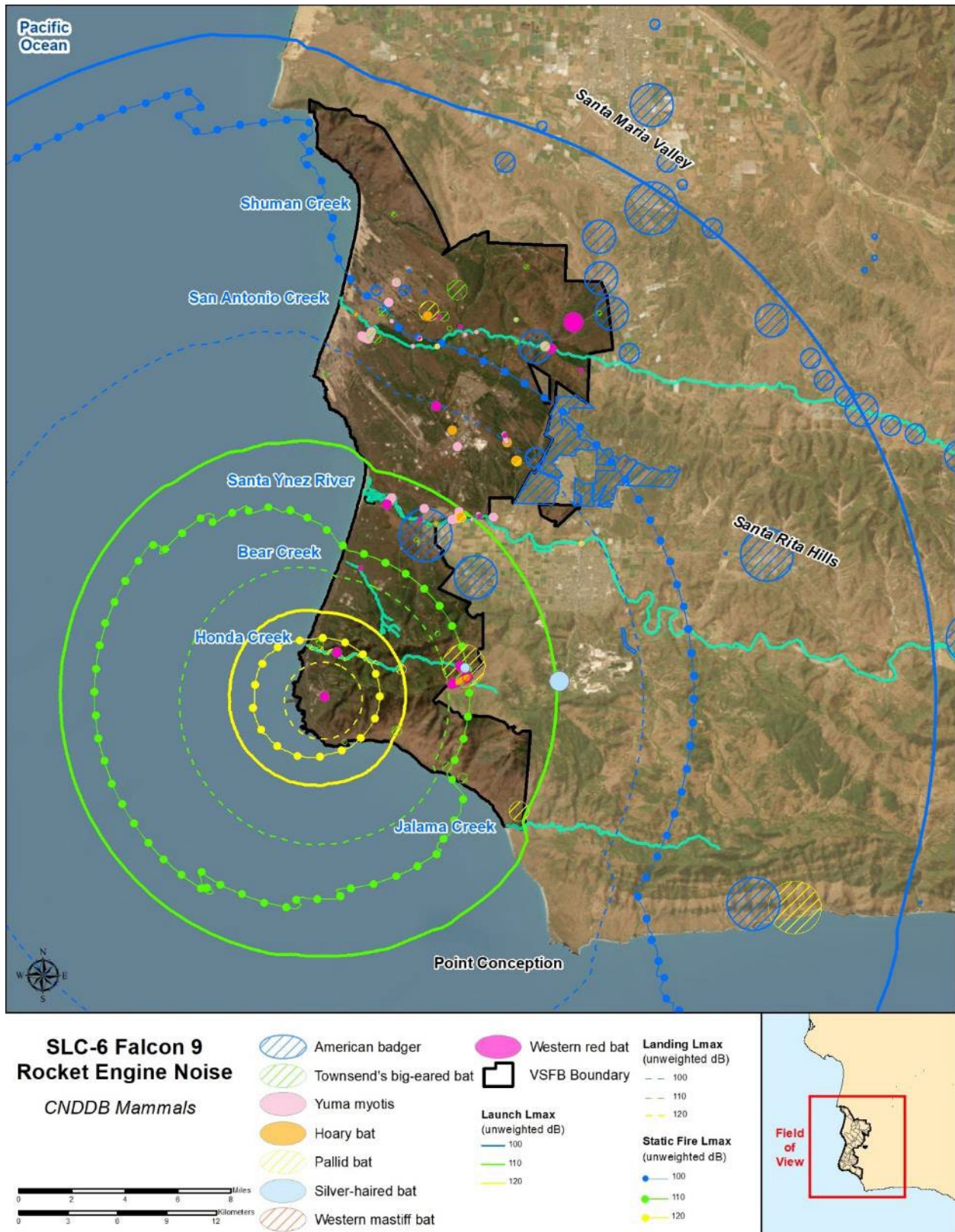


Figure C.0-65. Special status mammal CNDDDB localities and Falcon 9 SLC-6 static fire, launch, and landing rocket engine noise model results.

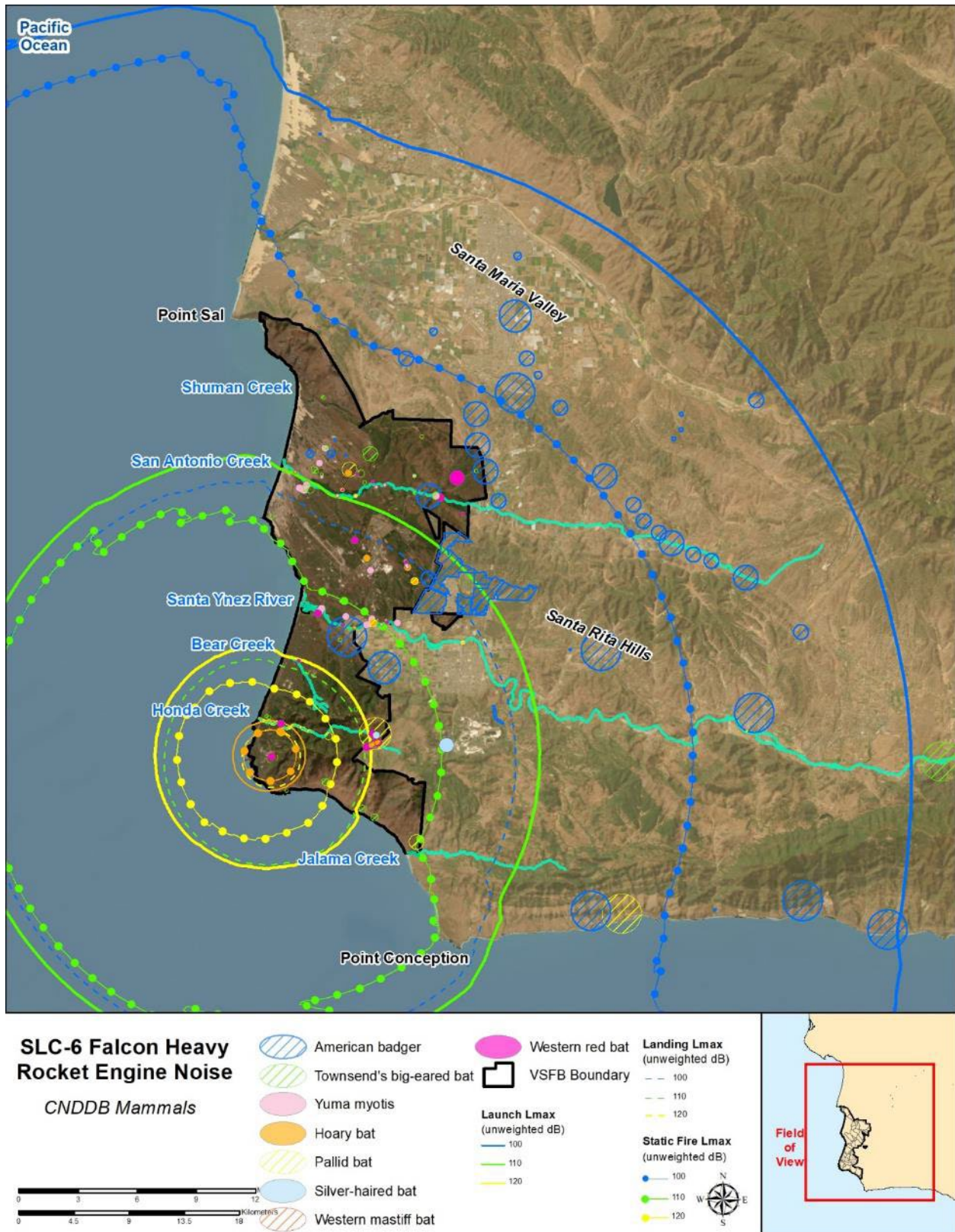


Figure C.0-66. Special status mammal CNDDDB localities and Falcon Heavy SLC-6 static fire, launch, and landing rocket engine noise model results.

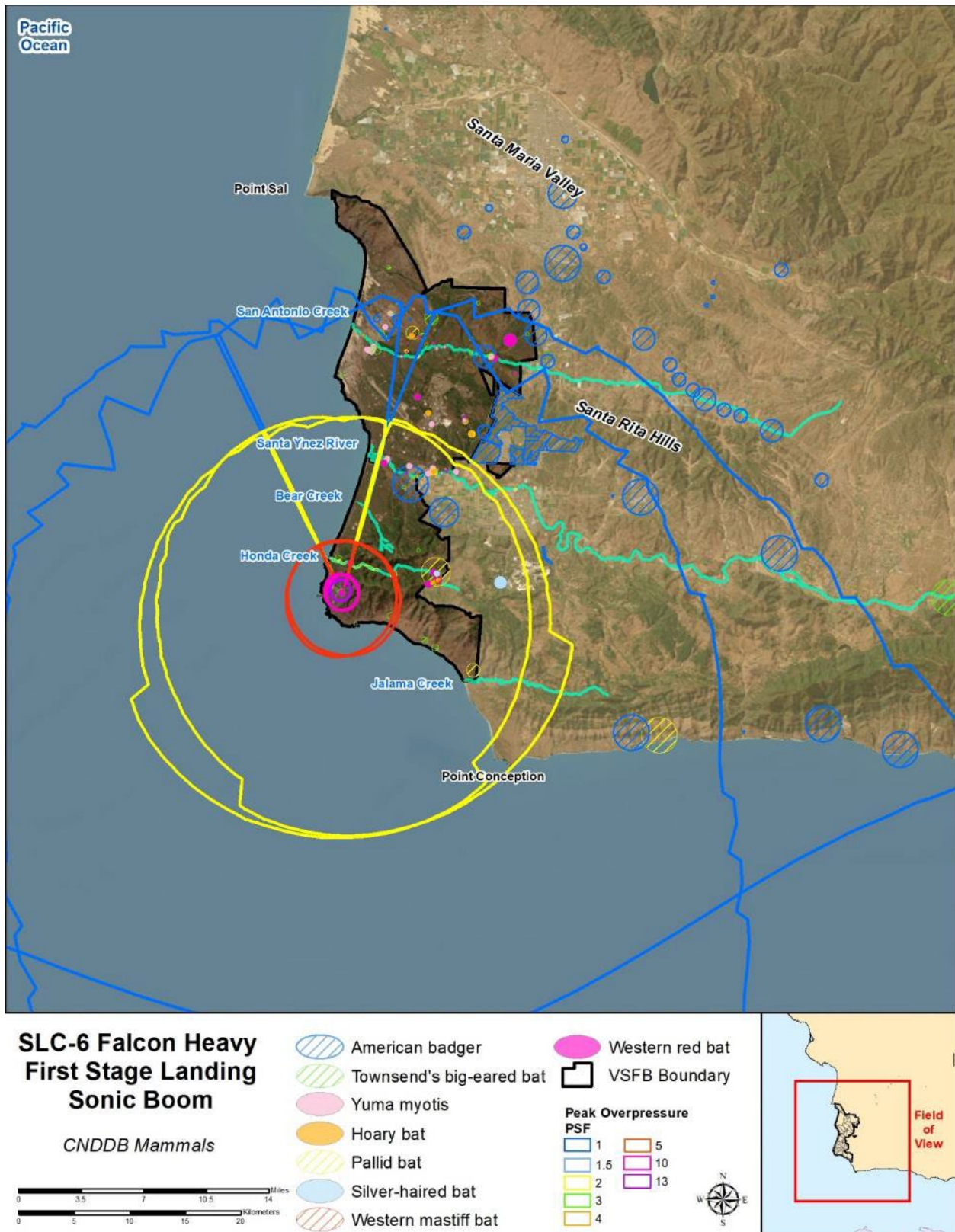


Figure C.0-67. Special status mammal CNDDDB localities and two sample sonic boom model contours for SLC 6 landing events.

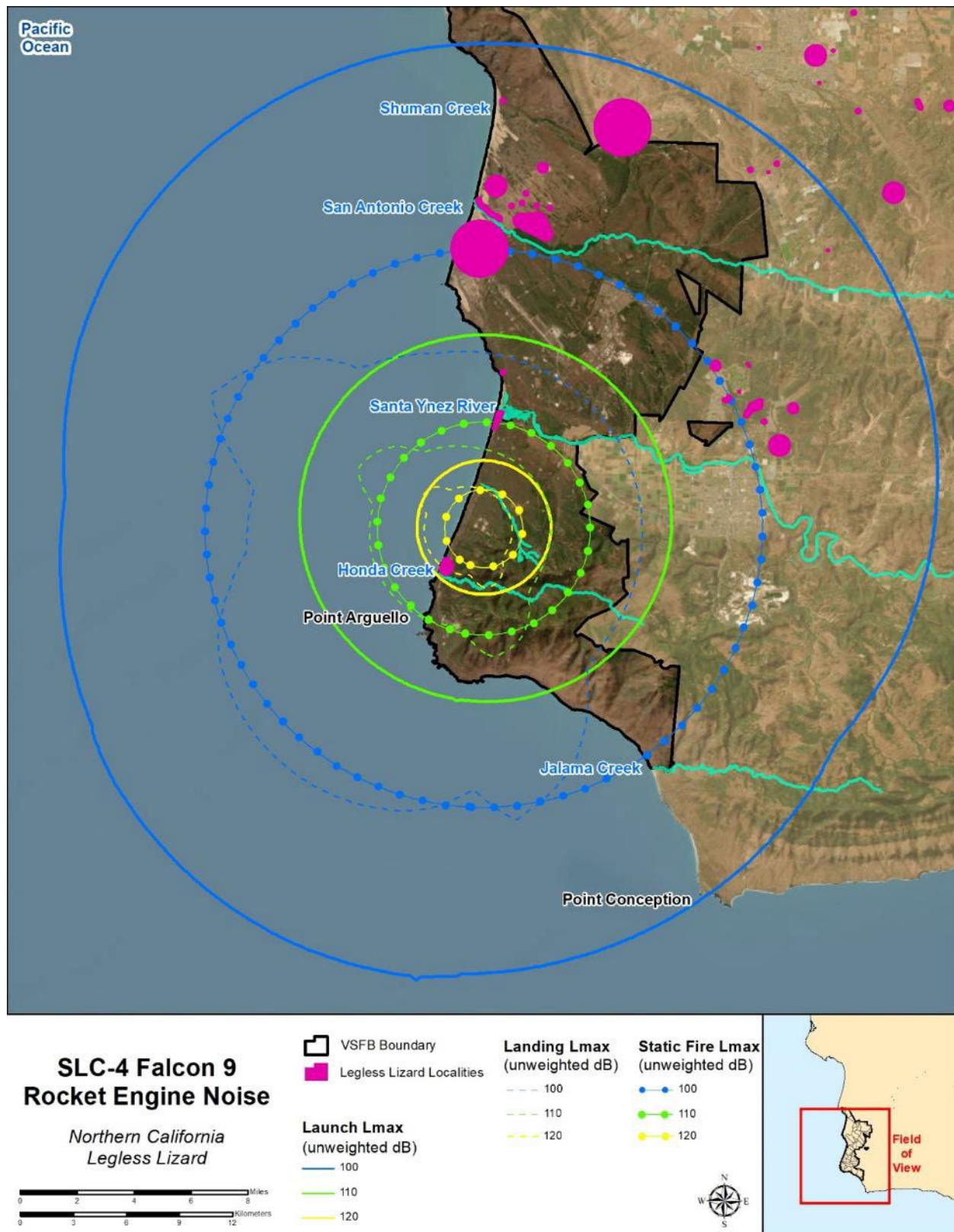


Figure C.0-68. Northern legless lizard localities and Falcon 9 SLC-4 static fire, launch, and landing rocket engine noise model results.

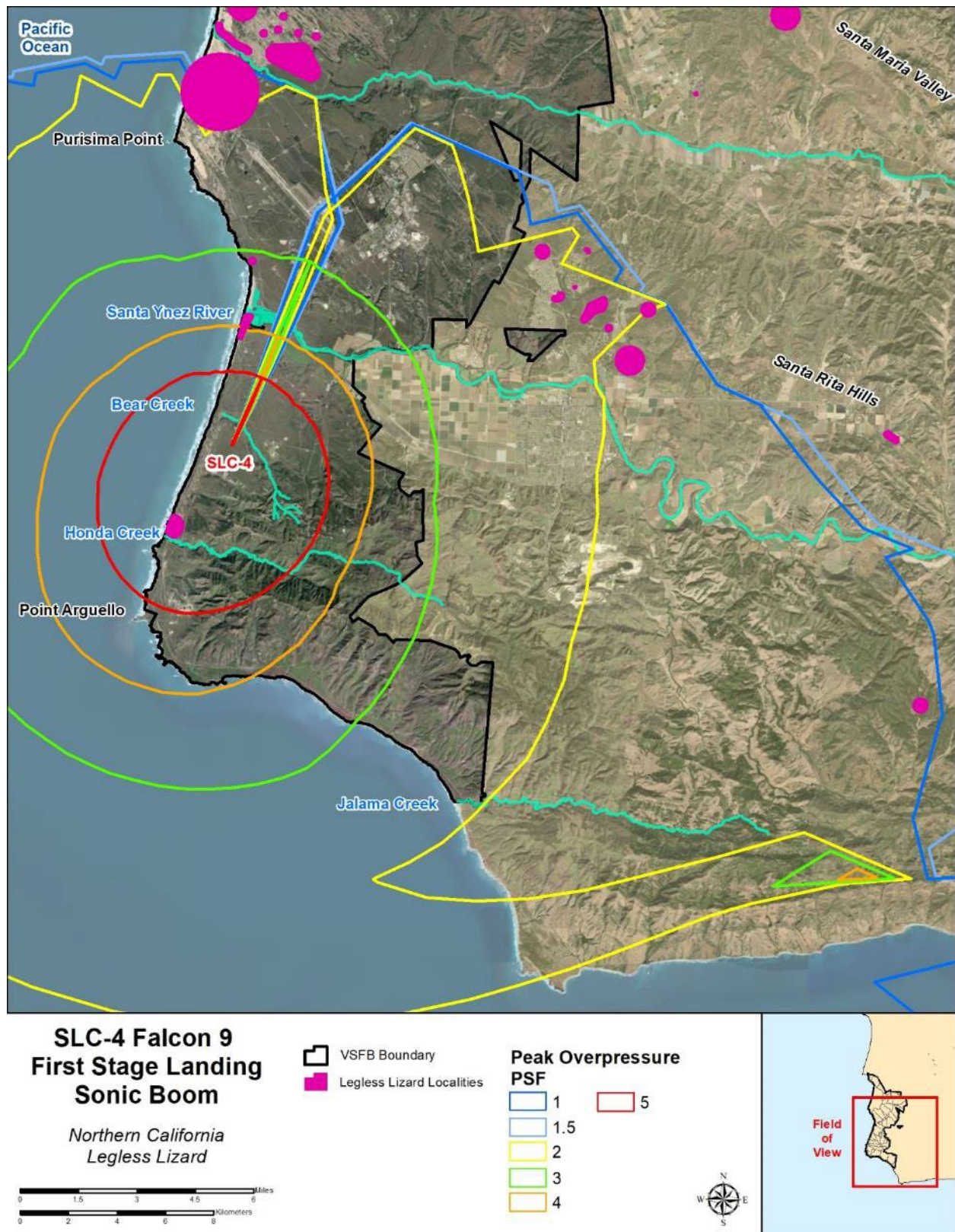


Figure C.0-69. Northern legless localities and example SLC-4 landing sonic boom contours.

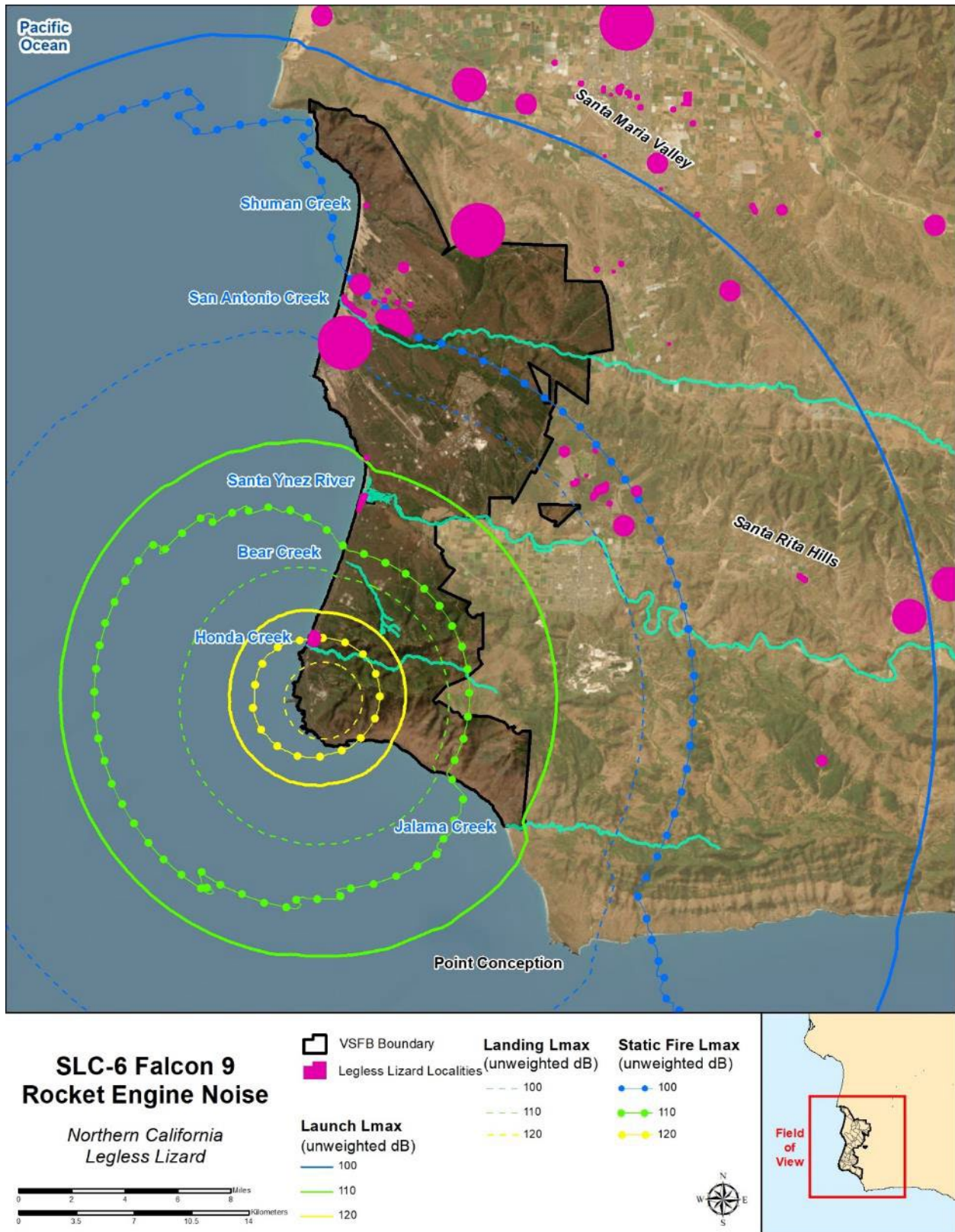


Figure C.O-70. Northern legless lizard localities and Falcon 9 SLC-6 static fire, launch, and landing rocket engine noise model results.

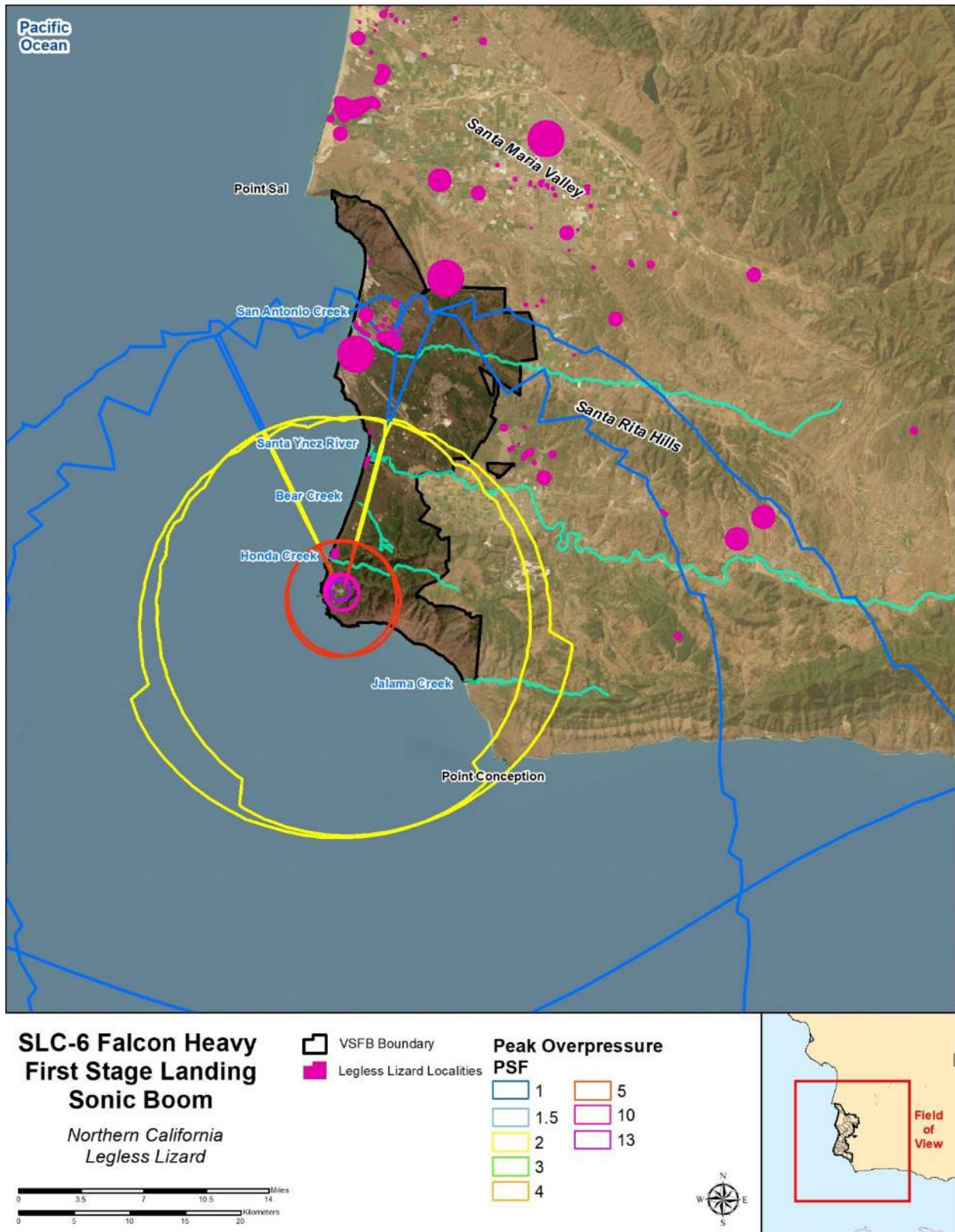


Figure C.0-71. Northern legless lizard localities and Falcon Heavy SLC-6 static fire, launch, and landing rocket engine noise model results.

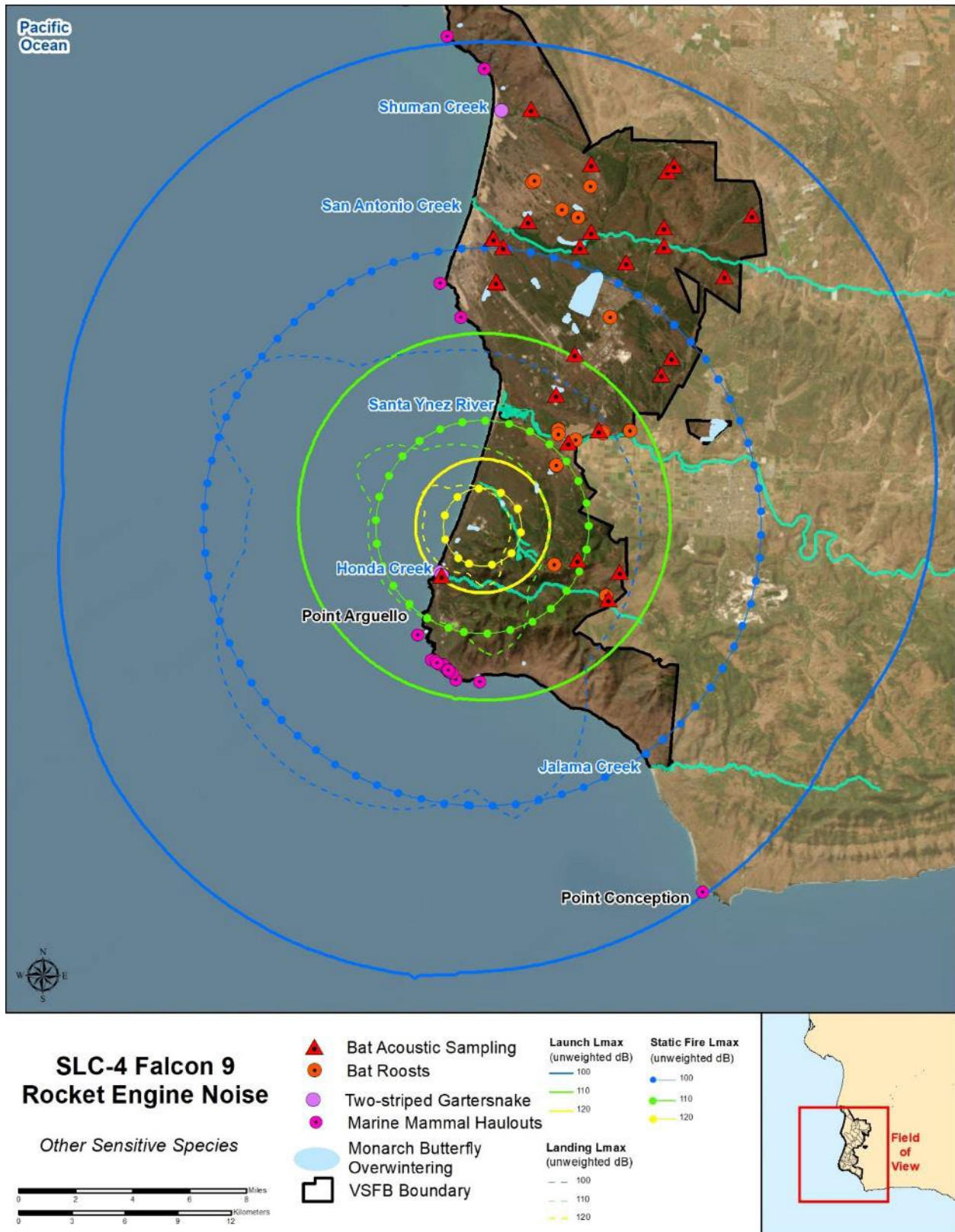


Figure C.0-72. Other sensitive species and Falcon 9 SLC-4 static fire, launch, and landing rocket engine noise model results.

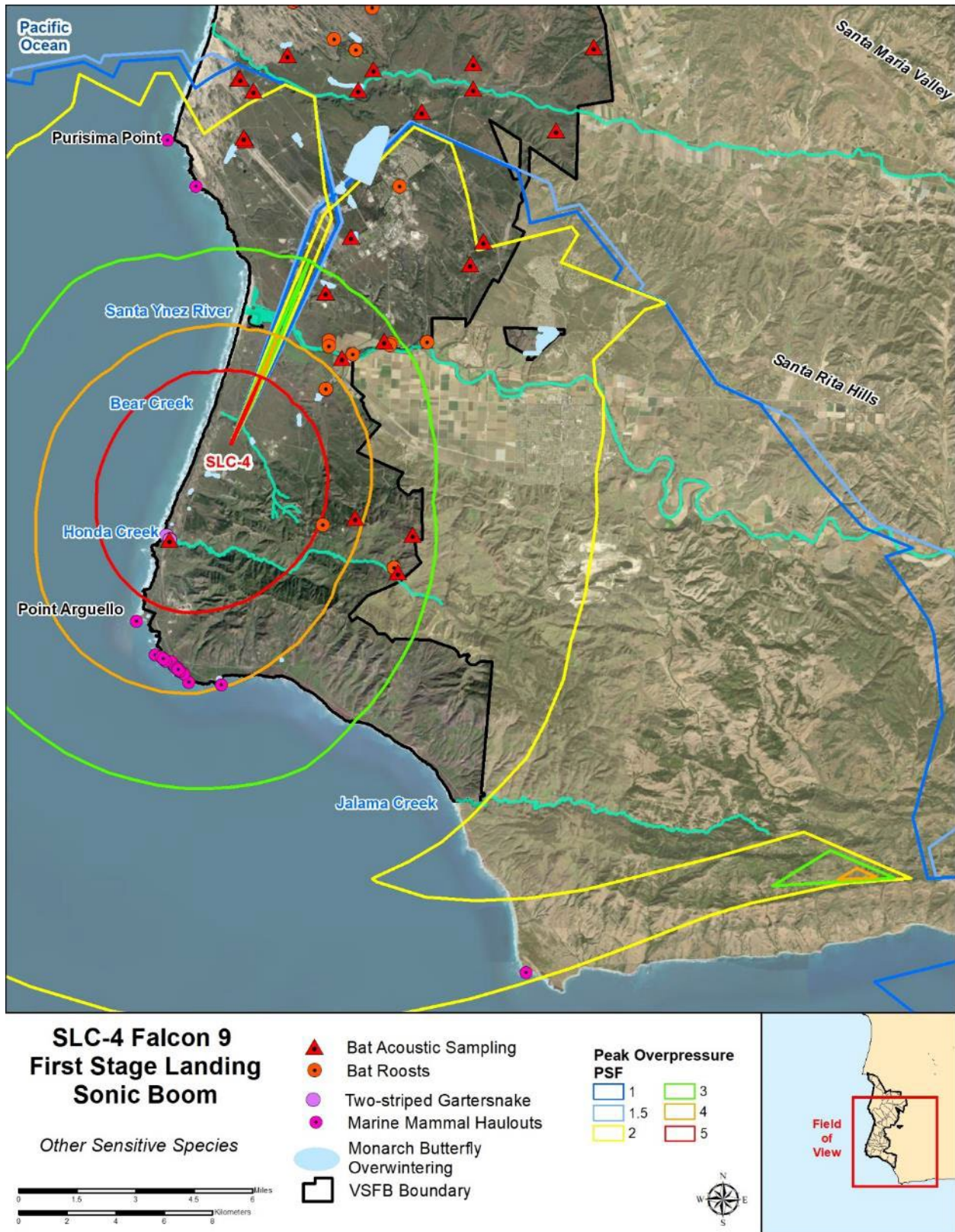


Figure C.0-73. Other sensitive species and example SLC-4 landing sonic boom contours.

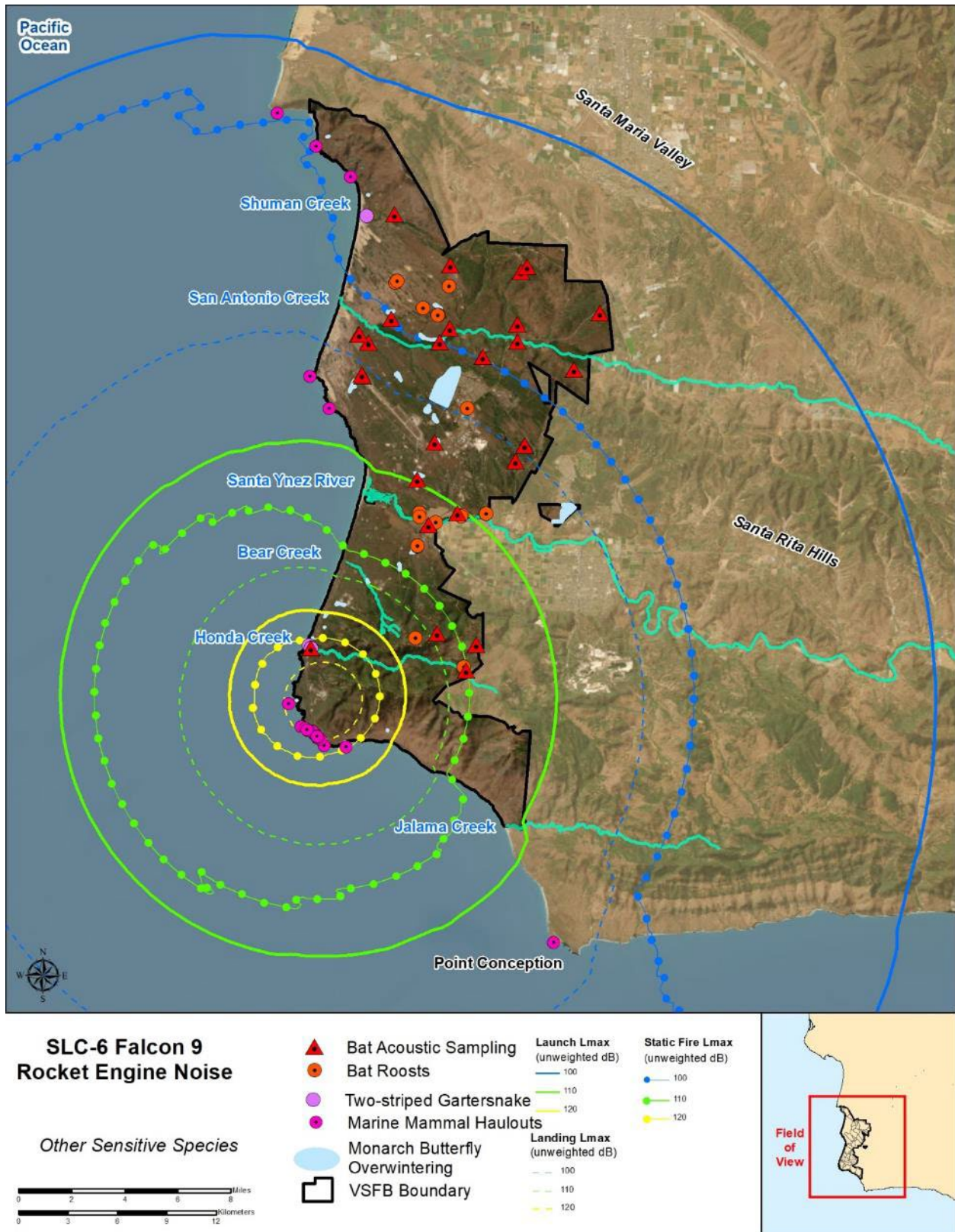


Figure C.0-74. Other sensitive species and Falcon 9 SLC-6 static fire, launch, and landing rocket engine noise model results.

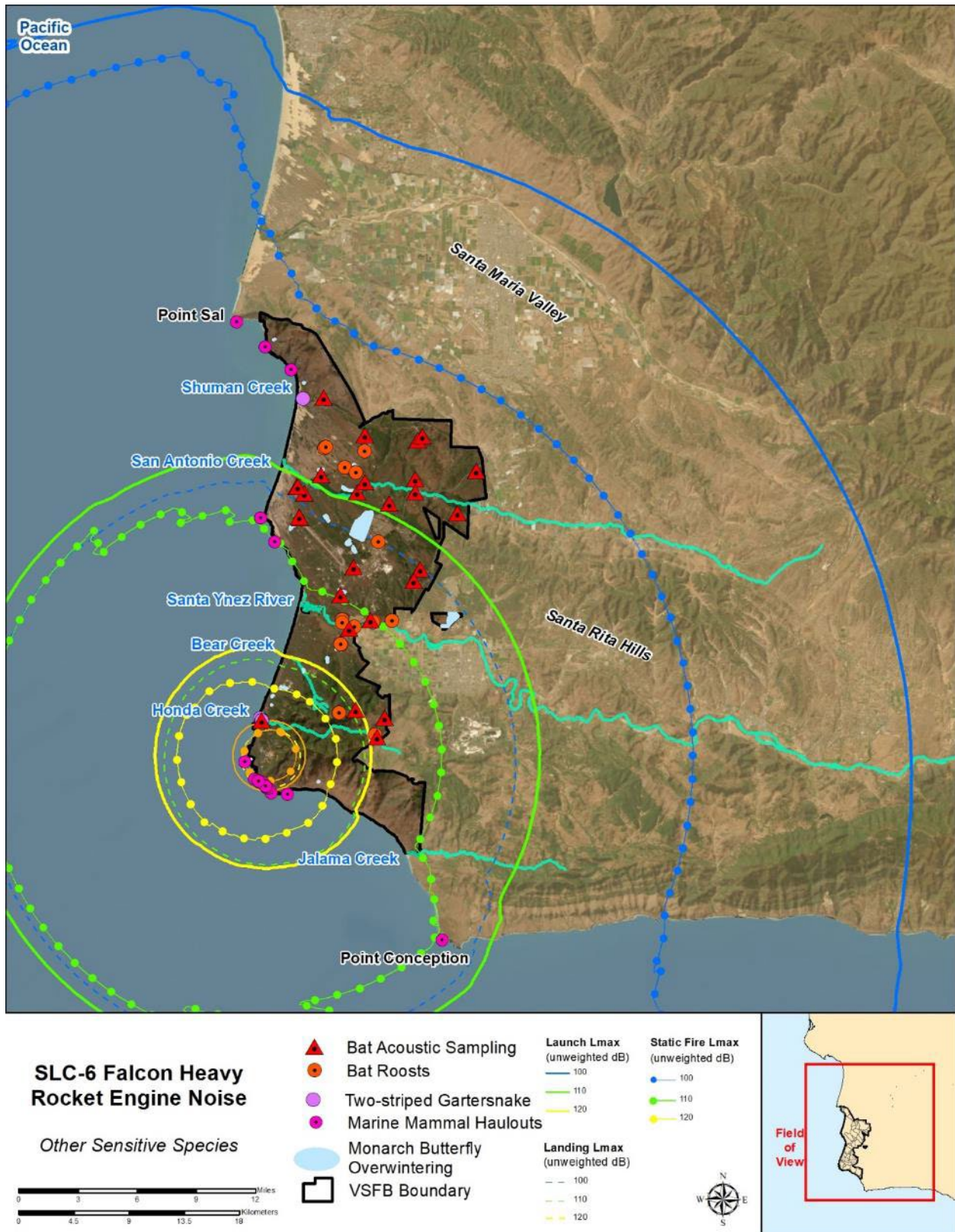


Figure C.0-75. Other sensitive species and Falcon Heavy SLC-6 static fire, launch, and landing rocket engine noise model results.

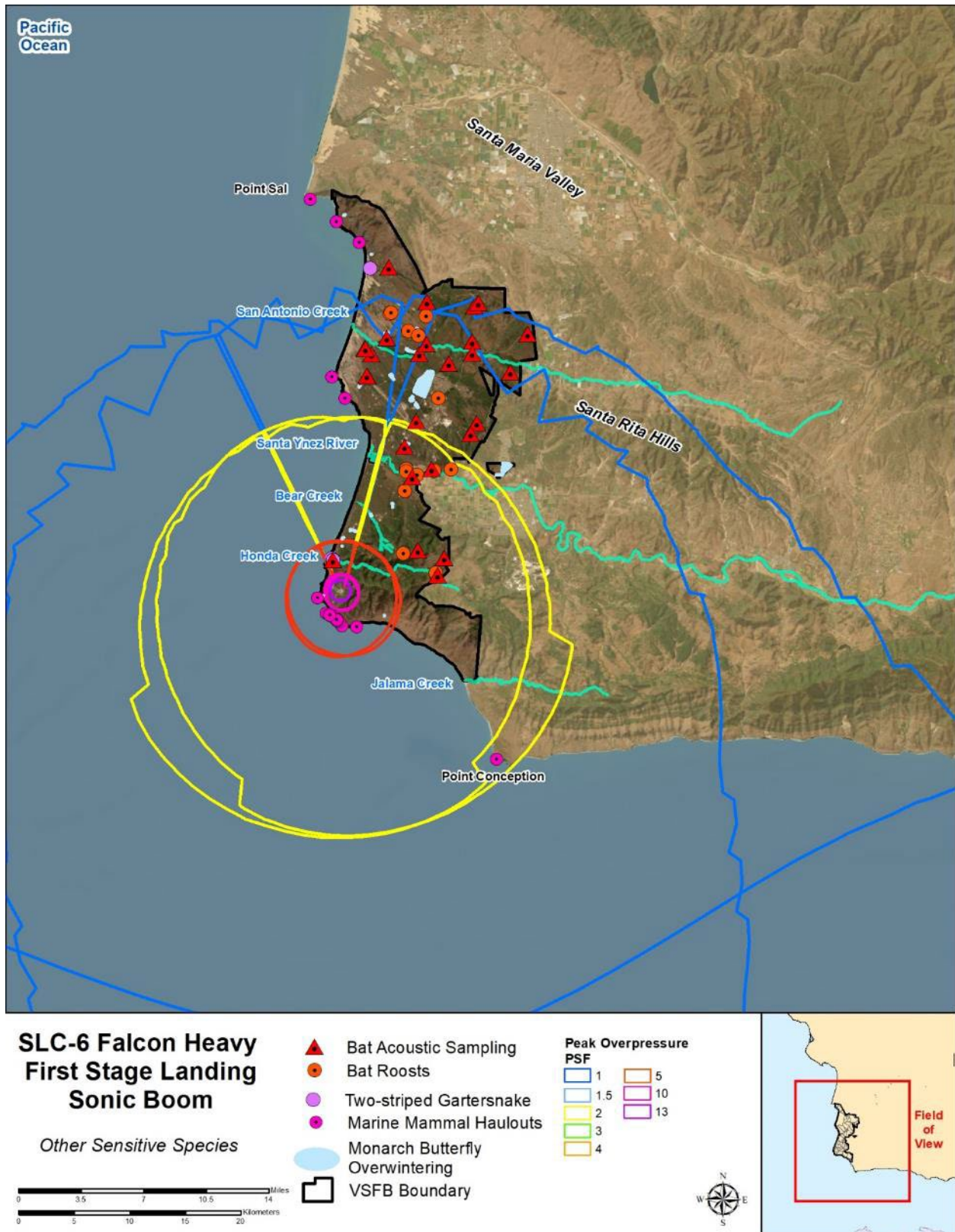


Figure C.0-76. Other sensitive species and two sample sonic boom model contours for SLC 6 landing events.

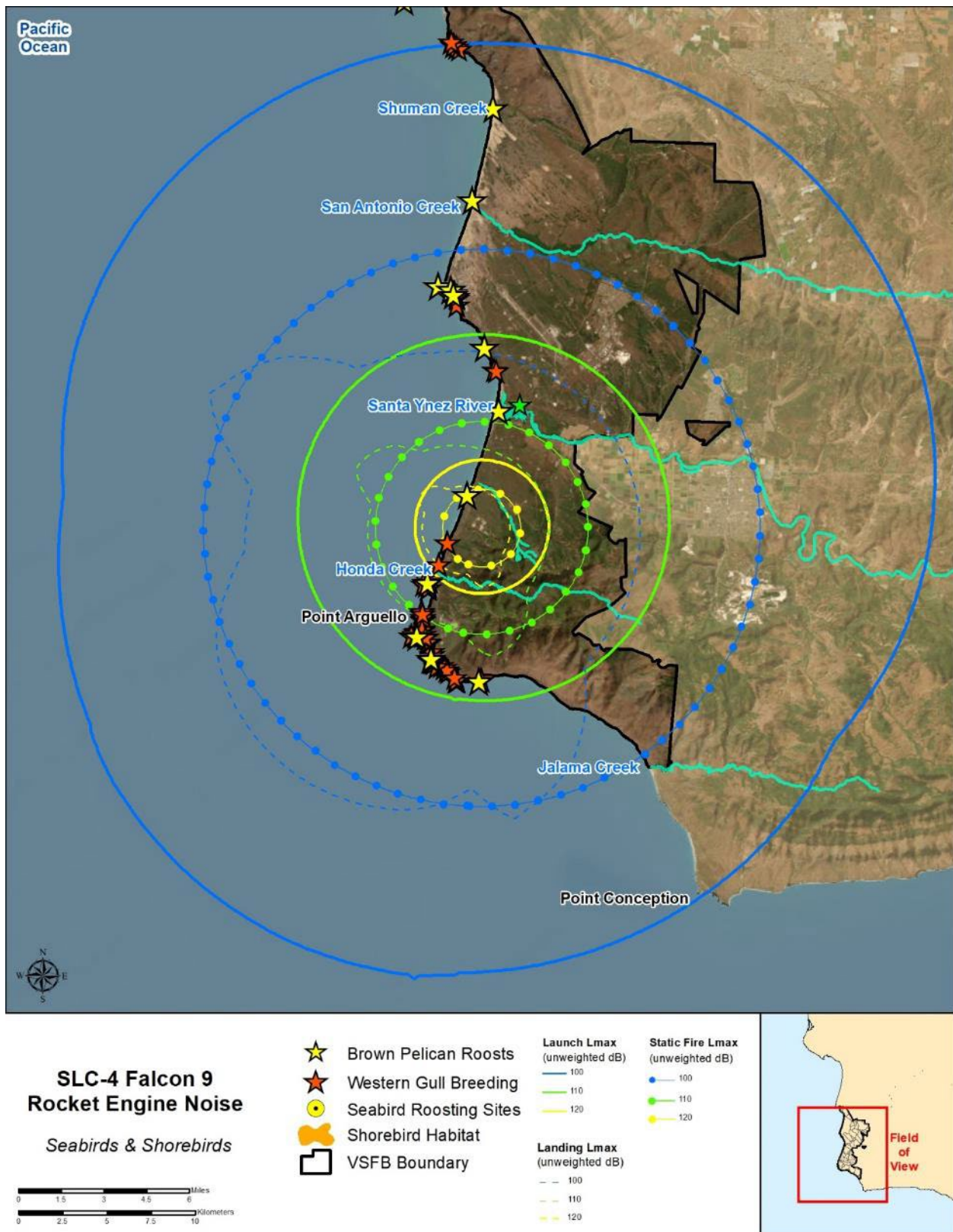


Figure C.0-77. Seabirds, shorebirds, and Falcon 9 SLC-4 static fire, launch, and landing rocket engine noise model results.

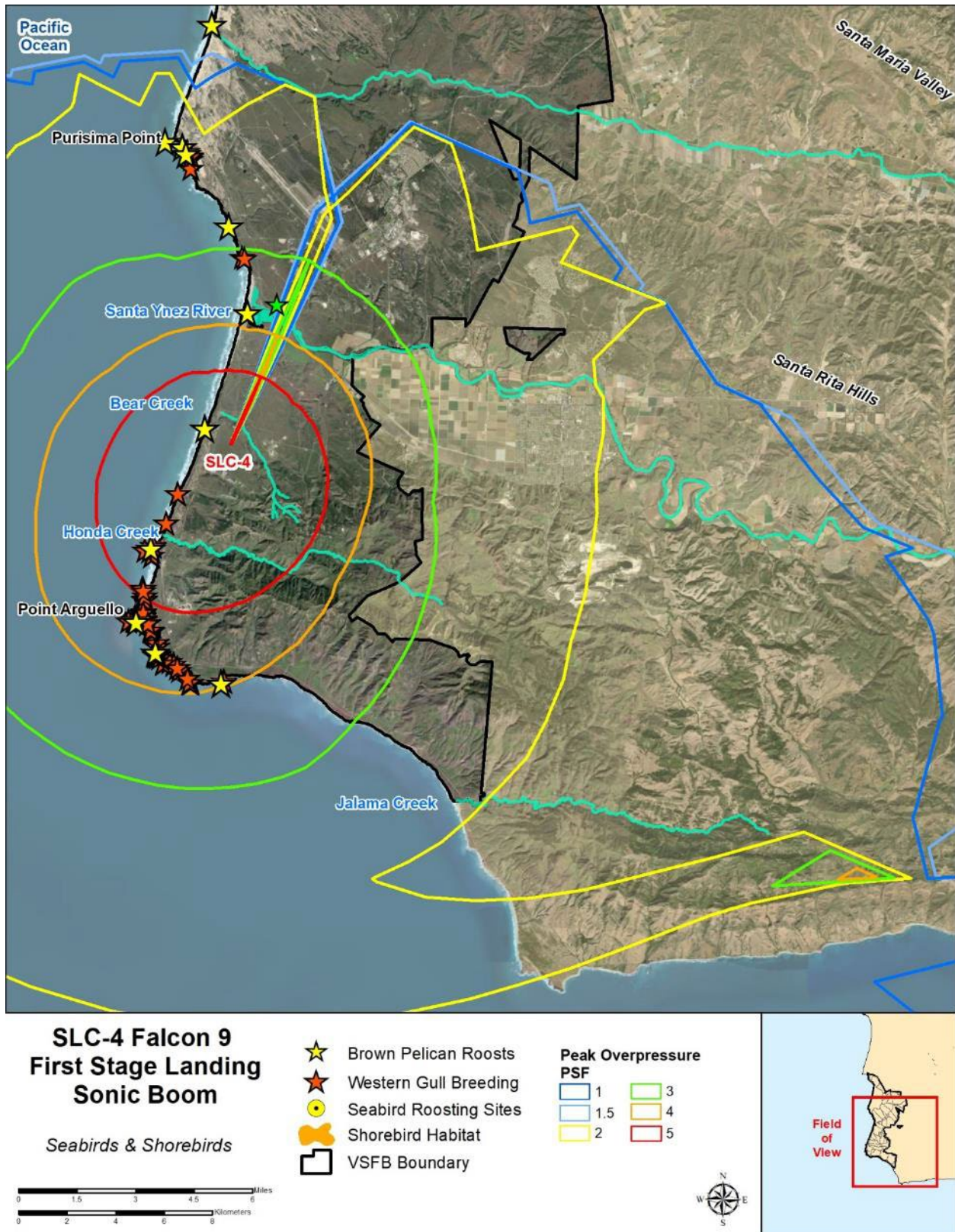


Figure C.0-78. Seabirds, shorebirds, and example SLC-4 landing sonic boom contours.

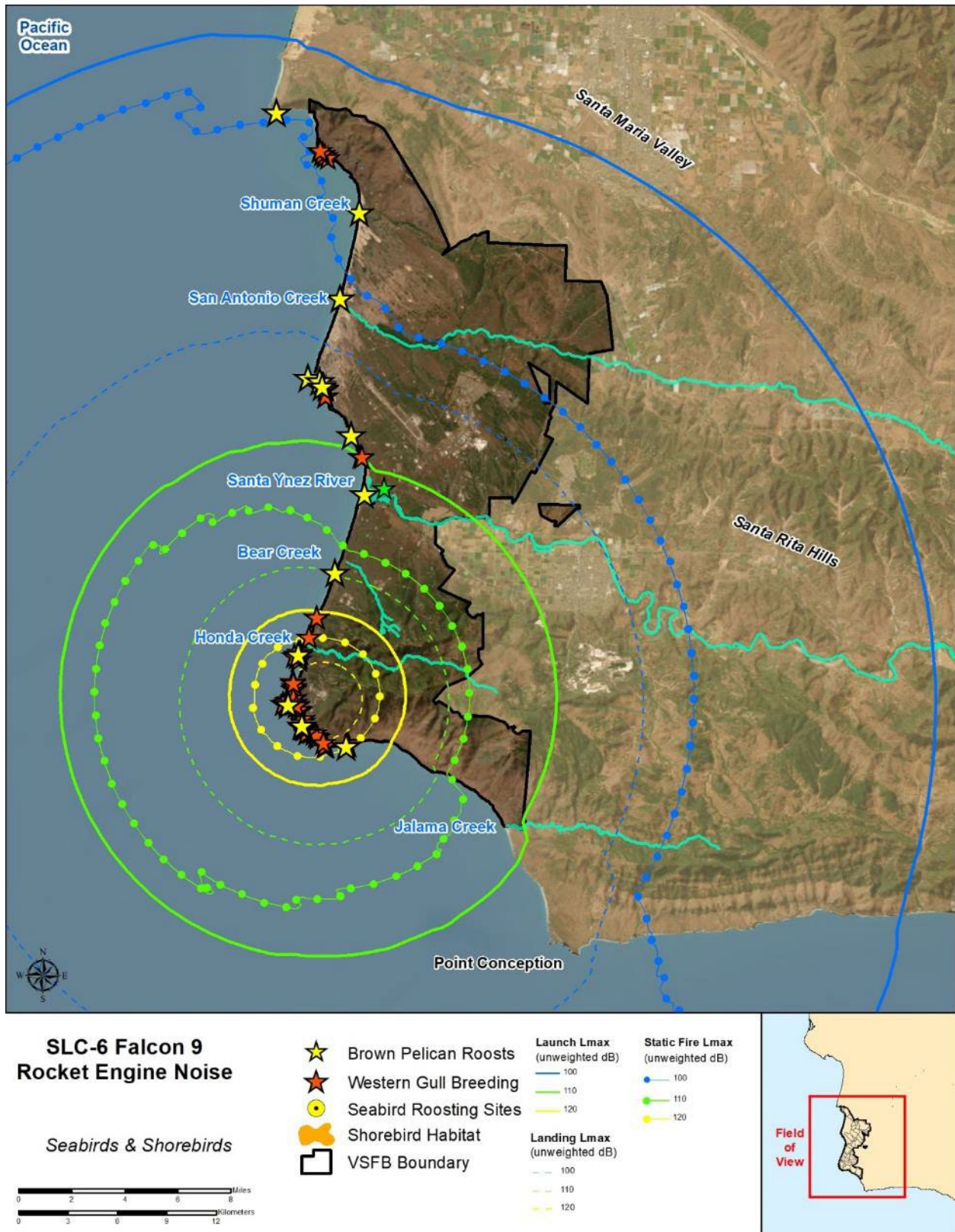


Figure C.0-79. Seabirds, shorebirds, and Falcon 9 SLC-6 static fire, launch, and landing rocket engine noise model results.

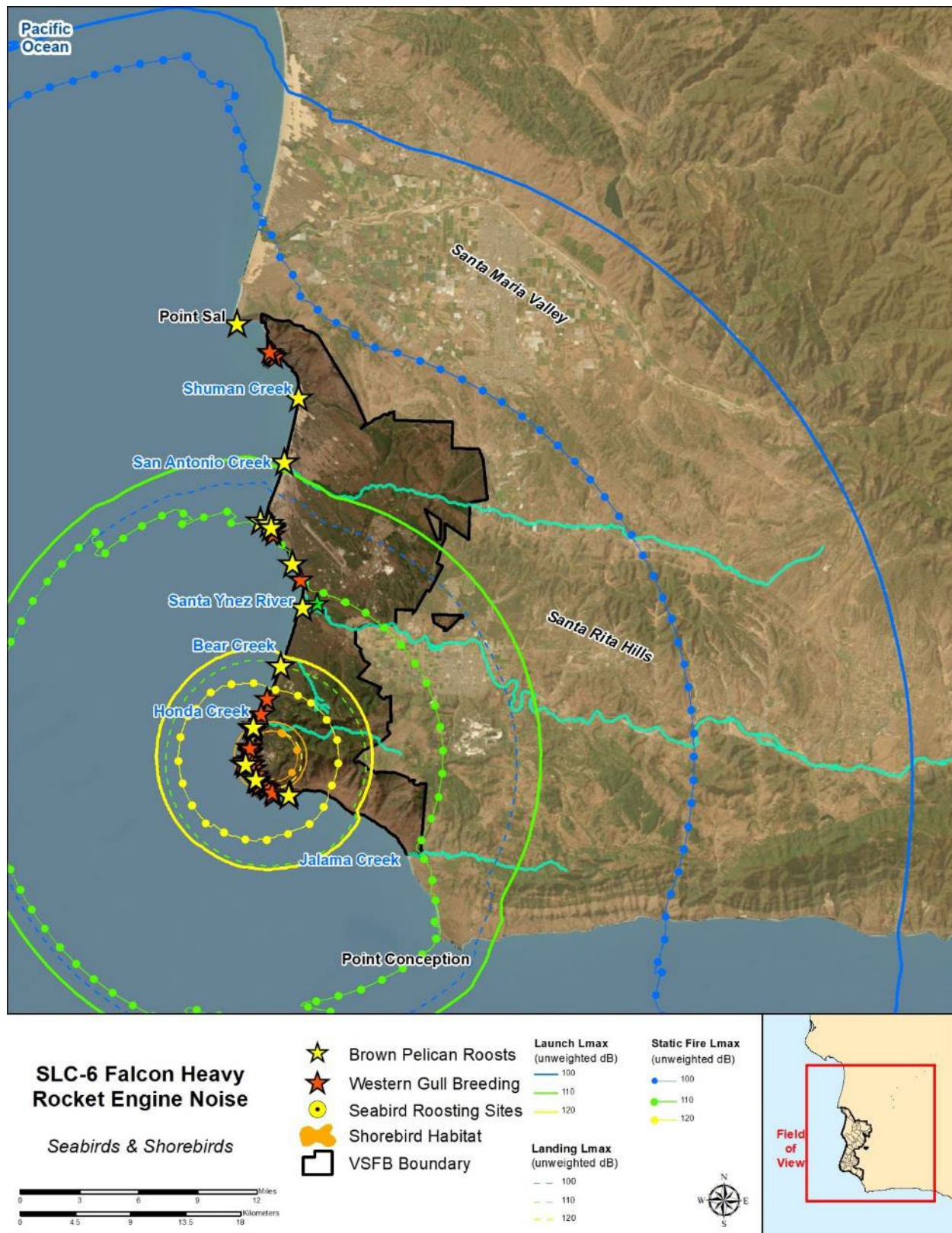


Figure C.0-80. Seabirds, shorebirds, and Falcon Heavy SLC-6 static fire, launch, and landing rocket engine noise model results.

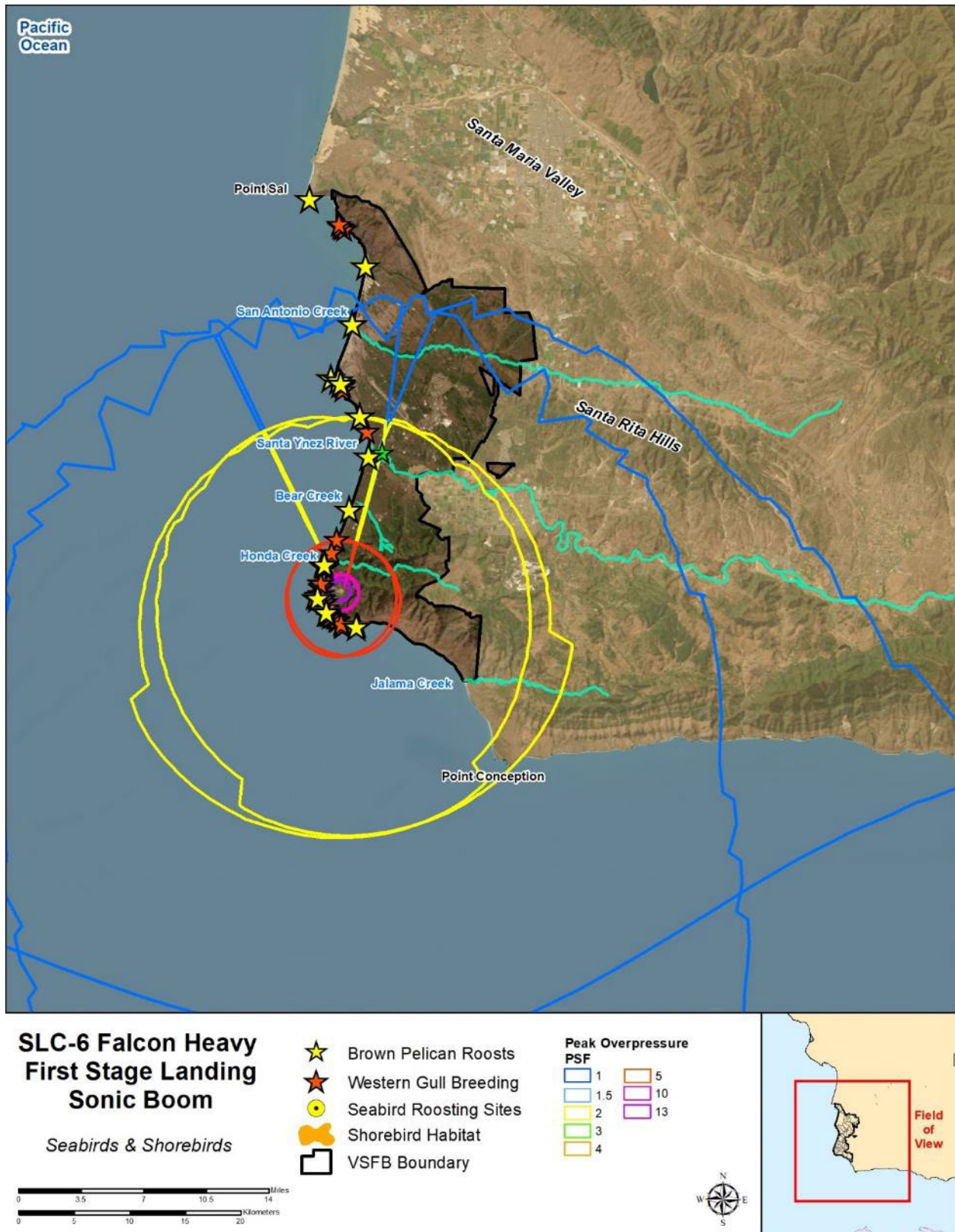


Figure C.0-81. Seabirds, shorebirds, and Falcon Heavy SLC-6 static fire, launch, and landing rocket engine noise model results.

APPENDIX D – BIOLOGICAL ASSESSMENT

Available in Appendix B of the Final EIS

APPENDIX E – NATIONAL MARINE FISHERIES SERVICE CONSULTATIONS

Available in Appendix C of the Final EIS

APPENDIX F – ENVIRONMENTAL PROTECTION MEASURES

Implementing the environmental protection measures (EPMs), outlined in Tables F.1-1 through F.6-1, would avoid or minimize potential adverse effects to various environmental resources during executing of the Preferred Alternative. Qualified SpaceX personnel or contractor staff would oversee fulfilling EPMs.

F.1 AIR QUALITY

The Santa Barbara County Air Pollution Control District (SBCAPCD) and California Air Resources Board (CARB) requires the dust control measures described in Table F.1-1 to decrease fugitive dust emissions from ground disturbing activities, as applicable to the Proposed Action.

Table F.1-1: Control Measures to Decrease Emissions

✓	Any portable equipment powered by an internal combustion engine with a rated horsepower of 50 brake horsepower or greater used for this project shall be registered in the California State-wide Portable Equipment Registration Program or have a valid SBCAPCD Permit to Operate.
✓	Ultra-low sulfur diesel fuel (15 parts per million by volume) will be used for all diesel equipment.
✓	CARB-developed idling regulations will be followed for trucks during loading and unloading.
✓	When feasible, equipment will be powered with Federally mandated “clean” diesel engines.
✓	The size of the engine in equipment and number of pieces of equipment operating simultaneously for the project should be minimized.
✓	Engines should be maintained in tune per manufacturer or operator’s specification.
✓	U.S. Environmental Protection Agency (USEPA) or CARB-certified diesel catalytic converters, diesel oxidation catalysts, and diesel particulate filters may be installed on all diesel equipment.
✓	SpaceX shall adhere to the CARB In-Use Off-Road Diesel-Fueled Fleets Regulation (CARB 2024) for fleet management and fuel selection.
✓	CARB diesel will be the only fuel combusted in the engines while in California Coastal Waters.

F.2 TERRESTRIAL BIOLOGICAL RESOURCES

The terms and conditions and reasonable and prudent measures identified during the Section 7 consultation and current consultation with the USFWS and the resultant BO would be implemented.

F.3 MARINE BIOLOGICAL RESOURCES

The DAF and qualified SpaceX personnel or contractor staff would ensure that all applicable minimization, monitoring, and avoidance measures listed in Tables F.3-1 would be implemented during operation of the Proposed Action. For the southern sea otter, the terms and conditions and reasonable and prudent measures identified during the Section 7 consultation and current consultation with the USFWS and the resultant BO would be implemented.

Table F.3-1 Minimization, Monitoring, and Avoidance Measures

✓	Sonic boom modeling (commercially available modeling software [PCBoom] or an acceptable substitute) would continue to be completed prior to each launch to verify and estimate the overpressure levels and footprint.
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✓	Semi-monthly surveys (two surveys per month) would continue to be conducted to monitor the abundance, distribution, and status of pinnipeds at VSFB. Whenever possible, these surveys will be timed to coincide with the lowest afternoon tides of each month when the greatest numbers of animals are usually hauled out.
✓	Marine mammal monitoring and acoustic measurements will be conducted at the Northern Channel Islands (NCI) if the sonic boom model indicates that pressures from a boom will reach or exceed 7 psf from 1 January through 28 February, 5 psf from 1 March through 31. July, or 7 psf from 1 August through 30 September. No monitoring is required on NCI from 1 October through 31 December. The monitoring methods are described in the LOA included in Appendix E.
✓	The DAF will continue to submit report detailing results of the monitoring program, to the Office of Protected Resources, NMFS, and the West Coast Regional Administrator, NMFS, in compliance with the requirements of the current LOA.
✓	Discoveries of injured or dead marine mammals, irrespective of cause, would be reported to the Office of Protected Resources, NMFS, and the West Coast Regional Stranding Coordinator, NMFS. Specific protocol would be followed depending on the cause of the event, if cause is unknown, and whether injury or death was relatively recent.
To reduce the risk of injury or mortality of ESA-listed species in the marine environment, the following EPMs will continue to be implemented during first stage and fairing recovery operations:	
✓	The DAF will ensure that all personnel associated with vessel support operations are instructed about marine species and any critical habitat protected under the ESA that could be present in the proposed landing area. Personnel will be advised of the civil and criminal penalties for harming, harassing, or killing ESA-listed species.
✓	Support vessels will maintain a minimum distance of 150 ft from sea turtles and a minimum distance of 300 ft from all other ESA-listed species. If the distance ever becomes less, the vessel will reduce speed and shift the engine to neutral. Engines would not be re-engaged until the animal(s) are clear of the area.
✓	Support vessels will maintain an average speed of 10 knots or less.
✓	Support vessels will attempt to remain parallel to an ESA-listed species' course when sighted while the watercraft is underway (e.g., bow-riding) and avoid excessive speed or abrupt changes in direction until the animal(s) has left the area.
✓	The DAF will immediately report any collision(s), injuries, or mortalities to ESA-listed species to the appropriate NMFS contact.
✓	To offset the impacts from unrecoverable debris in state waters, SpaceX will continue to make an annual contribution to the California Lost Fishing Gear Recovery Project and the National Marine Sanctuary Foundation. For every pound of unrecovered debris in state waters, SpaceX would make a compensatory donation of \$20.00.
✓	Vessels will enter the harbor, to the extent possible, only when the tide is too high for pinnipeds to haul-out on the rocks. The vessel will reduce speed to 1.5 to 2 knots once the vessel is within 3 mi of the harbor. The vessel will enter the harbor stern first, approaching the wharf and mooring dolphins at less than 0.75 knots.
✓	Vessels using the harbor will follow a predetermined route that limits crossing kelp beds.
✓	No vessels will anchor within kelp beds or hard-bottom habitat outside of the dredge footprint, and no vessel anchors within the dredge footprint will be placed in kelp or hard bottom habitat.

✓	Activities that could result in the startling of wildlife in the vicinity of the harbor will be allowed so long as they are initiated before dusk and not interrupted by long periods of quiet (in excess of 30 minutes). If such activities cease temporarily during the night, they will not be reinitiated until dawn.
✓	Starting-up of activities (either initially or if activities have ceased for more than 30 minutes) will include a gradual increase in noise levels if pinnipeds are in the area.
✓	The restrictions on access to the intertidal area will be included in the personnel orientations provided at project startup and for new employees.
✓	The tug vessels and barge will be periodically cleaned as necessary to avoid impacts related to the transfer of non-native invasive pests and vegetation to VSFB Harbor.

F.4 WATER RESOURCES

The following measures, as described in Table F.4-1, would be implemented to minimize impacts on water resources and stormwater.

Table F.4-1: Water Resources and Stormwater Measures

✓	Best Management Practices (BMPs) will be implemented to minimize sediment, chemicals, debris or other pollutants from entering the storm water system, natural surface water drainages or groundwater per the latest California Stormwater Quality Association's Stormwater Best Management Practices Handbooks.
✓	Upon construction completion, disturbed soil areas will be stabilized with effective erosion control per the NPDES Construction General Permit.
✓	All temporary sediment and erosion control devices including silt fence and wattles with plastic netting shall be removed when disturbed soil areas are stabilized.
✓	Storm drain inlet protection will be used as needed to minimize pollutant discharge into storm drains.
✓	Fueling equipment or systems will only occur in pre-designated areas designed to capture runoff or spilled fuel or with portable spill containment devices.
✓	Hazardous and industrial materials that can be mobilized by contact with stormwater will be stored under cover prior to rain events.
✓	Trash disposal containers will be covered at all times. Trash that escapes from containers will be collected.
✓	Concrete materials, curing compounds, waste and washout water will be properly managed to prevent pollution. Washout water will be contained for evaporation.
✓	SpaceX will employ personnel trained to follow current California storm water pollution prevention industrial activity BMPs.
✓	SpaceX would prepare and implement an Industrial Storm Water Pollution Prevention Plan (SWPPP) including BMPs, employee training, storm water monitoring and reporting.
✓	SpaceX will continue to ensure that water ejected from the flame trench during launches does not result in any overland surface flow reaching Spring Canyon by maintaining current v-ditches within the SLC-4 fence-line and routinely assessing whether any additional diversion structures are necessary.

- ✓ Launch related wastewater and stormwater that accumulates within the flame trenches would be tested for contamination and disposed of per Regional Water Quality Control Board waste discharge waiver or permit and federal regulations.

F.5 CULTURAL RESOURCES

SpaceX personnel or contractor staff will ensure the following measures, described in Table F.5-1, would be implemented to minimize impacts on sensitive archaeological resources:

Table F.5-1: Cultural Resources Measures

Cultural Resources Measures
✓ If previously undocumented cultural resources are discovered during maintenance activities, work would stop, and the procedures established in 36 C.F.R. 800.13 and the VSFB Integrated Cultural Resources Management Plan shall be followed.

F.6 HAZARDOUS MATERIALS AND WASTE MANAGEMENT

SpaceX personnel or contractor staff will ensure the following measures, described in Table F.6-1, would be implemented to minimize impacts on hazardous materials and waste management:

Table F.6-1: Hazardous Materials and Waste Management Measures

✓ Proper disposal of hazardous waste would be accomplished through identification, characterization, sampling (if necessary), and analysis of wastes generated.
✓ All hazardous materials would be properly identified and used IAW manufacturer's specifications to avoid accidental exposure to or release of hazardous materials required to operate and maintain equipment.
✓ All equipment would be properly maintained and free of leaks during operation and maintenance activities. All necessary equipment maintenance and repairs would be performed in pre-designated controlled, paved areas to minimize risks from accidental spillage or release.
✓ SpaceX would ensure employees and contractor staff are trained in proper prevention and cleanup procedures.
✓ SpaceX would store liquids, petroleum products, and hazardous materials in approved containers and drums and would ensure that any open containers are covered prior to rain events.
✓ Per 40 CFR Part 112, Spill Prevention, Control, and Countermeasure Plan, SpaceX would place chemicals, drums, or bagged materials on a pallet and, when necessary, secondary containment.
✓ All aboveground oil or fuel tanks and containers 55 gallons or greater shall be reported to the 30 CES/CEIEC tank manager. All tanks and containers must be doubled-walled or constructed with secondary containment at minimum of 110 percent of the total capacity.

F.7 NOISE

In order to minimize any potential disturbance to human populations as a result of sonic boom, the DAF and SpaceX will notify the public prior to missions with potential sonic boom impacts in the Lompoc area,

eastern Santa Barbara County, and Ventura County so that the public can anticipate and prepare for the potential disturbance.

APPENDIX G – MARINE DEBRIS

Introduction

In accordance with Consistency Determination CD-0003-24, the Department of the Air Force (DAF), is providing this Marine Debris update pursuant to Measure 6:

6. Marine Debris. Marine Debris. DAF will ensure that annual payments by the Space Exploration Corporation (SpaceX) are made at a rate of \$20 (adjusted annually for inflation) for each pound of unrecoverable marine debris generated as a result of space launch and landing activities, including the release of weather balloons in advance of launch and/or landing activities occurring in State waters. The annual marine debris offset payment will be divided equally and provided to the U.C. Davis Lost Fishing Gear Recovery Project (U.C Davis Program) and the National Marine Sanctuary Foundation (Foundation). The Foundation partners with the California State University Channel Islands' Santa Rosa Island Research Station (CSUCI SRIRS) and administers an account specifically supporting the CSUCI SRIRS marine debris collection and removal program. In addition, DAF will, within 30 days of the Commission's consideration of Consistency Determination No. CD-0003-24, provide an update to the Executive Director describing its recent efforts to evaluate and implement measures to reduce the amount of marine debris released as part of launch activities (and described in the CD and the 2023 EA/FONSI for 36 launches), such as by minimizing the number of weather balloons released per launch, exploring alternatives to the released weather balloons, and modifying the radiosondes. If technological and/or operational advancements in the future allow for further reductions of the use of weather balloons or marine debris associated with launches, DAF will consider further marine debris reduction efforts. DAF will also provide an annual report to the Executive Director by January 1st of each year that includes the amounts and types of marine debris released as part of each SpaceX launch and provides details about the amounts of plastics and other materials within the released debris.

Weather Balloons

Since December 2023, the DAF has reduced the requirement for weather balloon releases by 10-20 balloons per launch as recent technology has improved and protocols have been updated. Currently approximately 6 weather balloons are released per launch to measure weather variables. In general SpaceX releases 5 balloons per launch; however, 1 in every 5 launches a 6th balloon is released. The SLD 30 Operations Support Squadron, on average, releases 1 balloon in support of each SpaceX launch; however, they retain the ability to launch 4 balloons per Return to Launch Station missions (boost-backs) and 3 for droneship landing mission, if needed.

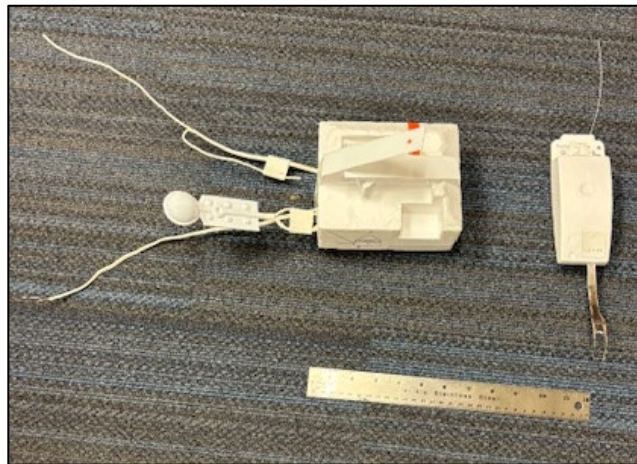
The DAF is continuing to review and update protocols to see under what circumstances weather balloon releases may be waived or reduced (such as during stable weather conditions). The weather balloons are 100% biodegradable natural latex.



Weather Balloon with
LMS Radiosonde

Radiosondes

The DAF is currently updating the radiosondes used on weather balloons. The existing system is the Lockheed Martin Sippican LMS Radiosonde which has three 3-volt lithium batteries. The DAF is moving to a new system using the Vaisala RS-41 which is approximately 50% less weight, 1/3 the size of the model that has been previously used and uses two 1.5-volt AA lithium batteries.

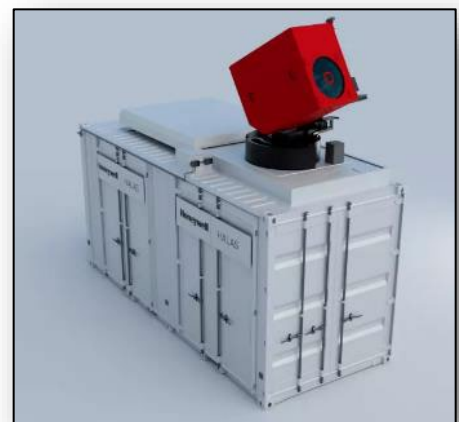


Vaisala RS-41 Radiosonde - New System (right)
Lockheed Martin Sippican LMS Radiosonde – Existing System (left)

Alternatives

The DAF has been and will continue to actively explore alternatives to using weather balloons. The following are currently under consideration and/or testing at Vandenberg Space Force Base:

1. Tropospheric Doppler Radar Wind Profiler/Vertical Wind Profiler
 - a. Expected to reduce balloon usage by approximately half or more
2. High-Altitude Lidar for Atmospheric Sensing (HALAS) system
 - a. Currently being tested at VSFB
 - b. This system would reduce requirements for weather balloons, but would not fully replace
3. Unmanned Aircraft
 - a. This is an experimental option that is being explored.
 - b. There is potential for this to reduce/eliminate the need for some of the weather balloons.



HALAS System

APPENDIX H – COMMERCIAL AND RECREATIONAL FISHING COORDINATION PLAN

Commercial and Recreational Fishing Coordination Plan

1. Introduction

This plan outlines the communication protocol and coordination efforts between Launch Service Providers (LSP), the Department of the Air Force (DAF), and the commercial and recreational fishing industry. The goal is to ensure the safety and awareness of mariners operating in the vicinity of VSFB during launch activities and hazardous operations. This plan has been developed in accordance with Consistency Determination CD-0003-24:

7. Commercial and Recreational Fishing Coordination Plan. Within 30 days of the Commission's consideration of Consistency Determination No. CD-0003-24, DAF will submit a Commercial and Recreational Fishing Coordination Plan to the Executive Director for review and comments. The Plan will include the development and implementation of a communication protocol, including regular dialogue, developed in coordination with the commercial and recreational fishing industry most likely to be affected by launch and landing activities at Vandenberg Space Force Base as well as an email to local fishermen's associations that includes the date and time of the surveillance area, the vessel hazard area that is also available in the Notice to Mariners, and for how long these will be in effect. DAF shall consider comments provided by the Executive Director and strive to address them, when possible.

2. Communication Protocol

2.1 Danger Zone Hotline

Mariners operating in the Vandenberg SFB area will receive the status of Vandenberg Danger Zones via email or text alert. This will provide up-to-date information on launch activities and any associated danger zones in Figure 1.

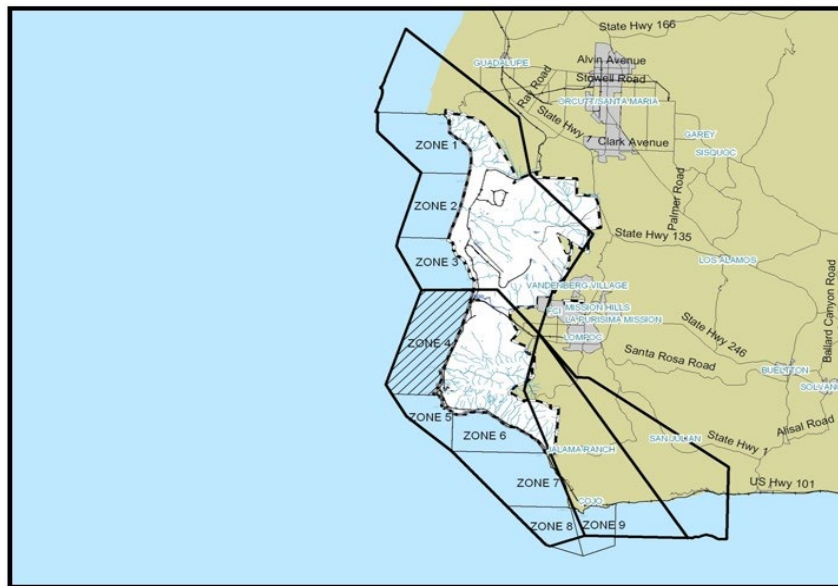


Figure 1. Vandenberg Danger Zones

2.2 Frontier Control Operations

Frontier Control will be manned and available on marine channels 6 & 16 no later than 3 hours prior to scheduled launch operations.

3. Distribution List

The following Harbor Masters will be included in the distribution of launch notifications and updates through the Launch Service Provider and Space Launch Delta 30 (SLD 30) Public Affairs:

- Harbor Master, Morro Bay
- Harbor Master, Santa Barbara
- Harbor Master, Oxnard
- Harbor Master, San Luis
- Harbor Master, Ventura Marina
- Harbor Master, Port Hueneme

4. Public Notices

Public Notices to Mariners links are available at the Vandenberg SFB website at <http://www.vandenberg.spaceforce.mil>.

4.1 Local Notice to Mariners

Local Notices to Mariners are publicly published on the USCG LNM District 11 page, which is updated weekly. Mariners can access these notices at: <https://www.dco.uscg.mil/Featured-Content/Mariners/Local-Notice-to-Mariners-LNMs/District-11/>

5. Additional Communication Channels

5.1 Concerns and Questions

An avenue for questions or concerns will be established on the <http://www.vandeneberg.spaceforce.mil> website to address concerns from the fishing community.

5.2 Sign-Up for Launch Information

A sign-up system will be implemented, initially including harbor master's aforementioned, to notify commercial and recreational fishermen who opt-in to either text or email of the date, time frame, and launch activities, including a map of avoidance areas if available. This system will ensure timely and accurate information dissemination to the affected parties.

6. Town Hall Meetings

6.1 Purpose

Town hall meetings will be held at the Santa Barbara and San Luis Obispo harbors and organized to provide a platform for direct communication between Vandenberg SFB and the commercial and recreational fishing community. These meetings will serve to address concerns, provide updates, and gather feedback from stakeholders.

6.2 Schedule

The DAF would hold town hall meetings ideally in first quarter of CY 2025, and annually after that, to ensure ongoing communication and coordination. The schedule for these meetings will be published on the Vandenberg SFB website and distributed to the Harbor Masters listed in Section 3.

6.3 Agenda

The agenda for each town hall meeting will include:

- Updates on launch activities
- Review of recent launch events and any communication issues encountered
- Discussion of safety protocols and avoidance areas
- Open forum for questions and feedback from the fishing community

6.4 Participation

Representatives from Vandenberg SFB will be present at the town hall meetings from 2d Range Operations Squadron, Airspace & Offshore Management, the SLD 30 Safety Office, the SLD 30 Environmental team, and SLD 30 Public Affairs. Members of the commercial and recreational fishing community, including Harbor Masters and other stakeholders, are encouraged to attend and participate.

7. Measures of Effectiveness

7.1 Direct Messaging Effectiveness

The Measures of Effectiveness for the plan include stakeholder awareness, measured by the percentage of mariners aware of upcoming launch activities. This is gauged through engagement with harbor master's measuring satisfaction with communication efforts and sign-ups for the direct messaging system.

7.2 Town Hall Effectiveness

The effectiveness of town hall meetings is measured by the number of fishermen participating in town hall meetings, as well as the level of engagement and feedback from the fishing community who feel their concerns were addressed and the number of actionable feedback items implemented.

APPENDIX E

Public Participation

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APPENDIX E PUBLIC PARTICIPATION

The following is a summary of public involvement and stakeholder outreach activities conducted by the United States (U.S.) Department of the Air Force (DAF), in cooperation with the Federal Aviation Administration (FAA) and the U.S. Coast Guard (USCG), during the public scoping period and Draft Environmental Impact Statement (EIS) public review and comment period for Authorizing Changes to the Falcon Launch Program at Vandenberg Space Force Base, California. Outreach and involvement efforts were conducted in accordance with the National Environmental Policy Act (NEPA). The DAF is the lead agency for the preparation of the EIS, and the FAA and USCG are cooperating agencies.

E.1 Public Scoping Period

The purpose of public involvement and outreach during the public scoping period was to (1) notify and inform stakeholders and the public about the Proposed Action and the intent to prepare an EIS; and (2) provide the opportunity for stakeholders and the public to submit comments on the scope of the EIS, potential alternatives, environmental concerns, issues that should be addressed in the EIS, and the project's potential to affect historic properties pursuant to Section 106 of the National Historic Preservation Act. Table E-1 provides a summary of key public scoping activities. Additionally, the DAF notified local, state, and federal agencies and tribes in writing of the intent to prepare an EIS and host public meetings. A total of 1,188 comments were received during the scoping period. The scoping comments are summarized in Table E-2.

Table E-1. Key Public Scoping Activity Dates

Activity	Dates
Federal Register Notice of Intent	13 December 2024
Public Scoping Period	13 December 2024, through 27 January 2025
Public Scoping Comment Period Close Date	27 January 2025 (to be considered in Draft EIS)
Newspaper Advertisements	16 December 2024: <i>Los Angeles Times</i> 18 December 2024: <i>Lompoc Record</i> 20 December 2024: <i>Santa Maria Times (Spanish)</i> , <i>Ojai Valley News</i> , <i>Ventura County Star</i> 22 December 2024: <i>Los Angeles Times</i> , <i>Ventura County Star</i> 2 January 2025: <i>Santa Barbara Independent</i> * 9 January 2025: <i>Santa Barbara Independent</i> 10 January 2025: <i>Santa Maria Times (Spanish)</i> , <i>Ventura County Star</i> , <i>Ojai Valley News</i> 12 January 2025: <i>Los Angeles Times</i> , <i>Ventura County Star</i> 13 January 2025: <i>Los Angeles Times</i> , <i>Lompoc Record</i>
Public Scoping Meetings	14 January 2025: Veterans of Foreign Wars Post 1679 15 January 2025: Westside Neighborhood Center 16 January 2025: Dick DeWees Community Center 23 January 2025: Virtual Public Meeting via Zoom.gov

*The Santa Barbara Independent made an error causing the initial publication date of December 19, 2024, to be missed. Due to the publication error the ad instead ran on January 2, 2025.

Table E-2. Summary of Public Scoping Comments

Resource Area/Topic	Issue/Concern
Air Quality	• Increase in air pollution from increased launches (80). • Concern about the localized depletion of ozone in California (50). • Concern about rocket fuel and increased need with more launches (45). • Rockets create debris, soot, and fiberglass that falls in neighborhoods (35). • Concern about reducing the launch window availability by “overcrowding” the lower atmosphere. • Concern about exceeding World Health Organization standards in nitrogen oxide emissions. • Request the project obtain an Authority to Construction permit from the Santa Barbara County Air Pollution Control District. • Request for the project follow all Santa Barbara County Air Pollution Control District regulations.
Climate Change	• Concern about the increase in greenhouse gas emissions when focus should be on decarbonizing practices (3). • Concern about the contribution of the entire process of design, engineering, construction and satellite launches to global warming (3). • Concern about the launches to impact the local weather (2).
Space Debris	• Presence of space “junk,” debris, and pollution from rockets (100). • Include an analysis of the Kessler Syndrome and resulting cumulative or indirect impacts of new satellites and other new orbiting material that would be introduced under the proposed action (10). • Concern about the ability of early detection systems to be confused by “space junk” and not be able to identify potential threats in the lower atmosphere.
Cumulative Impacts	• Concern about cumulative impacts of increasing the launch cadence (30).
Noise	• Concern that sonic booms cause property damage (e.g., cracks appearing in walls or foundations, windows breaking) (890). • Request launches be conducted during daytime hours to reduce noise at night (700). • Concern about increase in noise and sonic booms with increased launches (680). • Concern about noise impacts on pets (415). • Request that all residents receive notice prior to launches via email or text message (100). • Concern that noise is affecting children’s sleep patterns and their ability to learn (50). • Disproportionate noise impact on those who reside in mobile homes (3). • Request for the noise study to make a clear distinction between landing operations on the base versus landing operations on drone ships (2). • Concern that sonic booms will impact fault lines in the Proposed Action area (2). • Concern about the creation of a “sonic boom cone” extending 101 miles in the surrounding areas for each launch.

Resource Area/Topic	Issue/Concern
	• Request for sonic boom analysis to be measured from real-time launches and maximum permissible sound levels throughout the year rather than computer modeled numbers. • Concern that knowledge of the timing of launches does not help with severe reactions from sonic booms. • Request noise levels inside homes from sonic booms be measured. • Request to include Ojai Valley in the sonic boom analysis. • Request for all sonic boom field measurements collected from Santa Barbara to Malibu to be made public. • Request that noise complaints submitted to VSFB between the Environmental Assessment comment period and now should be considered in the noise evaluation of this EIS. • Claim that residents that moved to the area prior to 2024 have a legal right to live without the “nuisance” of weekly launches. • Concern that sonic boom landings are not necessary since there is the option to use drone ships. • Request for new mitigation measures to be implemented to reduce or dampen the current sonic boom produced by launches. • Question how the night-time launches don’t violate current California noise ordinances. • Concern about possible hearing loss from the sonic booms over time. • Stated there is no concern about launches if the sonic booms are mitigated or prevented. • Concern that these sonic booms violate the existing over-land sonic boom prohibition from 1973. • Request for a third party to complete the analysis on noise.
Terrestrial/ Freshwater Biological Resources	• Concern that noise from launches will impact wildlife (257). • Concern about the impact launches may have on birds (167). • Request for studies on the snowy plover and how it is impacted by the launches (35). • Concern about the impact on legally protected species such as the golden eagle or snowy plover (25). • Concern about the impact on local farm animals (2). • The California red-legged frog and snowy plover are not intelligent enough to be permanently impacted by the increased launches. • Concern about the impacts on insect behavior due to increased vibrations. • Request to look further into the environmentally sensitive habitats in Santa Barbara and San Luis Obispo counties. • Concern about the impact on Monarch butterflies.
Marine Biological Resources	• Request for environmental impacts on marine life to be studied more closely (97). • Concern that the increased launches will interfere with the migration pathways of marine life (89). • Concern about impacts on critically important environmental marine resources, including marine sanctuaries (45). • Concern about the impacts on the local seal populations (including those at

Resource Area/Topic	Issue/Concern
	Carpinteria Seal Sanctuary) and the potential for sonic booms to cause them to abandon or trample their young (6). • Marine life is more bothered by human activity than the launch noise so the Proposed Action will promote a healthier ecosystem (2). • Concern about sonic booms causing beached whales (2). • Concern that marine species are hypersensitive to the pressure changes and sounds produced by launches (2). • Request for a comprehensive maritime surveillance plan with an operational capability. • Concern about the impact on southern sea otters.
Water Resources	• Concern about an increase in water pollution with increased cadence (68). • Concern about the increased need for water due to increased cadence (67). • Request release of a detailed analysis of the wastewater created from each launch.
Cultural Resources	• Concern about impacts on critically important prehistoric archaeological resources (2). • Request analysis of potential effects on historic properties over time from increased cadence, booms, and vibrations (2). • Request a comprehensive inventory and assessment of all historic properties within the area of potential impact. • Request to financially support cultural resources and programs in the area.
Utilities	• Concern that launches can cause power outages and burst water mains. • Concern that launches are causing cell service interference. • Concern about removal or demolition of mobile service tower and environmental mobile shelter on Space Launch Complex (SLC)-6.
Socioeconomics	• Concern property values will decrease with more launches and disturbances (258). • Taxpayers should not subsidize commercial space programs (189). • Concern that the only wealth being added to the area is going to Elon Musk (7). • Concern about those who must evacuate Jalama Beach when a launch occurs and how the increase will make this harder on those individuals (5). • Concern that increased launches is only to support a private enterprise's requests (3). • Concern about negative impacts on local economy if launches are reduced or stopped. • Concern that "over-regulation" of the environment is chasing business out of the state. • Reinvestment needed for impacted communities from private entities that benefit from taxpayer subsidized activities (2). • Request a breakdown of commercial versus governmental launches per year. • Evaluate impact on small businesses from decline in tourism and health problems. • Concern about housing shortage from additional workers supporting increased cadence.
Transportation	• Concern about increased traffic.

Resource Area/Topic	Issue/Concern
Human Health and Safety	• Concern about health impacts from noise and vibrations, including those sensitive to noise and/or people with Post Traumatic Stress Disorder or prior trauma (560). • Concern about potential fires to start due to a failed launch (100). • Concern about individuals with autoimmune conditions being impacted greatly by the increased activity (46). • Concern about sonic booms and launches to cause ear pain and headaches (18). • Request for a detailed assessment of the psychological and physiological impacts of the increased launches on residents.
Hazardous Materials and Waste Management	• Concern when satellites die and reenter the atmosphere, they burn toxic chemicals (98). • Concern about carcinogenic materials being released and how they will be mitigated (2). • Concern about unknown health impacts of materials used that will become apparent for future residents to have to deal with (2). • Concern about toxic materials to be introduced to marine life. • Concern about human's increased exposure to Hydrazine propellant. • Concern about the impact rocket exhaust will have on soil quality and plant health. • Concern about the impact of sonic booms and vibrations on the nuclear power plant in the region.
Solid Waste Management	• Concern about solid waste reentering the atmosphere and falling back to Earth (180).
Coastal Resources (Coastal Zone Management Act)	• Concern about violations to the Coastal Zone Management Act with previous increase to 50 launches per year (3). • Concern that California Coastal Commission recently rejected the Air Force's consistency determination (2). • Include all data and results from sonic boom monitoring, as well as current or potential new avoidance and minimization measures, as agreed to under previous conditional consistency determination.
General Project	• Support for the No Action Alternative (725). • Request to reduce or stop launches rather than increasing frequency to 100 (654). • Request to change the launch location to uninhabited or nonresidential and less wildlife rich areas (395). • Threat to sue for property damages (194). • SpaceX missions wrongly classified as essential defense missions (170). • Support for increasing the space program, research, technology, and/or launches (69). • Concern that the space industry is being monopolized (60). • The scale of this project warrants a slow and cautious approach to analysis (3). • Request to "dogleg" the trajectories to allow for the sonic boom to not fall over land (3). • Request for the inclusion of all SLC-6 modifications in the EIS (2). • Request for more detailed descriptions of the launch and landing operations to

Resource Area/Topic	Issue/Concern
	be held at each space launch complex (2). • Request for the EIS to include all projected launch rates for the future (2). • Request for launches to be limited to 20 per year to create a balance between innovation and environmental stewardship (2). • Request for analysis of additional viable alternatives, such as more gradual, stepwise increase in frequency of launches guided by biological monitoring results. • Request for government oversight of SpaceX activities. • Request for compensation for property damage. • Concern that SpaceX would rather pay a fine for a rushed analysis than heed the law. • Support for the project as people who moved to the area knew that the base was in existence before they moved. • Support that national security must outweigh “temporary environmental harm.” • Concern that SpaceX has too much power and ability to influence analyses. • Concern that launches will not be able to be reduced in the future. • Request for public to be made aware of the purpose of each individual launch. • Concern about conflict of interest between the project proponents and investigators. • Question whether all launches could occur from SLC-6. • Question whether “Human Annoyance” can be a metric. • Question about plans to introduce Starship/Superheavy launches to VSF.

E.2 Draft EIS Public Review and Comment Period

The 45-day public review and comment period began with the U.S. Environmental Protection Agency’s publication of the Notice of Availability (NOA) of the Draft EIS in the Federal Register on 23 May 2025. During the Draft EIS public review and comment period, the DAF hosted three in-person public hearings and one virtual public hearing. The in-person public hearings took place on 10, 11, and 12 June 2025, from 5:00 to 8:00 p.m. Pacific Time. The virtual public hearing was held via Zoom Webinar on 18 June 2025 from 6:00 to 8:00 p.m. Pacific Time. The virtual public hearing was held to ensure maximum participation from interested parties not able to attend the in-person hearings.

Newspaper display advertisements were published in six local and regional newspapers in California. The advertisements were published beginning 23 May 2025, to coincide with publication of the NOA in the Federal Register, and again in early June 2025, closer to the scheduled public hearings. The publications included a description of the Proposed Action, dates, times, and locations of the public hearings, and a link to the project website. In addition, Space Launch Delta (SLD) 30 Public Affairs Office distributed a press release to various media outlets. Table E-3 lists the newspapers and corresponding publication dates for each advertisement and press release.

Table E-3. Public Hearing Newspaper Advertisements

Outlet	Distribution Frequency	Area Covered	Publication Dates
Newspapers			
Lompoc Record	Weekly; Wednesdays	City of Lompoc	28 May 2025 4 June 2025
Santa Maria Times en Espanol	Daily (online only)	Santa Maria Valley	30 May 2025 through 7 July 2025
Santa Maria Times (English)	Daily	Santa Maria Valley	27 May 2025 31 May 2025 6 June 2025 7 June 2025
Ventura County Star	Daily, except Saturday	Ventura County	23 May 2025 25 May 2025 6 June 2025 8 June 2025
Ojai Valley News	Daily online, Fridays only for print	Ojai Valley	23 May 2025 6 June 2025
Santa Barbara Independent	Weekly; Thursdays	Greater Santa Barbara Area	29 May 2025 5 June 2025
Los Angeles Times	Daily	Los Angeles County	23 May 2025 25 May 2025 6 June 2025 8 June 2025
Space Launch Delta (SLD) 30 Public Affairs Office			
SLD 30 Public Affairs Office distributed a media release to local media outlets	Once	Project Area	2 June 2025

The DAF notified local, state, and federal agencies and tribes in writing of the availability of the Draft EIS and public hearings. Notification letters were also emailed to interested parties. The project website (www.VSFBFalconLaunchEIS.com) provided the public with updated project information including the Draft EIS for viewing and download. The project website served as the primary hub for all information related to the EIS and public outreach.

E.2.1.1 Public Hearings

The purpose of the public hearings was to inform the public about the Draft EIS and solicit public comments. The hearings provided agency representatives and the public an opportunity to provide oral and written comments on the analysis of the Draft EIS. A Hearing Officer (military judge) presided over the public hearings. A certified court reporter was present at each meeting to record the presentation and oral comment session. Public hearing locations, dates and statistics are shown in Table E-4.

Table E-4. Draft EIS Public Hearings

Hearing Date	Location	Total Written Comments	Total Oral Comments	Total Attendees
Tuesday, June 10, 2025 5:00 to 8:00 p.m. Pacific time	Four Points by Sheraton/ Ventura Harbor Resort 1050 Schooner Dr. Ventura, CA	4	11	35
Wednesday, June 11, 2025 5:00 to 8:00 p.m. Pacific time	Santa Barbara Museum of Natural History 2559 Puesta del Sol Santa Barbara, CA	0	12	31
Thursday, June 12, 2025 5:00 to 8: 00 p.m. Pacific time	Hilton Garden Inn 1201 North H St. Lompoc, CA	4	14	46
Wednesday, June 18, 2025 6:00 to 8:00 p.m. Pacific time	Zoom Webinar	0	16	52

E.2.1.2 Draft EIS Public/Agency Comments

The 45-day Draft EIS public review and comment period ended on July 7, 2025. The DAF received the following comments:

Oral Comment Submittals: 53 (during Public Hearings)

Written Comment Submittals: 8 (during Public Hearings)

Electronic Comment Submittals: 241 (via project website)

Mailed Comment Submittals: 20

Substantive comments received on the Draft EIS were defined as comments that challenge the Draft EIS as being factually or analytically incorrect, identify impacts not analyzed in the Draft EIS, identify reasonable alternatives not included in the Draft EIS, identify feasible mitigations not previously considered by the DAF in the development of the Draft EIS, or offer differences in interpretations of significance and/or scientific and technical conclusions within the Draft EIS. The DAF is obligated to respond to such comments. Non-substantive comments are defined as comments that are generally nonspecific to the proposal (i.e., refer to an action that is separate from and not interconnected to this proposal), agree or disagree with the proposal, provide a vote for or against the proposal, or state a personal preference or opinion. The DAF is not obligated to provide responses to non-substantive comments. All comments received on this proposal will be included in the Administrative Record regardless of when they were received and regardless of their substantive or non-substantive nature.

Of the 322 total comment submittals received, 444 unique, substantive comments requiring responses were identified.

To address substantive comments received during the Draft EIS review period, standard comment responses were developed. Table E-5 shows the topic code and corresponding resource/topic area, which were used to code the standard comment responses. Table E-6 contains the standard comment responses, which is organized alphabetically by topic code. Table E-7 provides the substantive comments received during the Draft EIS comment period along with the response. In the response column of Table E-7, if a response code is provided, the standard comment response that coincides with the response code(s) can be found in Table E-6. For comments where a standard response did not fully address the comment, or no standard response was applicable, unique responses were provided in Table E-7, where applicable. In addition to substantive comments, the DAF received one or more non-substantive comments from the commenters listed in Table E-8. Table E-7 and Table E-8 are organized alphabetically by the commenter's last name. The DAF has recorded all comments received in the administrative record for this EIS.

Table E-5. Comment Topic Codes and Categories

Topic Code	Resource/Topic Area
AQ	Air Quality
BI	Biological Resources
CO	Coastal Resources
CR	Cultural Resources
CE	Cumulative Effects
DE	Debris
HM	Hazardous Materials and Wastes
N	Noise
NP	NEPA Process
P	Public Access
PA	Proposed Action and Alternatives
PN	Purpose and Need
S	Safety
SE	Socioeconomics
T	Trajectories
U	Unclassified
WR	Water Resources

Table E-6. Standard Comment Responses

Response Code	Standard Comment Response
AQ-01	As stated in Section 3.3.2.1.3 of the Environmental Impact Statement (EIS), an emerging area of research focuses on the potential effects of rocket launches on ozone levels and emissions in the upper atmosphere. While some research has indicated there may be such effects, primarily from black carbon impacting the ozone layer and/or global temperatures, currently there is neither a regulatory requirement nor a generally accepted method for analyzing these impacts. The Department of the Air Force (DAF) examined the research that has been published on this topic to date and determined the necessary data and tools do not exist to accurately estimate emissions of black carbon from rockets and any associated effects. A detailed analysis or effort to quantify stratospheric ozone effects of this Proposed Action is not practicable. Any quantification would be based on speculative assumptions and hypotheses rather than actual data. The National Environmental Policy Act (NEPA) does not require such speculation.
AQ-02	As analyzed in Section 3.3 (Air Quality) of the EIS, emissions from Falcon 9 and Falcon Heavy launches were modeled and evaluated using conservative estimates for the proposed launch cadence. The analysis determined that the Proposed Action would not result in violations of federal or state air quality standards and would be de minimis under the Clean Air Act. As the emissions are de minimis, no mitigations or future mitigations are required to be developed, beyond the implementation of environmental protection measures (EPMs) to minimize emissions from exhaust and dust (Section 3.3.2.5).
AQ-03	The Ventura County Air Pollution Control District (VCAPCD) operates real-time air quality monitoring stations throughout Ventura County, including in the City of Ojai (see: https://www.vcapcd.org/current-air-quality/). As described in Section 3.3.1.1 of the EIS, under the Clean Air Act, the United States Environmental Protection Agency (USEPA) established the National Ambient Air Quality Standards. As shown in Table 3.3-5 of the EIS, net annual emissions of the Proposed Action within the VCAPCD would not exceed the DAF significance thresholds. Additionally, the DAF would implement EPMs to minimize emissions from exhaust and dust (Section 3.3.2.5). As such, delaying launches during poor air quality conditions is not currently proposed as a mitigation measure, since the Proposed Action would not have a significant effect on air quality within the VCAPCD.
AQ-04	Secondary pollutants of concern relating to DAF actions currently have no Federal regulations specifically pertaining to Hazardous Air Pollutants (HAPs) emissions from engines or DAF bases. While a net-change inventory assessment may be useful for disclosure, reporting, and comparative purposes, it does not provide results that are directly comparable to any regulatory or enforceable ambient air quality standards or emission thresholds.
AQ-05	The EIS discusses launch-related emissions in Section 3.3. In addition, greenhouse gas (GHG) calculations are detailed in Appendix F of the EIS. While there are currently no binding GHG significance thresholds under NEPA, the DAF disclosed GHG emissions from the Proposed Action and evaluated their contribution to cumulative emissions. These emissions represent a small fraction of national totals.
AQ-06	The predominant winds at Vandenberg Space Force Base (VSFB) are North and Northwest, which pushes air to the south, away from Lompoc and offshore of downwind communities.

Response Code	Standard Comment Response
BI-01	The DAF monitors pinnipeds under the requirements of the National Marine Fisheries Service (NMFS) 2024 Letter of Concurrence (LOC) for Section 7 consultation and the NMFS 2024 Letter of Authorization (LOA) under the Marine Mammal Protection Act (MMPA). The LOA allows for unintentional take of pinnipeds by Level B Harassment (behavioral disruption) as a result of space launch activities undertaken by the DAF and requires monitoring and annual reporting to identify potential impacts to species. Noise levels as a result of the Proposed Action would not exceed established NMFS thresholds for either temporary or permanent hearing threshold shifts. Section 3.6.2.1.4 of the EIS acknowledges that visual disturbance and noise as a result of the Proposed Action is likely to cause a behavioral disruption in pinnipeds. Normal behavior and numbers of hauled out pinnipeds typically return to normal within two to four hours or less (often within minutes) after a launch event. During monitoring required by NMFS under the LOA, no observations of injury or mortality to pinnipeds have been attributed to past launches. Because the DAF complies with the conditions of the NMFS LOA and LOC and implements the required monitoring, the Proposed Action would not result in significant impacts on pinnipeds.
BI-02	As stated in Sections 3.6.2.1.3 and 3.6.2.1.4 of the EIS, NMFS has previously determined that the only potential stressors associated with the specified activities that could cause harassment of marine mammals (i.e., rocket engine noise, sonic booms) only have the potential to result in harassment of marine mammals that are hauled out of the water (NMFS 2024a). As a result, launches and first stage recoveries are not expected to result in harassment of marine mammals that are at sea.
BI-03	Section 3.6.2.1.7 of the Final EIS was revised to remove references to “pre-existing excluded activities” as the basis for exemption from Channel Islands National Marine Sanctuary (CINMS) prohibitions as it’s not directly applicable to the Proposed Action. The DAF appreciates this clarification and opportunity to revise the analysis to be more precise given the complex regulatory history of the CINMS and applicability of the sanctuary prohibitions. The revised EIS text will clarify that the Proposed Action involves ongoing launch activities originating from VSF, and that these operations are conducted under the authority of the DAF in support of national defense and civil space missions. Although the reference to pre-existing exclusions will be removed, the EIS supports that the Proposed Action would not result in significant impacts on marine reserves, including the CINMS, the Vandenberg State Marine Reserve, and the Chumash Heritage National Marine Sanctuary. This conclusion is supported in the analysis by detailed modeling of acoustic effects (including sonic booms) on marine resources and DAF’s informal consultation with the NMFS, which resulted in concurrence that the Proposed Action “may affect, but is not likely to adversely affect” marine species listed under the Endangered Species Act (ESA).
BI-04	The potential impacts of the Proposed Action to wildlife and habitat were analyzed in Section 3.5.2 of the EIS. The analysis determined that any reactions would likely be short term and are unlikely to cause any long-term consequences for individuals or populations. Therefore, the Proposed Action would not have a significant impact on wildlife resources due to launch-related noise. Additionally, impacts to species protected under the ESA were analyzed in Section 3.5.2.1.3. The DAF initiated Section 7 consultation with the United States Fish and Wildlife Service (USFWS) for ESA-listed species and would adhere to the terms and conditions of the resultant Biological Opinion, including any monitoring, minimization, and avoidance measures. As a result, the DAF determined that there would not be a significant effect on wildlife species, including ESA-listed species.

Response Code	Standard Comment Response
BI-05	The DAF incorporated the most recent monitoring data available in preparation of the Biological Assessment (see Appendix B of the EIS), including data from 2024, during which there were 46 Falcon 9 missions at VSFB. These data included monitoring results during breeding and nesting seasons for various ESA-listed species and, in combination with other past studies and scientific literature, were crucial in assessing potential effects of the Proposed Action. The DAF initiated Section 7 consultation with the USFWS for potential impacts of the Proposed Action on ESA-listed species. The DAF would implement all applicable minimization, monitoring, and avoidance measures in the resultant Biological Opinion (see Appendix B of the EIS). As a result, the DAF determined that there would not be a significant effect on wildlife species, including ESA-listed species.
BI-06	The DAF incorporated the most recent monitoring data available in preparation of the Biological Assessment (see Appendix B of the EIS), including data from 2024, during which there were 46 Falcon 9 missions at VSFB, and other past studies and scientific literature. The DAF initiated Section 7 consultation with the USFWS for potential impacts of the Proposed Action on southern sea otter and would implement all applicable minimization, monitoring, and avoidance measures in the resultant Biological Opinion (see Appendix B of the EIS), including continuing to conduct southern sea otter population surveys to monitor the densities and distribution of southern sea otters along VSFB's coastline to detect any unanticipated responses. Therefore, the Proposed Action would not result in significant impacts on ESA-listed southern sea otter.
BI-07	The DAF initiated Section 7 consultation with the NMFS in 2022 for the potential effects of space launching and landing activities at VSFB on ESA-listed marine species. The DAF's proposed action included up to 110 launches annually, 36 first stage landings on droneships, and 12 first stage landings at Space Launch Complex 4 West (SLC-4W). The analysis included potential effects of noise and evaluating the risk of entanglement for ESA-listed marine species from expended stages, unrecovered parafoils, parachutes, and weather balloons. While individuals could encounter expended materials that may pose a risk of entanglement, the likelihood of entanglement was determined to be extremely small because: (1) the encounter rate for these expended materials is low, (2) there is limited overlap with susceptible species, and (3) the physical characteristics of the expended materials reduce the risk of entanglement compared to abandoned fishing gear. In 2023, NMFS issued a LOC to the DAF that the action may affect but was not likely to adversely affect specified ESA-listed fish, sea turtles, pinnipeds, and cetaceans occurring within the action area. In 2024, the DAF reinitiated this consultation to increase first stage and booster recoveries on a droneship to 100 times per year, and expanding the first stage/booster and fairing recovery area in the Pacific Ocean. NMFS issued a LOC in 2024, concurring that the proposed action may affect, but was not likely to adversely affect the specified ESA-listed marine species. The 2023 Supplemental Environmental Assessment (EA) cites the 2023 LOC and the 2024 EA cites the 2024 LOC. The EIS also cites coverage for ESA-listed marine species under the NMFS 2024 LOC, which covers up to 110 launches per year, up to 100 first stage landings on a droneship per year, and up to 36 first stage landings at VSFB per year. Therefore, the conclusions reached in Section 3.6.2.1 of the EIS are appropriate.

Response Code	Standard Comment Response
BI-08	As discussed in Section 3.6.2.1.5 of the EIS and the 2024 EA, Guadalupe fur seals are relatively insensitive to disturbance, occur in low numbers at San Miguel Island in isolated locations, and are adept at jumping into the water if they do flee from a disturbance, therefore are unlikely to be injured if they flush due to launch disturbance. The DAF conducted informal Section 7 consultation with NMFS, which concurred potential impacts may affect, but not likely to adversely affect the Guadalupe fur seal through a LOC issued on 17 April 2024. Additionally, the LOA issued to SLD 30 by NMFS in 2024 allows unintentional take of small numbers of Guadalupe fur seals during launches. The Proposed Action would not result in exceedance of take thresholds as identified in the 2024 LOA. DAF complies with the conditions of the LOA and would continue to implement all applicable minimization, monitoring, and avoidance measures in the LOC and LOA. Therefore, the Proposed Action would not result in significant impacts on ESA-listed Guadalupe fur seal.
BI-09	The DAF has implemented improvements in monitoring to reduce risk of future failures. Overall, the number of failures has been relatively small, as is evident in Appendix B of the Biological Assessment for the Proposed Action (see Appendix B of the EIS), which presents all acoustic monitoring data collected for the SpaceX Falcon program at VAFB through January 2025. The DAF continues to ensure that any data loss due to equipment failures is minimized and when such failures occur, root causes are identified quickly, and corrective actions are implemented.
BI-10	NMFS issued a LOA to the DAF in April 2024 that is effective from 10 April 2024 through 9 April 2029. The analysis considered the potential for up to 110 rocket launches and 15 missile launches within a year and includes consideration of launch engine noise, sonic boom, and the proposed Falcon Heavy launches. The Proposed Action would not result in exceedance of take thresholds as identified in the 2024 LOA. DAF complies with the conditions of the LOA listed and would continue to implement all applicable minimization, monitoring, and avoidance measures in the LOC and LOA. Therefore, the Proposed Action would not result in significant impacts on marine mammals.
CO-01	The DAF prepared a Consistency Determination (CD), as discussed in Section 3.9.2.1 and included in Appendix D of the EIS, that evaluates the potential impacts of SpaceX's modifications of SLC-6, addition of Falcon Heavy, and increased cadence up to 100 Falcon launches per year. The DAF submitted the CD to the California Coastal Commission (CCC) on 13 June 2025, requesting its concurrence. Based on the DAF's review of the Proposed Action's compliance with the Coastal Zone Management Act (CZMA), the DAF determined that the Proposed Action is consistent with the enforceable policies of the California Coastal Management Program, pursuant to the requirements of the CZMA. The CCC voted to object to the DAF's CD on 14 August 2025. Under the CZMA and its implementing regulations, the DAF may proceed with the Proposed Action over a CCC objection if it finds the Proposed Action is consistent with the enforceable policies of California's approved coastal management plan. See 15 Code of Federal Regulations (CFR) Part 930.43(d)(1)-(2).

Response Code	Standard Comment Response
CO-02	As defined in Section 304 of the CZMA, the term “coastal zone” does not include “lands the use of which is by law subject solely to the discretion of or which is held in trust by the Federal government, its officers or agents.” SLC-4 and SLC-6 are located on VSFB, property which is owned by the United States (U.S.) and operated by the DAF as the federal agency with full administrative authority and operational management over the federal property, so they are excluded from the coastal zone. Because launch activities from VSFB are Federal agency activities, as that term is defined by the CZMA regulations at 15 CFR Part 930.31(a), the DAF complies with the CZMA by following the procedures in 15 CFR Part 930, Subpart C, rather than through the Coastal Development Permit process. Section 3.9 of the Final EIS has been revised to provide clarification.
CR-01	In regard to notifying and engaging with tribes, as discussed in Section 1.4.1 of the EIS, the DAF engaged with the Santa Ynez Band of Chumash Indians (SYBCI) and solicited comments on the Proposed Action and the SYBCI did not identify any perceived potential effects. The DAF has completed consultation with the Tribe, and the tribal consultation correspondence is included in Appendix A of the EIS.
CR-02	The potential impacts of the Proposed Action on historic buildings listed under the National Register of Historic Places (NRHP) was analyzed in Section 3.8.2.1 of the EIS. The analysis determined there are no NRHP-eligible resources identified with the potential to be adversely affected within the Area of Potential Effects. The analysis also determined there are no eligible or NRHP-listed archaeological resources identified with the potential to be adversely affected within the Archeological Study Area as a result of intensive pedestrian surveys and subsurface testing. The State Historic Preservation Office concurred with the DAF's finding of no historic properties affected on 6 February 2025 (see Appendix A and Section 3.8 of the EIS). Therefore, the Proposed Action would have no effect on any known historic properties.
CE-01	The environmental analysis in this EIS includes consideration of cumulative impacts from military and non-military activities in the region. Should future operational coordination or cumulative effects with the Navy or other Department of Defense (DOD) entities be identified, the DAF is committed to appropriate coordination with those DOD entities in accordance with NEPA and other applicable frameworks.
DE-01	As described in Section 4.7.1 of the 2023 Supplemental EA (incorporated by reference into the EIS), in 2022, SpaceX was successful at all attempted fairing recoveries (110 fairing halves) and recovered approximately 50 percent of parafoils across the entire Falcon program. However, due to weather conditions, sea state, or other factors, recovery attempts may be unsuccessful. While precise parachute and parafoil recovery rates vary, recovery is an operational objective. Under the Proposed Action up to 200 parachutes and 200 parafoils would be deployed for fairing recovery and attempted to be recovered as conditions allow. In 2024, of the 46 total Falcon 9 missions launched from VSFB, recovery included all 46 boosters and 46 pairs of fairings (92 fairing halves). As discussed in Section 3.6.2.1.8 of the EIS the DAF has determined that potential impacts from unrecovered marine debris would not be significant under NEPA, however, the DAF remains committed to minimizing marine debris and will continue to monitor and ensure compliance with environmental protection standards.

Response Code	Standard Comment Response
DE-02	The DAF acknowledges the concern regarding marine debris. However, the assumptions are valid and not outdated, the Proposed Action is essentially the same current operation as previously analyzed but at a higher cadence. Annual marine debris impacts have not been dismissed, they are considered in the EIS but do not rise to a level of significant impact under NEPA. The 177 pounds of debris that could be expended during each launch, as stated in the 2023 Final Supplemental Environmental Assessment, is a conservative figure since the MVac skirt ring (approximately 4 pounds) is no longer utilized. Additionally, current consultations consider potential impacts from debris.
DE-03	As stated in the EIS section 3.6.2.5, to offset the impacts from unrecoverable debris in state waters, SpaceX will continue to make an annual contribution for every pound of unrecovered debris in state waters at a rate of \$20 per pound, adjusted annually for inflation. The annual marine debris offset payment would be divided equally and provided to the U.C. Davis Lost Fishing Gear Recovery Project and the National Marine Sanctuary Foundation.
DE-04	Radiosondes are small, lightweight (approximately 0.25 pounds) devices. Radiosondes are routinely used by government and meteorological agencies worldwide, with tens of thousands released annually in the U.S. alone. They are designed in accordance with international safety and environmental standards to minimize risks if they are not recovered. While radiosondes may contain small quantities of metals in battery components, they do not contain hazardous levels of lead, mercury, nickel, zinc, or lithium compounds regulated under federal environmental laws. The California Code of Regulations (CCR) Title 22, Section 66273.2(b) states, “Batteries that do not exhibit a characteristic of a hazardous waste as set forth in article 3 of chapter 11 of this division,” are not covered as universal waste. For Article 3, Chapter 11, the batteries are not alkali enough to corrode steel, and not otherwise a liquid corrosive. Ignitability, reactivity, and toxicity don’t apply either. Thus, these batteries do not exhibit a characteristic of a hazardous waste. Their environmental footprint is extremely small and widely dispersed. Given their size, materials, and frequency of use, the DAF determined that the potential impacts from unrecovered radiosondes are negligible and not significant under NEPA.
DE-05	As described in Section 2.1.2.4 of the EIS, most Falcon 9 first stages are recovered, either offshore on a dronship or landing back at the launch site. Certain mission profiles may require the booster to be expended in the ocean, but this occurs infrequently. The Falcon Heavy center core is typically expended due to fuel and trajectory demands, therefore under the Proposed Action up to five center cores per year could potentially be unrecovered. While independent verification of each recovery attempt is outside the scope of NEPA, the DAF notes that SpaceX launch and recovery operations are closely coordinated with the U.S. Coast Guard, the Federal Aviation Administration (FAA), and other federal oversight agencies. Recovery missions require maritime safety zone coordination, post-mission reports, and real-time telemetry tracking. In addition, any changes to recovery protocols or mission profiles that could alter environmental effects would require additional environmental or regulatory review as appropriate.
DE-6	The EIS focuses on the environmental impacts associated with launch operations, rather than variable, speculative effects of on-orbit payload behavior or atmospheric reentry events, which depend on specific mission profiles and are not uniform across all launches. For more information see Section 2.1.2.7 of the EIS which references the analysis in the 2011 National Aeronautics and Space Administration EA for payloads. The DAF and its launch partners comply with federal requirements, including those administered by the FAA, related to orbital debris mitigation and end-of-life planning for spacecraft. While the EIS does not address on-orbit operations, launches from VSBF are subject to licensing requirements that include orbital debris minimization measures.

Response Code	Standard Comment Response
HM-01	As described in detail in Sections 3.15 and 3.16 of the EIS, the DAF complies with all pertinent federal, state, and local laws and regulations, and applicable DAF and SLD 30 plans would govern all actions associated with implementing the Proposed Action. These include the Comprehensive Environmental Response, Compensation, and Liability Act (42 United States Code [USC] Chapter 103), as amended by the Superfund Amendments and Reauthorization Act (26 USC Section 9507); the Environmental Health Standards for the Management of Hazardous Waste (CCR Title 22); the Toxic Substances Control Act (15 USC Sections 2601–2671); the Solid Waste Disposal Act (42 USC Section 6903), as amended by the Resource Conservation and Recovery Act (42 USC Sections 6901–6992); and as defined in Title 8 CCR Section 5161. The SLD 30 Hazardous Waste Management Plan details hazardous waste packaging, turn-in, transportation, storage, recordkeeping, and emergency procedures. SpaceX follows all federal, state, and local laws regulating generating, storing, transporting, and disposing hazardous waste for current operations at SLC-4 and SLC-6 would continue to do so under the Proposed Action. SpaceX has also obtained a U.S. Environmental Protection Agency generator identification number to manage and dispose hazardous waste generated from its site operations on VSFB. In addition, solid waste management on VSFB is directed by DOD Instruction 4715.23, Integrated Recycling and Solid Waste Management, and implemented in SLD 30's Integrated Solid Waste Management Plan. Air Force Manual 32-7002, Environmental Compliance and Pollution Prevention, details requirements and programs that installations must comply with to successfully divert as much solid waste as economically feasible. Federal and state Occupational Safety and Health Administration regulations govern protecting workplace personnel at VSFB.
N-01	Section 3.4 of the EIS evaluates the acoustic effects of launches, including sonic booms and low-frequency noise. While it is acknowledged that some members of the public may experience rattling windows or perceive launch noise as disruptive and may be startling on occasion, the analysis concluded that such noise would be temporary and infrequent and would not result in significant impacts under NEPA. The DAF and launch providers continue to implement EPMs to minimize acoustic impacts to wildlife and humans (Sections 3.4.2.5 and 3.5.2.5). In response to community concerns on launch related noise at night, VSFB is working with launch providers to adjust many launch times to occur between 6 a.m. and 10 p.m. However, missions that can only be launched outside these hours remain due to factors such as mission-specific technical, orbital, safety, and regulatory factors, such as the orbit the payload must reach. The Earth's rotation and required payload orbital plane alignment give rise to limited launch opportunities within a day. To read more on VSFB's active sonic boom research, see https://www.vandenberg.spaceforce.mil/News/Article-Display/Article/4212277/vsfb-pioneers-research-on-ascent-sonic-booms/. Property owners may contact SpaceX directly to submit claims and evidence in support of the damage claim. Information on how to make a damage claim is available on the VSFB website (www.vandenberg.spaceforce.mil/Contact-Us).
N-02	Property owners may contact SpaceX directly to submit claims and evidence in support of the damage claim. Information on how to make a damage claim is available on the VSFB website (www.vandenberg.spaceforce.mil/Contact-Us). Claims are processed following industry-standard procedures.

Response Code	Standard Comment Response
N-03	Section 3.4 of the EIS evaluates the acoustic effects of launches, including sonic booms and low-frequency noise. While it is acknowledged that some members of the public may experience rattling windows or perceive launch noise as disruptive and may be startling on occasion, the analysis concluded that such noise would be temporary and infrequent and would not result in significant impacts under NEPA because the frequency of these events would not be expected to cause chronic health problems, the Community Noise Equivalent Level would not exceed 65 A-weighted decibels off of VSFB, and the C-weighted Day-Night Average Sound Level (CDNL) would not exceed the FAA significance threshold of 60 decibel FAA significance threshold (see Section 3.4 of the EIS). In addition, the DAF added an analysis of the Percent Awakening (PA) to Section 3.4.2.1.4 of the EIS, which showed that approximately 5 to 11 percent of the population of Lompoc have the potential to be awakened by Falcon 9 nighttime launch events. The PA estimates for Lompoc would increase up to 13 percent for Falcon Heavy nighttime launch events. The DAF and launch providers continue to implement best management practices to minimize acoustic impacts to wildlife and humans, which include the use of the launch notification system and minimizing launches between 10 p.m. and 6 a.m. to the maximum practicable extent. To sign up for VSFB launch alerts, visit https://public.govdelivery.com/accounts/USDODSFVANDENBERG/signup/41755. Noise complaints may be submitted to VSFB at https://www.vandenberg.spaceforce.mil/Contact-Us/
N-04	Falcon Heavy sonic booms modeling would be completed in accordance with the LOA. Sonic booms produced by Falcon Heavy over the mainland are expected to result in similar sonic boom levels and areas of geographic impact as Falcon 9 as depicted in EIS dot map in Figure 3.4-9.
N-05	The anticipated impact on domestic animals is similar to those for wildlife species, as described in Section 3.5.2.1.2 of the EIS. Noise associated with launch, landing, and static fire may elicit a startle response in individuals that may either see, hear, or sense vibrations caused by these activities. Although launch noise may be disruptive or startling on occasion, the analysis concluded that such noise would be temporary and infrequent and would not result in significant impacts under NEPA.
N-06	As required under NEPA, the EIS evaluates potential impacts and was independently analyzed by the DAF and the FAA. These analyses are based on established methodologies and regulatory thresholds are consistent with federal guidance. Modeling must be used in order to estimate potential acoustic impacts from a wide variety of potential launch and landing trajectories. However, existing acoustic monitoring protocols are already in place and would continue under the Proposed Action, as described in the EIS. The DAF has performed acoustic monitoring regularly and data collected through January 2025 were provided in Appendix B of the Biological Assessment (see Appendix B of the EIS). The results of these acoustic monitoring efforts have verified that sonic boom and rocket engine noise levels during launches and landings have generally been consistent with acoustic noise modeling predictions. Acoustic monitoring in southern Santa Barbara County and Ventura County area will continue through at least 2025. Acoustic monitoring is also performed under the conditions of the USFWS Biological Opinion and the NMFS LOA. The DAF remains committed to coordinating with regulatory agencies, continuing established monitoring programs, and ensuring compliance with applicable environmental protections during ongoing and future operations at VSFB.

Response Code	Standard Comment Response
N-07	In order to support transparency in VSFB launch operations, SLD 30 leadership has implemented a text message and email launch alert option. The new system allows users to select from notification topic's as well as how to receive notifications, offering users updates via text and email. To sign up for alerts, visit https://public.govdelivery.com/accounts/USDODSFVANDENBERG/signup/41755. The launch alert system has recently been improved to communicate launch delays and rescheduling of missions. In addition to text and email alerts, SLD 30 issues online updates and social media announcements about launches. SLD 30 is also exploring ways to coordinate with municipalities in the affected areas and other ways to improve communications with the public. The DAF encourages the public to submit their experiences with sonic booms through an online complaint form. Please go to https://www.vandenberg.spaceforce.mil/Contact-Us/ and click the link to submit a noise complaint. These data will help the DAF to improve the science of predicting sonic booms and lead to more effective outreach, eventually enabling the DAF to improve the launch alert system.
N-08	In Section 3.4.2.1.2 of the EIS, the DAF acknowledges that noise-induced stress can activate the body's sympathetic nervous system, leading to elevated blood pressure and heart rate and that noise exposure can contribute to stress, anxiety, depression, and reduced overall well-being and interfere with concentration, productivity, and relaxation, exacerbating psychological distress. The DAF takes community concerns seriously and remains committed to transparency and public safety regarding launch activities at VSFB. Sonic booms from rocket launches can occasionally be heard in inland areas such as Ventura, Santa Barbara, and Los Angeles counties, depending on trajectory and weather conditions. While it is acknowledged that some members of the public may perceive launch noise as disruptive and may be startled on occasion, the frequency of these events would not be expected to cause chronic health problems. The analysis concluded that such noise would be temporary and infrequent and would not result in significant impacts under NEPA. The DAF and launch providers continue to implement best management practices to minimize acoustic impacts to wildlife and humans, which include the use of the launch notification system and minimizing launches between 10 p.m. and 6 a.m. to the maximum practicable extent. Sonic booms are brief and occur under controlled conditions during scheduled, publicly announced launches. Launch schedules posted in advance on official VSFB and SpaceX websites. The DAF regrets any distress caused by these events and encourages community members to stay informed through official launch notices. While the DAF cannot eliminate the noise, it remains committed to minimizing disruption where feasible and to ensuring public awareness and safety throughout all launch activities. To sign up for VSFB launch alerts, visit https://public.govdelivery.com/accounts/USDODSFVANDENBERG/signup/41755.
N-09	The potential for structural damage due to Falcon launch, landing, and static fire test events and their associated noise levels and vibrations was assessed in Section 3.4.2.1.2 of the EIS. Falcon launch noise levels are depicted in Figures 3.4-6 and 3.4-7 of the EIS. The analysis determined that the damage associated with noise and vibrations to off-base structures was unlikely; however, damage may occur to lightweight or brittle structural elements in poor condition, such as windows and plaster that are pre-cracked, prestressed, older and weakened, or poorly mounted.

Response Code	Standard Comment Response
N-10	An analysis was performed to assess Community Noise Equivalent Levels as a result of the Proposed Action as required under FAA Order 1050.1F in Section 3.4.2.1.3 of the EIS to assess compatible land use in California. However, the DAF also analyzed sonic boom impacts by examining CDNL in Section 3.4.2.1.6 of the EIS. The DAF conservatively estimated that if all operations occurred at night, the maximum CDNL would be 58.0 C-weighted decibels (dBC). Since the FAA uses 60 dBC CDNL as the significance threshold for determining land use compatibility, the cumulative sonic boom levels from Falcon 9 and Falcon Heavy landing operations would be below the threshold for acceptable land use. In addition, the DAF analyzed sonic boom using pounds per square foot (mathematically equivalent to peak sound pressure level) to assess sonic boom impacts in Section 3.4.2.1.4 of the EIS. Sonic booms were modeled using conservative assumptions and industry-standard tools such as the PCBoom model, and impacts are assessed using thresholds from the FAA, U.S. Air Force, and the Occupational Safety and Health Administration, which are commonly used for evaluating both occupational and environmental noise exposures. These standards focus on sound exposure levels and peak overpressure, which are appropriate for short-duration, impulsive events such as sonic booms. The DAF acknowledges that the public may perceive launch noise and sonic booms as disruptive and may be startled on occasion. Nevertheless, the DAF remains committed to transparency and will continue to evaluate whether additional monitoring or public outreach is warranted as part of ongoing operations.
N-11	While NEPA does not require prospective public health studies, the DAF is open to continued collaboration with academic institutions and regulatory agencies to improve understanding of community acoustic exposure and responses. For example, SLD 30 began collaborating with Brigham Young University and California State University at Bakersfield in June 2024 to collect acoustic measurements in Santa Barbara, Ventura, and Northern Los Angeles Counties during launches from VSFb.
N-12	A study was performed in 2025 to assess the amount of soil vibration caused by Falcon 9 launch and landing at SLC-4 on VSFb. As described in Section 5.1.4.2 of Appendix B of the EIS, vibrations in soil were detected during engine noise and sonic boom events during this effort. At Spring Canyon, 0.27 miles from the launch site, mild vibrations were detected at a maximum peak particle velocity (PPV) of 0.96 inches per second, roughly equivalent to a magnitude 3-4 earthquake at a distance of several miles from the epicenter. The study found that those levels declined exponentially with distance from SLC-4. At Bear Creek, 1.4 miles from SLC-4, the maximum PPV measured was 0.04 inches per second, which is unlikely to be perceptible to humans and roughly equivalent to a magnitude 2 or less earthquake at 2 miles from the epicenter. Ground vibrations as a result of earthquakes of this level are common in California. For instance, between 5 February 2025 and 7 March 2025, of the 3,387 earthquakes recorded in California, 41% of them were at levels between magnitude 1 and 2. At approximately 11 miles from SLC-4, the PPV measurements were approximately 0.01% of the PPV measured at the Bear Creek, therefore any effect on soil stability or geological processes due to vibration as a result of launch noise is unlikely. Property owners may contact SpaceX directly to submit claims and evidence in support of the damage claim. Information on how to make a damage claim is available on the VSFb website (www.vandenberg.spaceforce.mil/Contact-Us).
NP-01	The DAF uses the most complete, scientifically sound, and available data at the time of our NEPA assessments. The EIS incorporates the best available data, interagency consultations, and predictive modeling to assess potential effects on 15 resource areas, as available in Chapter 3 of the EIS. In accordance with NEPA, the EIS also includes a cumulative impacts analysis that accounts for past, present, and reasonably foreseeable future actions.

Response Code	Standard Comment Response
NP-02	The DAF's goal in the Draft EIS public review process is to actively solicit substantive comments on the results of the environmental impact analysis. The DAF announces the notice of availability of the Draft EIS through multiple avenues to ensure the public is aware. The 45-day public review and comment period for the Draft EIS began on 23 May 2025 and concluded on 7 July 2025. A notice of availability was published in the Federal Register on 23 May 2025. In addition, the DAF published newspaper advertisements announcing the availability of the Draft EIS in the six newspapers covering Los Angeles, Ventura, and Santa Barbara counties, each running on multiple dates, with the first publications beginning 23 May 2025. The DAF distributed an email announcement on 23 May 2025 to individuals who had either signed up for updates on the website or during the scoping meetings. In addition, the DAF distributed letters to 35 stakeholders on 23 May 2025. Printed copies of the Draft EIS were also made available at eight public libraries in the region. Additionally, at least eight news articles were released by local and industry media between 19 May 2025 and 8 June 2025.
NP-03	The DAF held three in-person meetings at centralized locations where residents within the region of influence of the Proposed Action would not need to travel more than approximately one hour to attend. These locations were in Ventura (10 June 2025), Santa Barbara (11 June 2025), and Lompoc (12 June 2025). In addition, a virtual public hearing was conducted online via the Zoom platform at 6:00 p.m. Pacific Time on 18 June 2025 to accommodate those who could not attend one of the three in-person hearings. All meetings, regardless of format, provided an opportunity for attendees to learn more about the Draft EIS and provide an open process for public comments. In addition to providing oral comments during the public hearings, the DAF also welcomed comments to be submitted on the Draft EIS through the comment form on the project website (https://vsfbfalconlauncheis.com/) and via postal mail.
NP-04	NEPA does not include a mechanism or requirement for public participation through voting. The DAF's Environmental Impact Analysis Process provides an opportunity for public input on DAF decision-making, allows the public to offer input on alternative ways for the DAF to accomplish what it is proposing, and solicits comments on the DAF's analysis of environmental effects. NEPA allows for the public to provide comments and questions on the Proposed Action and Draft EIS through the scoping process and Draft EIS public review period.
P-01	If necessary for the safety of park visitors, the County Parks Department and the County Sheriff would evacuate Jalama Beach County Park upon request from SLD 30 and under agreement between DAF and Santa Barbara County. The Proposed Action would comply with these procedures. SpaceX flies a variety of trajectories from VSFB to support a wide range of missions, thus increasing to 100 launches per year does not mean that all 100 launches would be a trajectory that impacts Jalama Beach County Park. In 2024 there were only four evacuations of Jalama Beach County Park despite 46 launches of Falcon 9. One of these evacuations was rescinded and thus the park was not closed during launch but was included in this count. Additionally, as launch vehicles become more reliable (e.g., a proven record of flight), impact limit lines decrease. A launch attempt that could evacuate Jalama Beach County Park could be scrubbed due to weather, an issue with the vehicle, or another reason after an evacuation order has been issued. While some impacts on Jalama Beach County Park are unavoidable due to mission requirements, evacuations would not be issued for more than 12 launches as indicated in Section 3.10.2.1 of the EIS.

Response Code	Standard Comment Response
PA-01	DAF notes that the Proposed Action does not have a defined end date, as it involves ongoing space launch activities at VSFB in support of U.S government and commercial missions. The EIS analyzes the potential environmental impacts associated with up to 100 Falcon launches per year on a continuing basis. The DAF is committed to ensuring that any additional launches or project modifications are fully evaluated for environmental impacts.
PA-02	The EIS evaluates the Proposed Action to launch Falcon 9 and Falcon Heavy launch vehicles at VSFB at up to 100 launches per year, incorporating both historical operational data and forward-looking analysis based on conservative assumptions and maximum-case scenarios. Impacts associated with preexisting launch activity were considered as part of the affected environment and cumulative impact analyses (Section 3.0 of the EIS). The existing launch cadence was used as the baseline condition, consistent with NEPA practice, and the potential incremental effects of the proposed increase were analyzed in detail across all resource areas. The DAF remains committed to monitoring operations and coordinating with regulatory agencies to ensure continued compliance with applicable environmental laws and permit conditions. Should actual impacts exceed those anticipated, additional environmental review would be conducted as appropriate.
PA-03	The term “cadence” in the EIS is used to describe the annual number of launches, not a regular frequency. The EIS analyzes up to 100 launches per year, with per-launch and cumulative impacts evaluated using the best available information. There is no evidence to suggest that variable timing between launches results in additional impacts beyond those analyzed. Therefore, the EIS meets all applicable NEPA requirements.
PN-01	As described in Chapter 2 of the EIS, the Proposed Action would authorize up to 100 Falcon 9 or Falcon Heavy launches, combined, per year from VSFB, encompassing national security, other U.S. government missions (e.g., National Aeronautics and Space Administration, National Oceanic and Atmospheric Administration), and commercial payloads such as Starlink. The number of annual launches—and their monthly distribution—is highly variable and dependent on mission readiness, national security needs, orbital windows, and global launch demand. With respect to disclosing U.S. Government launch requirements, many missions—particularly those involving national defense—are classified or subject to operational security constraints and cannot be publicly disclosed in advance. Similarly, commercial launch contracts held by SpaceX, including Starlink, are proprietary business agreements that are not subject to public reporting under NEPA. Commercial payloads often include federal contracts (e.g., Starlink missions supporting U.S. military or emergency communications), making a precise percentage breakdown speculative. The EIS analyzes the maximum potential environmental impacts based on launch activity, regardless of payload type, encompassing the full range of launch-related environmental effects. The DAF will continue to coordinate with regulatory agencies to ensure compliance with applicable environmental laws and policies for all launch activities conducted at VSFB.
PN-02	As discussed in Section 2.4 of the EIS, the DAF objectively evaluated reasonable alternatives to the Proposed Action, including alternatives that the DAF eliminated from detailed study. An alternative that considered an intermediate launch cadence would restrict the ability of the DAF and its partners to meet projected national security, civil, and commercial mission demands. While national defense remains a primary mission of VSFB, commercial space launch partnerships also support U.S. policy goals to maintain leadership in space and ensure resilient, diversified launch capabilities. The purpose of and need for the Proposed Action, based on Congress’ direction to maximize the use, effectiveness, and efficiency of DOD’s space launch infrastructure, effectively eliminated any analysis of an alternative that considered an intermediate launch cadence.

Response Code	Standard Comment Response
PN-03	As discussed in Section 2.4 of the EIS, the DAF objectively evaluated reasonable alternatives to the Proposed Action, including alternatives that the DAF eliminated from detailed study. The purpose of and need for the Proposed Action, based on Congress' direction to maximize the use, effectiveness, and efficiency of DOD's space launch infrastructure, effectively eliminated any analysis of alternatives that were not located on a DOD installation. The geographic location of VSFb allows access to orbits that cannot be achieved at other DOD and non-DOD locations. As discussed in Section 2.4, sites at Cape Canaveral Space Force Station and Kennedy Space Center were dismissed from consideration as they predominantly support a different range of trajectories. For example, polar trajectories or those with an inclination greater than 53 degrees cannot be launched from Launch Complex-39A or SLC-40 without substantial impacts on vehicle performance, to the point that certain payloads cannot be launched.
PN-04	As stated in Section 1.3 of the EIS, the Proposed Action fulfills (in part) 10 USC Section 2276(a), "Commercial space launch cooperation," authorizing the Secretary of Defense to: maximize the use of the capacity of the space transportation infrastructure of the DOD by the private sector in the U.S.; maximize the effectiveness and efficiency of the space transportation infrastructure of the DOD; reduce the cost of services provided by the DOD related to space transportation infrastructure and launch support facilities and space recovery support facilities; encourage commercial space activities by enabling investment by covered entities in the space transportation infrastructure of the DOD; and foster cooperation between DOD and covered entities Implementation of the Proposed Action would support the DAF's statutory obligation to ensure capabilities to launch and insert necessary national security payloads into space (10 USC Section 2273). This would be accomplished through Falcon operations at VSFb, including Falcon Heavy, with a focus on heavy-lift missions supporting the DAF, DOD, and other National Security Space Launch requirements and objectives. SpaceX currently launches U.S. Government and commercial payloads using the Falcon 9 from SLC-4. SpaceX supports, and is under contract for, the full spectrum of U.S. Government space mission requirements, including spacecraft launches for National Aeronautics and Space Administration and the DOD.
S-01	The reliability of the Falcon launch vehicle is addressed in the EIS, including its successful launch and recovery record. As of July 2025, Falcon 9 and Falcon Heavy have completed over 500 launches with a high success rate. This historical performance demonstrates consistent launch reliability and provides a basis for bounding potential impacts from normal operations. These performance metrics are relevant to NEPA analysis as they inform the expected frequency and footprint of environmental effects under normal operating conditions. Off-nominal scenarios such as launch failures and anomalies are discussed qualitatively in the EIS (e.g., Section 3.6.2.1.5 and Appendix F). Modeling the environmental impacts of extremely low-probability events (such as catastrophic failures) is not required under NEPA unless they are reasonably foreseeable. Given the demonstrated reliability of the Falcon launch vehicle, launch anomalies are considered unlikely and too speculative to meaningfully analyze in detail under NEPA. However, SLD 30's Launch Safety Team provides an independent analysis for hazards to ensure all FAA established public risk criteria are met, for all launches. The launch risk analyses performed accounts for off-nominal cases for the most probable failure scenarios. The risk assessment process incorporates the probability of failure (PoF) as a critical input. This metric considers not only the inherent reliability of the launch system but also the relative experience of the launching entity and reliability of the launch vehicle. Consequently, a launch service provider lacking prior experience will be assigned a higher PoF than one with a documented history of successful launches utilizing a comparable vehicle. This independent analysis drives the day-of-launch Go/No Go decision during the launch countdown which considers all safety constraints, including compliance with public safety criteria and ensuring that all flight safety systems aboard the launch vehicle that would control an errant vehicle are operational. These factors are also used to determine the size and location of

Response Code	Standard Comment Response
	hazard areas during launch, as described in Section 3.14.1.4 of the EIS. SLD 30 Launch Safety is the independent enforcement of operational safeguards, airspace coordination, and launch failure response. This team also independently verifies each launch vehicles destruct system is robust, reliable, and will meet established public protection requirements.
S-02	The DAF maintains authority over launch cadence decisions and operational safety. Emergency response procedures are in place and coordinated with federal, state, and local agencies to address any unplanned events. These procedures are reviewed regularly and implemented regardless of the launch provider. As described in Section 3.14.1.3 of the EIS, the SLD 30 Safety Office assess proposed mission profiles to ensure public safety criteria are met. Their evaluation assesses hazards associated with debris, toxics, and blast distant focusing overpressure for a normal launch. All launch, high-risk offshore, and airspace areas are monitored to ensure public safety during launch operations. Launch day meteorological conditions are accounted for to ensure compliance with acceptable risk criteria. As described in Section 3.14.1.4 of the EIS, SpaceX performs a mission-specific debris analysis before launching. The SLD 30 Safety Office reviews and approves these analyses prior to authorizing any launch activities. Impact debris corridors would be established to meet security requirements and reduce hazards to persons and property during launch activities. Based on a mission's specific trajectory, specific debris impact areas are determined for each launch.
S-03	Incidents involving Starship vehicles referenced from other locations are not representative of Falcon operations at VSFB, which are mature systems with extensive launch and recovery experience (see Section 2.1.2.1 - Launch Safety). Falcon 9 and Falcon Heavy are different launch vehicles than Starship/Super Heavy, thus alleged impacts from Starship are non-germane to the Proposed Action. Starship/Super Heavy operations are not authorized for launch from VSFB and are not part of the Proposed Action evaluated in this EIS.
SE-01	The EIS evaluates potential impacts on population and housing pursuant with the NEPA of 1969, as amended (42 USC § 4321 et seq.), and the applicable DAF's NEPA implementing regulations (32 CFR Part 989). As discussed in Section 3.12 of the EIS, the Proposed Action would not involve activities of a scale anticipated to induce substantial population growth or displace housing. The DAF anticipates that temporary construction labor would be sourced primarily from the existing regional labor market, which includes Santa Barbara and San Luis Obispo counties. Based on typical labor mobilization patterns and the intermittent nature of proposed demolition and construction activities at SLC-6, the DAF does not expect the temporary influx of workers to result in measurable changes to housing availability or affordability indicators, such as rental vacancy rates or the local jobs-to-housing balance. Federal agencies evaluate significance based on the context and intensity of the potential effect. In this case, the workforce needs associated with the Proposed Action are limited in scale and duration, and within the absorption capacity of the regional housing market. The EIS includes regional housing data and Regional Housing Needs Allocation (RHNA) opportunity sites to characterize overall planning capacity, but does not rely on RHNA-designated sites as mitigation for temporary workforce housing needs. The DAF agrees that RHNA sites do not equate to existing units or short-term capacity; however, the use of RHNA data supports the finding that the Proposed Action is consistent with regional housing and growth trends. The EIS concludes that the total employment demand associated with the Proposed Action, both direct and indirect, falls within the growth projections identified in the Santa Barbara County Association of Governments (SBCAG) RHNA Plan and the Dudek 2024 Housing Impact Study.

Response Code	Standard Comment Response
SE-02	The DAF found no significant socioeconomic impact in the EIS analysis therefore this mitigation would not be commensurate with the action. The DAF acknowledges the concern raised by the HASBARCO regarding the potential impacts of sonic booms and percussive noise events associated with the increased Falcon 9 launch cadence at VSFb. The EIS recognizes that impulsive noises, including sonic booms and engine ignitions, may disrupt human and wildlife behavior, particularly in areas located within the 55 dB Lmax impact zone. However, as discussed in Section 3.4 of the EIS, the DAF has assessed noise impacts based on existing modeling and established thresholds, and these analyses have been conducted in accordance with federal guidelines for acceptable noise levels. While we acknowledge that impulsive sounds like sonic booms can be disruptive, mitigation strategies in the form of retrofitting existing housing or providing financial assistance for noise improvements are outside the scope of this NEPA analysis. The Proposed Action does not include provisions for retrofitting residential properties, as the DAF is not authorized to implement local housing interventions or provide direct financial assistance to private property owners. As such, the request for Community Development Block Grant (CDBG) loans or similar financial assistance for noise mitigation retrofits will not be incorporated as part of the Final EIS. Instead, the DAF will continue to coordinate with local agencies and stakeholders, including HASBARCO and other regional entities, to explore opportunities for addressing noise-related concerns through community engagement. Additionally, public notification procedures will remain in place, ensuring that residents and property owners are informed of upcoming launches and potential noise impacts. In summary, while the DAF recognizes the importance of addressing noise impacts, it is not in a position to directly fund housing retrofits or assist with Community Development Block Grant loans for impacted communities. Future efforts to mitigate noise will focus on minimizing launches between 10 p.m. and 6 a.m. to the maximum practicable extent, monitoring, and collaboration with local agencies and organizations.
SE-03	Impacts to the local economy were analyzed in Section 3.12.2.1.1 of the EIS. Although the DAF acknowledges that government personnel often use on base services, they also contribute to the local economy. A study in 2021 commissioned by REACH, a regional economic development organization, and conducted by Cal Poly researchers found that VSFb accounted for 16,000 jobs and an annual economic impact of \$4.5 billion in Santa Barbara and San Luis Obispo counties (https://reachcentralcoast.org/wp-content/uploads/VAFB_economic-impact-051421.pdf). The analysis in the EIS found that construction activities under the Proposed Action would result in short term economic benefits from the use of local labor and supplies. Launching and landing operations under the Proposed Action would result in moderate but positive economic benefits from increased demand in the existing workforce, higher revenues, and increased per capita income. SpaceX would continue to use its existing workforce for launching and landing activities. Ongoing commercial space activities at VSFb would continue to be an important economic generator for the local region and nearby counties. The DAF found no significant socioeconomic impact in the EIS analysis therefore this mitigation would not be commensurate with the action.
T-01	Launch trajectories are determined based on mission-specific orbital limitations and safety constraints. While some missions may use trajectories that direct vehicles over open ocean, this is not feasible for all launches due to payload limitations, safety margins, and national security considerations. “Dog-leg” maneuvers could exceed safety margins and would reduce efficiency and payload capacity. Moving trajectories to fly further away from the coastline would change the orbit the payload would launch into such that it could no longer perform the mission and not meet the Purpose and Need as analyzed under NEPA. Safety remains a priority in all launch planning, and alternate trajectories are considered on a case-by-case basis in coordination with the FAA and U.S. Space Force.

Response Code	Standard Comment Response
T-02	Regarding overflights of populated areas, once clear of VSFB, no rocket launch trajectories are approved for overflight of mainland areas of California.
U-01	The EIS evaluates the potential, reasonably foreseeable environmental impacts of proposed launch activities at VSFB; satellite operations or orbital system-level effects are outside the scope of this analysis. Downstream impacts of orbital operations are regulated and reviewed under separate statutory authorities. Ground-based telemetry systems at VSFB are regulated under federal safety standards and fall outside the scope of this analysis.
U-02	Section 1.1 of the EIS identifies the Proposed Action as DAF's authorization of the redevelopment of SLC-6 to support SpaceX Falcon 9 and Falcon Heavy operations, including launch and landing at VSFB; DAF's authorization of an increase in Falcon 9 launches and landings at VSFB and downrange landings in the Pacific Ocean; and the FAA's licensing of SpaceX Falcon operations at VSFB and approval of related airspace closures. Contracting is not evaluated in the NEPA process. The government and other entities separately seek bids from launch service providers to support various programs and missions, which promotes competition, innovation, and reduces reliance on singular systems. The DAF and FAA also conduct NEPA analysis to evaluate authorization and licensing of other launch service providers. The DAF and FAA make these NEPA documents available for public review and comment.
U-03	The purpose of this NEPA review is to evaluate the potential environmental impacts of authorizing up to 100 Falcon launches annually from VSFB, rather than to assess downstream impacts of orbital operations, which are regulated and reviewed under separate statutory authorities. The Proposed Action authorizes a maximum annual launch cadence, not a specific manifest. The actual number, size, and type of satellites vary by mission and customer, and are subject to change based on national security priorities, commercial contracts, and other factors outside the authorization of the DAF. Providing an estimated satellite count would therefore not reflect a reliable or meaningful basis for environmental analysis.
WR-01	Sections 3.6 and 3.9 of the EIS address concerns about potential contamination of terrestrial and marine environments. Water used in the flame bucket and deluge systems is captured and treated or discharged in compliance with permits issued by the Regional Water Quality Control Board. Launch vehicle propellants are not released into the ocean, and protective measures are in place to prevent discharges of hazardous materials.

Response Code	Standard Comment Response
WR-02	VSFB has never taken full delivery of its contracted amount but rather has only taken delivery of water that has been allocated to the base, and only a few times has the base come close to using its full allocation for the year. As noted in the EIS, overall water demand under the Proposed Action would remain within historical base-wide usage levels and would not require additional State Water Project allocations or new groundwater wells. However, there are limitations associated with groundwater pumping, referencing the applicable Groundwater Sustainability Plan (GSP) prepared under the Sustainable Groundwater Management Act (SGMA) for the Western Management Area (WMA) of the Santa Ynez River Valley Groundwater Basin. Although VSFB pumping is not subject to SGMA regulation due to its federal status, the DAF remains committed to operating in a manner that supports long-term basin sustainability and avoids contributing to undesirable results, such as: saltwater intrusion, especially in coastal subareas, and subsidence, particularly in historically sensitive zones. The DAF partners with the San Antonio Basin Groundwater Sustainability Agency (SABGSA) and serves on their advisory committee. Based on the projected demand under the Proposed Action, no increase in pumping rates beyond existing operational baselines is anticipated. Therefore, no measurable contribution to basin overdraft, seawater intrusion, or land subsidence is expected. Additionally, VSFB will continue coordination with local water agencies and the SABGSA for the WMA to ensure consistency with regional planning and groundwater modeling. VSFB's primary water source is State Water, which it uses most of the time; however, even if VSFB was to use VSFB the San Antonio groundwater basin all of the time, it would only use approximately 7% of the total amount of withdrawn water from the basin. Additionally, there is a geologic upthrust at the western boundary of the San Antonio Groundwater Basin that acts as a barrier (aquiclude) to prevent seawater intrusion into the basin. No recorded subsidence has occurred.
WR-03	As described in Sections 2.1.2.6 and 3.7.2.1.2 of the EIS, the current water source for VSFB is via an existing connection between State Water and the VSFB water supply system. VSFB primarily relies on State Water; however, during annual maintenance that lasts two to three weeks, VSFB utilizes four water wells in the San Antonio Creek Basin. At maximum cadence, the Proposed Action would use up to 65.6 acre-feet of water per year. This would represent an increase of approximately 2.3 percent of the total annual water usage on VSFB. As discussed in Section 3.11.2.1 of the EIS, even if pumping this entire volume of water from the San Antonio Creek groundwater basin, it would have an undetectable effect on water levels and flow rates in the creek over the short two-to-three-week period of time when annual maintenance occurs. Therefore, implementation of the Proposed Action would have a discountable effect on water supply and can be met with the current sources and would not exacerbate water scarcity at VSFB or the surrounding area.

Response Code	Standard Comment Response
WR-04	Regulated practices and facilities for the sampling and discharge of deluge water from launches at SLC-4 are in place and similar plans and facilities will be used at SLC-6. At SLC-4, launch operations generate operational process water primarily from flame trench and deluge systems. There would be no change to water flow processes at SLC-4 under the Proposed Action. Launch deluge water is directed to engineered concrete v-ditches that convey flow to an on-site retention basin. The retention basin allows for settling and accumulation of flow. Water is sampled for discharge under the terms of the General Waiver of Waste Discharge Requirements issued by the Central Coast Regional Water Quality Control Board (RWQCB). From there, depending on water quality, water is discharged to a designated spray field, permitted by the RWQCB. These facilities are designed to prevent overland flow to Spring Canyon. The v-ditch and basin system are actively maintained and inspected to ensure proper function and compliance. Although a visual schematic will not be included in the EIS, key water management information from previous NEPA analyses (e.g., 2023 Supplemental EA) are incorporated by reference. All discharges will continue to be subject to applicable state water quality requirements (terms of the General Waiver of Waste Discharge Requirements issued by the RWQCB), SpaceX would apply for similar permit coverage from the RWQCB for SLC-6 discharges, as applicable, to authorize limited discharge from the flame trench and support areas. Reporting and recordkeeping would remain consistent with RWQCB requirements. Under the Proposed Action, stormwater discharges from both SLC-4 and SLC-6 would remain subject to regulatory authorizations from the RWQCB. Site-specific Stormwater Pollution Prevention Plans would be maintained, and best management practices such as good housekeeping, preventive maintenance, spill prevention, material handling, waste management, erosion and sediment controls and employee training would be employed to ensure compliance.
WR-05	Federal agencies are required to conduct a 3-parameter delineation. Wetland analysis is included in Section 3.7.2.1.1 of the EIS. A jurisdictional wetland delineation was completed (see Section 3.7.2.1.3 of the EIS) and no Waters of the U.S. occur at the site.
WR-06	In recent years, the U.S. Geological Survey and VSFB engaged in a study to explore the potential effects of future climate and military groundwater withdrawals (military pumping) on the availability of groundwater as a water source for VSFB, water availability to Barka Slough, and associated potential effects of changing hydrologic conditions on the riparian and aquatic habitats of federally listed species. Scenarios were developed to evaluate the effects of military pumping on water availability in the San Antonio Creek Valley Watershed and Barka Slough, and to evaluate the effects of changing hydrology on federally listed species habitat in the slough. Three habitat metrics were identified as important for the federally listed species: 1) streamflow, 2) stream disconnection, and 3) depth to groundwater. Simulated military pumping had a negligible effect on streamflow in Barka Slough. Simulated cumulative streamflow at the Barka Slough stream gage in all model scenarios were within two percent of each other. Streamflow in Barka Slough is not sensitive to changes in local groundwater pumping conditions and is most likely influenced by climatic inputs (precipitation) and basin-wide hydrologic parameters (Draft Assessment of the Simulated Effects of Military Groundwater Pumping on Barka Slough, Santa Barbara County, California [USGS 2025]). Since streamflow in Barka Slough is not expected to be affected by the proposed groundwater pumping, the stretch of San Antonio Creek downstream of Barka Slough would not be expected to be affected either.

Table E-7. Substantive Comments and Responses

Source	Last, First Name	Organization/ Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
Electronic Form	Abbott- Mayer, Kathy	N/A	1	I object to the expansion of approved launches from 50 per year to 100, and also object to adding the much bigger and more powerful Delta Heavy rocket to the mix. The launches at their current rate are not only creating objectionable VERY loud noise which requires our family to consider if we are in danger due to earthquake; but also creating extreme vibrations that we feel are detrimental to the safety of our home, our hillside soil stability, which could all be considered a hazard capable of causing personal harm and financial duress.	N-02, N-09, N-12
Electronic Form	Akeman, Kim	N/A	1	To Whom It May Concern, I am just going to come straight to the point. Increasing rocket launches anywhere on the West coast is not only damaging to our environment but is devastating to sensitive wildlife like harbor seals. I have been documenting harbor seals for 15 years and they are very sensitive to visual as well as auditory disturbances. They are generally nocturnal and require sleep during the day to survive. We have been watching a decline in the population along the West coast with climate change but more lately because of disturbances in the form of construction and increasing anthropogenic noises of all sorts. In the past 5 pupping seasons when noise such as construction was happening, a greater loss was observed. A normal loss would be less than 10 percent but when noise was introduced that loss rose to 28 and 33 percent respectively. This was only the pup loss but breeding females were also loss during these events. The noises from these events pale in comparison to the noise of a rocket launch. Nothing quite matches the roar of a rocket at liftoff: the bellowing engines, the trembling ground, the	BI-01

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				shockwaves that ripple through air and water. To human observers, it might be a spectacle; to wildlife, it can be a cataclysm. The environmental disturbances caused by rocket launches are manifold, but noise pollution stands out as one of the most immediate and pervasive threats. The acoustic energy produced during launch events far surpasses most natural and anthropogenic sounds, reverberating across coastlines and through the seas. For harbor seals, which rely heavily on auditory cues for navigation, communication, and the detection of predators, such sudden, intense noise can be traumatic. Seals resting on beaches or sandbars may flee in masse into the water, abandoning pups or risking injury in their haste. The disruption can last far beyond the moment of launch: repeated disturbances may lead to chronic stress, altered behavior, and even abandonment of critical haul-out sites. Chronic disturbances that drive seals away from traditional haul-out sites can lead to broader changes in the ecosystem, with consequences that may not become apparent for years. Harbor seals are already losing habitat at alarming rate due to coastal erosion from climate change and very few areas remain for them, so it is vital that we protect the areas that these sensitive animals remain and choose to haul out. The coastal sites chosen for spaceports often overlap with crucial habitats for harbor seals and countless other species. The loss of these areas cannot be easily mitigated or reversed. There are active harbor seals colonies near Vandenberg and are directly impacted by launches currently. Nearby central coast cities such as Carpinteria, are working feverishly to protect and conserve the harbor seal colonies and rookeries they have because they are	

Source	Last, First Name	Organization/ Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				part of the tourist attractions in the area. Many other coastal cities are also working to save their harbor seal colonies which are just now being recognized as seriously declining. In conclusion, we need to first consider life on earth over exploration of our universe. Rocket launch sites can be moved to other less sensitive areas but our harbor seals and other critical wildlife along our shorelines have no other place to go. We the people have a right and a responsibility to protect life on earth first. Please reconsider this launch site and either discontinue or move it. Thank you.	
Electronic Attachment	Alexis, Jasmine	Defend Them All Foundation	1	Inadequate Consideration of Cumulative Impacts. The Draft Environmental Impact Statement (DEIS) concludes that the proposed increase in Falcon 9 launch activity will have no significant impact on terrestrial or marine biological resources. For terrestrial species, the Department of the Air Force (DAF) acknowledges vegetation loss and potential harm to wildlife from construction, demolition, and launch noise, but asserts that environmental protection measures and terms from a forthcoming Biological Opinion under Section 7 of the Endangered Species Act will mitigate these risks to an insignificant level. For marine species, including ESA-listed turtles, fish, cetaceans, and pinnipeds, the DAF relies on a Letter of Concurrence from the National Marine Fisheries Service (NMFS) and an existing Letter of Authorization under the Marine Mammal Protection Act, which allows for "Level B Harassment" of marine mammals. The DEIS states that these authorizations, coupled with historical monitoring data, support a conclusion that any behavioral disturbances to pinnipeds and other marine life will be temporary and not biologically significant. This conclusion fails to	BI-05, BI-07, BI-09, BI-10

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				adequately account for the cumulative impacts of up to 100 launches per year, each generating repeated sonic booms and elevated noise levels, in a region home to numerous special-status species that are already vulnerable to disturbance. Several ESA-listed marine mammals and birds in the vicinity, including Guadalupe fur seals and sea otters, are known to exhibit heightened sensitivity to acoustic and visual stressors. The repeated nature of these disturbances, combined with data gaps and monitoring failures identified in previous years, undermines confidence in the proposed mitigations. Moreover, some effects, such as the disorientation of marine mammals from underwater shockwaves or the separation of sea otter pups from their mothers, are inherently unmitigable and may contribute to broader disruptions in ecosystem function. As such, the conclusion that these impacts will be insignificant lacks a sound ecological or legal basis and fails to meet the threshold of using the “best scientific and commercial data available” under the ESA.	
Electronic Attachment	Alexis, Jasmine	Defend Them All Foundation	2	The DEIS asserts that Southern Sea Otters “quickly acclimate to disturbances from boats, people, and harassment devices.” However, this conclusion fails to account for the explosive, unpredictable, and high-intensity nature of rocket launches and sonic booms, which differ significantly in character, frequency, and scale from typical coastal disturbances. (DEIS p. 3.78). These events generate sudden, high-decibel, wide-ranging auditory and visual effects including low-frequency booms capable of reverberating across the air-water interface posing a distinct and potentially more disruptive threat to surface-dwelling marine mammals. Monitoring efforts cited in the DEIS offer little reassurance. While sea otters were observed	BI-06; As described in Section 5.1.16.2 of the Biological Assessment (BA; Appendix B of the Environmental Impact Statement [EIS]) sea otters have been shown to acclimate to a variety of types of disturbances and is therefore a potential outcome for otters on Vandenberg Space Force Base (VSFB). However, as also discussed in Section 5.1.16.2 of the BA, recent video monitoring of reactions of otters to launch disturbance showed behavioral disruptions. As a result, the Department of the Air Force (DAF) and the United States Fish and Wildlife Service (USFWS) mutually agreed to change the Endangered Species Act (ESA) determination for southern sea otter from

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				diving and later resettling following two Falcon 9 missions in 2024, these short-term observations do not account for chronic or cumulative effects. Sublethal impacts such as stress, foraging disruption, or changes in habitat use can be difficult to detect yet may have meaningful population-level consequences over time. Furthermore, launch events are inherently unpredictable and do not occur on a routine schedule making acclimation unlikely. Finally, the DEIS offers no analysis of the cumulative impact of such high-frequency disturbances on animals that rely on nearshore, surface-level habitats. Given the Southern Sea Otter's threatened status, reliance on incomplete or inconsistent data does not meet the legal standard of "best available science" required under both the ESA and MMPA.	may affect, but not likely to adversely affect to may affect and likely to adversely affect, reflecting the evidence that otters had not acclimated. The DAF used best available science to estimate metabolic effects from these disturbances and determined that they would not be significant.
Electronic Attachment	Alexis, Jasmine	Defend Them All Foundation	3	The Guadalupe Fur Seal (<i>Arctocephalus townsendi</i>), is particularly vulnerable to noise exposure and the cumulative impacts of launch-related activities. This species is known to be sensitive to elevated sound levels which are expected to increase in both intensity and frequency under the proposed action. (DEIS p. 2.24). Additionally, the DEIS acknowledges that the risk of ship strikes and entanglement will likely rise with increased offshore operations and vessel traffic. The deployment of parachutes, parafoils, weather balloons, and radiosondes will further compound entanglement and debris hazards in the marine environment. (DEIS p. 3.79).	BI-08
Electronic Attachment	Alexis, Jasmine	Defend Them All Foundation	4	Similarly, the effects of the proposed increase in launch activity on the Western Snowy Plover (<i>Charadrius nivosus nivosus</i>) have not been fully considered. A 2021 study by researchers at UCLA found that light pollution was the second most important factor in predicting where Western Snowy	The DAF previously completed an in-depth review of Simons et al. 2021, which appears to be the study that the commenter has referenced. Although Simons et al. reported that the likelihood of plover roosting sites declined significantly at 50 millilux (mlx), and goes on to

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				Plovers would choose to roost, following predator presence.” ⁴ Despite this, the DEIS downplays the significance of light pollution, stating that artificial lighting associated with the project is not expected to substantially alter behavior or reproductive success in terrestrial species, including the Western Snowy Plovers. (See DEIS p. 3.68). This is inconsistent with existing research.	assert that “it has therefore been found that exposure to ALAN [artificial light at night] to be a significant stressor for these beach dependent species.” The conclusion of causation is unsubstantiated. In the discussion, the authors themselves recognize that the study is limited because it is correlational; however, do not discuss the potential correlates of light pollution nor note that their conclusion is weakly supported. The correlates of light pollution include all of the additional stressors associated with urbanization, including, but not limited to, use of beaches at day and night by humans and pets and vehicles, beach grooming, invasive plant species that alter habitat quality, and urban predators (cats, dogs, racoons, rats, crows, etc.). These factors, especially when considered in combination, significantly degrade plover nesting habitat and should have been analyzed or at least acknowledged as potentially significant stressors that could very well explain presence of plover nesting. Additionally, the sites that Simons et al. found reduced nesting had much higher in radiance levels than beaches on VSFB. South Surf, for instance, is much darker than these other sites, as can be explored through publicly available data at: https://lighttrends.lightpollutionmap.info . Additionally, SpaceX is developing a lighting management plan in coordination with Space Launch Delta (SLD) 30 and USFWS to reduce any potential impacts due to nighttime lighting.
Electronic Attachment	Alexis, Jasmine	Defend Them All Foundation	5	In addition, declines in feeding rates and reproductive success associated with increased human activity have been documented in Western Snowy Plover	BI-05

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				populations. Studies have also shown that these birds do not acclimate to repeated disturbances over short time scales, making them particularly vulnerable to recurring or unpredictable launch activities. Given these findings, the DEIS fails to account for the cumulative stressors facing this already threatened species, especially in a region where habitat is increasingly fragmented and human pressure is high.	
Electronic Attachment	Alexis, Jasmine	Defend Them All Foundation	6	The California Coastal Commission's Second Addendum to the Staff Report for Consistency Determination cited "multiple instances of equipment failure and data loss" that "significantly reduced the amount and usefulness of monitoring data." These included: • Battery failures during sea otter monitoring. • Unrecorded sonic booms. • Hard drive failures that affected nest camera data for the Western Snowy Plover. These failures undermine the reliability of the monitoring record and compromise the scientific basis for concluding that impacts are insignificant.	BI-09
Electronic Attachment	Alexis, Jasmine	Defend Them All Foundation	7	Human Impacts and Public Health Concerns. The DEIS underestimates the significance of human impact. It acknowledges potential structural damage (DEIS pp. 3.40–3.41) but concludes adverse community noise exposure is unlikely (DEIS p. S.4). This does not reflect community reports of disturbance and ignores the challenges of sonic boom monitoring (WE COULD SITE THE ORAL PUBLIC COMMENT SESSION HERE?). Researcher Kent Gee has likened the study of sonic booms to "trying to catch lightning in a bottle." The Environmental Protection Agency lists risks of exposure to noise pollution to include "stress related illnesses, high blood pressure, speech interference, hearing loss, sleep disruption, and lost productivity."8 While this kind of noise pollution typically needs to be	N-10, N-11

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				chronic to cause issues, the cumulative effects of the increased level of sonic booms and rocket launches have not been fully studied and need to be carefully monitored.	
Electronic Attachment	Alexis, Jasmine	Defend Them All Foundation	8	The DEIS has concluded that many of the adverse impacts that will be caused by the increased launches are not significant. This must be revised to more realistically account for the impact on the many species that reside in the impacted areas and the residents nearby.	BI-04
Electronic Attachment	Alexis, Jasmine	Defend Them All Foundation	9	The California Coastal Commission made a negative determination on the increase from 36 launches to 50, out of concern for the coast. These same risks are now being increased, and this is significant. Furthermore, new issues have surfaced since that determination. The equipment issues that occurred during the monitoring of the sea otters, plovers, and the intensity of the sonic booms are concerning, because this monitoring was considered an important part of the mitigation process for the project. This is further complicated by the fact that the high number of sonic booms and sporadic noise pollution have not been fully studied, and earlier studies with much less frequency may not be as comparable anymore.	CO-01
Electronic Attachment	Alexis, Jasmine	Defend Them All Foundation	10	The risks posed by the increase in the launches are extensive. This is clear when considering the sensitive nature of the vulnerable species in the impacted areas. It is even more concerning when the monitoring malfunctions and the lack of fully comparable studies make it difficult to have the full picture as to the impacts. There is evidence to suggest the impacts will be more significant than was considered in the DEIS. It is vital for the Air Force to take into account these issues before moving forward. The health and habitat of the marine	BI-04, BI-05

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				ecosystem, and the safety of nearby residents are negatively impacted by the increase in launches. Moving forward with the proposed project without further consideration would leave many crucial variables unaccounted for.	
Electronic Form	Anderson, Sean	N/A	1	Subject: Petition Opposing the Redevelopment of SLC-6 at Vandenberg Space Force Base for Falcon 9 and Falcon Heavy Launches To: Department of the Air Force, Vandenberg Space Force Base, Santa Barbara County Board of Supervisors, and Relevant Regulatory Agencies Date: 7/7/25 From: Sean Anderson, Concerned Resident of Lompoc/Santa Barbara County I. Introduction I/We, the undersigned resident(s) of Lompoc, Santa Barbara County, and concerned supporters of local ecology, submit this petition in opposition to the Department of the Air Forces (DAF) authorization of the redevelopment of Space Launch Complex-6 (SLC-6) at Vandenberg Space Force Base (VSFB) for expanded SpaceX Falcon 9 and Falcon Heavy operations and launches. II. Environmental Impact on Burton Mesa Ecological Reserve: The Burton Mesa Ecological Reserve, adjacent to Vandenberg, is a unique and sensitive habitat, home to more than 300 plant species, including several that are rare, threatened, or endangered (California Department of Fish and Wildlife, 2023). According to the Santa Barbara County Conservation Blueprint, the Reserve is recognized for its rare maritime chaparral and sandhill ecosystems, which are highly susceptible to disturbance and fragmentation (Santa Barbara County Conservation Blueprint, 2018). Rocket launches and increased industrial activity at SLC-6 pose the following threats: Noise and Vibration: Studies show that rocket launch noise can exceed 140 decibels at close range, disturbing wildlife up to	N-08, N-09, AQ-02, BI-04, CE-1; In regard to request to enforce noise and environmental regulations for all launch service providers (i.e., operators), the DAF and Federal Aviation Administration (FAA) evaluate all proposed launch programs under the requirements of National Environmental Policy Act (NEPA), which ensures compliance with all applicable laws and regulations. Finally, the proposed redevelopment of Space Launch Complex (SLC) 6 does not require an independent Environmental Impact Report as an EIS under NEPA analyzes the potential impacts of the proposed action and also includes a public involvement component.

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				several miles away (NASA Technical Reports Server, 2002). Sensitive species such as the federally-listed Gaviota tarplant (<i>Deinandra increscens</i> ssp. <i>villosa</i>) and the Lompoc yerba santa (<i>Eriodictyon capitatum</i>) are vulnerable to such disturbances, which can disrupt pollination, breeding, and survival (California Native Plant Society, 2022). Air and Soil Pollution: Rocket exhaust releases perchlorates, heavy metals, and hydrocarbons, which can contaminate local soils and water, threatening both plant and animal populations (Environmental Protection Agency, 2019). Light Pollution: Night launches and increased facility lighting threaten nocturnal wildlife and disrupt natural behaviors (International Dark-Sky Association, 2021). III. Impact on Residents of Lompoc and Santa Barbara County: Residents of Lompoc and surrounding communities have repeatedly voiced concerns about the impacts of rocket launches, including: Sleep Disruption and Health Effects: Frequent launches disturb sleep patterns, especially for children and the elderly. Chronic noise exposure is linked to increased risk of cardiovascular disease, stress, and sleep disorders (World Health Organization, 2018). Structural Damage: Homes, especially older structures, experience repeated shaking and vibration; residents have reported cracks and other damage following launches (Los Angeles Times, 2021). Quality of Life: The cumulative effect of increased launches, noise, and traffic diminishes the enjoyment and tranquility of our community. IV. Regulatory and Community Concerns: Santa Barbara County and the City of Lompoc have established noise ordinances to protect residents™ health and well-being. It is unacceptable for private corporations to operate under exemptions that disregard these	

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				protections, especially when the impact on the community is so profound. V. Conclusion and Request: Given the documented risks to the Burton Mesa Ecological Reserve and the well-being of local residents, we urge the DAF and all relevant agencies to: 1.Suspend further redevelopment of SLC-6 pending a full, independent Environmental Impact Report (EIR) with robust public participation. 2.Enforce existing noise and environmental regulations equally for all operators, including SpaceX. 3.Prioritize the protection of sensitive habitats and the health of local residents over private corporate interests. We request that our concerns be addressed transparently and that meaningful mitigation measures be developed in partnership with the community. Sincerely, Sean Anderson References: California Department of Fish and Wildlife. (2023). Burton Mesa Ecological Reserve. Santa Barbara County Conservation Blueprint. (2018). Ecological Resources Report. NASA Technical Reports Server. (2002). Rocket Launch Noise Effects. California Native Plant Society. (2022). Rare Plant Profiles. Environmental Protection Agency. (2019). Perchlorate and Rocket Launches. International Dark-Sky Association. (2021). Light Pollution and Wildlife. World Health Organization. (2018). Environmental Noise Guidelines for the European Region. Los Angeles Times. (2021). Rocket launches shake up life in Lompoc.	
Electronic Form	Angel, Edward	N/A	1	I live in North Vandenberg Village. My house has almost a direct line of site to the launch pad at SLC-4, and is about 9 miles away from the facility. Yes, like many others our house rattles and shakes violently every launch. I have no doubt that our house will be slowly rattled apart from these launches, but will	N-02

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				never be able to prove the cause or receive any compensation. This is a serious issue for all of us who live in the area and I don't think anyone in our local governments or SpaceX is giving it the concern it deserves. More money full speed ahead. I don't want SpaceX to be shutdown locally. So with that said, personally I think the best way ahead would be to shut down SLC-4, and move all SpaceX launches down to SLC-6. SLC-6 is nearly 4 miles further down the coast and sits behind a significant mountain range that would block a lot of the noise and vibrations Lompoc feels during these launches. I don't believe this would have any different impact on our local wildlife, but I don't think it would make things worse. Thank you for the opportunity to comment on this issue.	
Electronic Form	Anonymous 1	N/A	1	I am submitting the following public comment in response to the Draft Environmental Impact Statement (EIS) for the proposed expansion of Falcon launch operations at Vandenberg Space Force Base (VSFB). 1. Undue Deference to SpaceX. The EIS affords excessive credibility to SpaceX as a commercial operator, assuming its internal safety and procedural standards are sufficient and sustainable. This assumption lacks critical evaluation, particularly in light of SpaceXs leadership behavior. CEO Elon Musk has a well-documented public record of impulsive actions, open disdain for regulatory oversight, and a pattern of inflammatory and dismissive statements about public interest, environmental safeguards, and institutional accountability. It is insufficient for the DAF to rely solely on launch reliability metrics while ignoring organizational risk dynamics. A companys technical success rate does not mitigate concerns about its	S-01; The EIS analysis is focused on the environmental consequences of activities that would result from the Proposed Action, not on the personal or public behavior of company leadership. NEPA does not require DAF to regulate corporate culture or internal management of private entities. The DAF, in coordination with other regulatory agencies (e.g., FAA, Environmental Protection Agency [EPA], National Marine Fisheries Service [NMFS]), ensures that safety, airspace, and hazardous material protocols are in place through existing permitting, operational, and emergency response processes. Launches conducted at VSFB occur under the jurisdiction of multiple agencies, including the DAF and the FAA, which provide independent regulatory oversight of launch safety, airspace coordination, and mishap investigation. As such, the assumption that launch operations lack

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				cultural disposition toward risk and rule compliance especially when the pace of operations and pressure for commercial gains increase. 2. Inadequate Risk Modeling and Public Safety Consideration. The EIS dismisses the need to model off-nominal scenarios (e.g., launch failures, errant booster landings, propellant mishandling) as too improbable to warrant analysis. This position is inconsistent with NEPA's precautionary intent and inappropriate for a proposal that would double annual launch cadence and introduce new heavy-lift operations within proximity to civilian populations. Furthermore, sonic boom impacts, vibrations, and structural stress effects are under characterized, particularly for vulnerable residential infrastructure near Lompoc and areas within the acoustic footprint. 3. Credibility and Oversight Deficiencies The reliance on SpaceX for enforcement of operational safeguards, airspace coordination, and launch failure responses without demonstrated, independent oversight creates a significant accountability gap. SpaceX has previously defied FAA launch constraints and publicly minimized environmental and safety obligations. Without a mechanism for third-party auditing, continuous monitoring, or real-time enforcement, this EIS effectively externalizes risk to the public. 4. Requested Revisions To address these concerns, the EIS should be revised to: Include failure-mode risk assessments and model environmental and public safety consequences of launch anomalies; Evaluate cumulative psychological and physical impacts of increased launch frequency and sonic activity; Explicitly consider SpaceX's compliance history and leadership culture in operational credibility assessments; Propose formal, enforceable oversight	independent oversight is incorrect. Environmental compliance, including hazardous waste management, air and water discharges, and species protections, is also overseen by federal and state resource agencies. The environmental monitoring requirements identified during consultations with these agencies are made conditions of the FAA license. While the comment raises concerns about psychological and structural effects from launch noise and sonic booms, these potential impacts are evaluated using acoustic modeling based on site-specific topography and historical data (see Section 3.4 of the EIS). No significant long-term noise-related effects on human health or structural integrity are expected. Therefore, the EIS will not be revised to evaluate internal corporate leadership or to introduce additional independent audit mechanisms, as those elements fall outside the scope of NEPA. However, the DAF will continue to coordinate with oversight agencies to ensure full compliance with all applicable environmental and safety regulations.

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				mechanisms that do not rely on voluntary compliance by the operator. Until the EIS demonstrates a more rigorous and independent evaluation of SpaceXs credibility and the true scope of operational risk, the Proposed Action remains premature and unsupported.	
Electronic Form	Arneill-Brown, Lynn	N/A	1	After reading your Government Garbledy-goop it appears the Govt. is saying it's okay to disturb marine life and people. Overall, you aren't going to cause chronic health issues. Ask us in another 10 years. We are all fed up with the sonic booms already and you are giving them carte blanche to double the launches. It seems you all discount the heavy sonic booms projections for West Ventura County in your Map Illustration 3.4-10 where the contour lines for heavy exposure is somewhere between 5 to 7. Your map can't be enlarged for better charity. You only mention is won't bother Lompoc. You don't say anything about all of us in Ventura County. You all are blaming us for having older homes that will receive damage. Oh thanks!! So, it's basically a big FU to the citizens while Elon gets to plaster the atmosphere with all of his satellites.	N-04; Figure 3.4-10 shows Falcon Heavy modeled sonic boom levels in Ventura County to be between 0.1 and 0.5 pounds per square foot (psf; light purple) as opposed to 5 to 7 psf (dark purple) which is predicted to impact offshore.
Electronic Form	Arthur, Kathryn	N/A	1	To whomever it may concern, My name is Kathryn, I am in my 30s as well as a homeowner in Lompoc with my husband. I am very concerned at the prospect of bringing the Falcon Heavies to the region. I understand the potential positive impacts but I do not think our region should be used for Falcon Heavy launches at all due to; 1. The very likely property damage (foundation issues, window cracks, wall cracks, etc...) caused by much larger and louder launches (the Falcon 9s have already caused damage to surrounding homes). This will directly and negatively impact home values in the region and lead	N-02, N-03, U-02, S-02, S-03; The Falcon Heavy has not launched at the SpaceX facility in Texas.

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				to increased costs on those living here. 2. Why does a small community like Lompoc need to bear the environmental and noise issues that come along with launches when the profit will be going to third-party companies like SpaceX or the government? This is not ok. The money and infrastructure should require large investment in protecting the local community and I would argue payouts or profit share from the operation. 3. Noise impacts will be much greater. It is already known that community members do not like the launches where the rocket is brought back to the base thus causing direct sonic booms over Lompoc startling and scaring both humans and animals in the surrounding area. I do not think it fair for the community to bear the brunt or the emotional harm/damage caused by this. Especially for those with PTSD. 4. The risk of massive explosions and other dangers. We are all aware these Heavy rockets have exploded multiple times in Texas causing massive fireballs. CA is far too high a risk for wildfire for us to even be considering bringing such dangerous activities here. I want to acknowledge that I do recognize the potential positive impacts of these plans as I am not completely against the launches and in fact do find them cool. If the increasing launches were for "just" Falcon 9s and smaller rockets my concern would be much less. However, due to the proposal of both increasing the number of launches dramatically as well as introducing Heavy rockets to our area I don't think all considerations have been made at this point and the local community and south coast communities and beyond deserve to be given bigger consideration.	
Electronic Form	Artuso, Kathryn	N/A	1	I am writing to protest the proposed increase in launches. Please find my petition attached below.	Please see responses to K. Artuso substantive comments below

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Electronic Form & Electronic Attachment	Artuso, Kathryn	N/A	2	I am writing to protest the proposed increase in launches at SpaceX and VSFB. As a resident of Ventura County and a freelance journalist, I have begun to investigate the sonic booms emanating from Lompoc, which can be heard and felt, rattling homes like an earthquake, throughout Ventura County and beyond. I am currently investigating if realtors have to disclose information about sonic booms when selling homes, which would lead to a substantial reduction in property value, and whether residents should be concerned about structural damage to homes. Should they be evaluating their properties and foundations for this? The effects on coastal wildlife have also been profound, as harbor seals trampled their pups to death after being terrified of the noise from one of the launches. This information was confirmed by Jennifer Green-Lanchoney, a media spokesperson at VSFB. What steps are being taken to prevent this in the future? The California Coastal Commission has run into a variety of problems when dealing with SpaceX and VSFB, as reported in the L.A. Times last fall, as the CCC has sought unsuccessfully to limit the amount of launches allowed each year. When I contacted the FAA, a spokesperson told me that the FAA models the best available data to determine reasonably foreseeable launch and landing sound levels caused by an operator's vehicle in accordance with the National Environmental Policy Act and FAA Order 1050.1. Under its current FAA-issued license, SpaceX is authorized to launch its Falcon 9 vehicle up to 50 times per year from Vandenberg Space Force Base. What does it mean to "model the best available data" and why has this modeling failed to minimize the impact of the sonic booms? With all of this in mind, I	N-02

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				am vehemently opposed to the proposed increase to 100 launches. Thank you for your attention to this matter.	
Electronic Form	Asplund, Shari	N/A	1	I strongly favor the No Action Alternative. I object to the expansion of approved launches from 50 per year to 100, and also object to adding the much bigger and more powerful Delta Heavy rocket to the launch schedule. I attended a meeting and spoke to representatives, I was not satisfied with their answers to questions about potential environmental effects. The analysis is dismissive about the very real effects of noise and structural damage already being experienced by homeowners which would be worse with more and heavier launches. It is disturbingly dismissive of effects to marine and freshwater biological resources. Studies cited are not adequate to assess such effects. There is zero support from the community for the proposed action. Please be a good neighbor and listen to the concerns and do not go forward with this plan.	N-02
Electronic Form	Ayala, Emily	N/A	1	I have found the sonic booms scary and disruptive. I especially do not like those occurring between 9 pm and 6 am as they wake me up. Several times they have sent me into earthquakes mode, ducking under my desk. It has been worse for animals and our friends who gave PTSD from wars. Typically when a neighbor is noisy they apologize and make it up to others by offering some goodwill. Where is the good we are owed? During the 1980's there were noisy space shuttle launches which were clearly announced and were for scientific research and for the benefit of mankind. The launches were infrequent. NASA was very open about their launches and intentions. This is not the case with current launches. Those of us that have lived with these ongoing booms over the years	N-01, N-03

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				ought to have some compensation. Perhaps discounted wifi or cable in our region? Instead, this whole project seems for the betterment of private interests rather than benefitting the general public. As it harms animals and offers no additional benefits to those of us being disrupted by noise and pollution I am opposed to further and increased launches Emily	
Electronic Form	Baker, Monica	N/A	1	As a citizen of Ventura, I am very concerned about the environmental impact of increased launches. Not only do the sonic booms affect us humans, they impact our house pets and wildlife in the area. The finite resources these launches use, the air pollution they create and the debris should be taken into serious consideration when making the decision to allow more launches. Taking into account the critical habitat we have here on the mainland and on our offshore islands, we should not increase the amount of rockets that will be launched. If anything, there should be a dramatic decrease. Thank you for your consideration, Monica Baker Ventura, CA	AQ-02, BI-04, DE-01, DE-04, N-05
Electronic Form	Barandiaran, Javier	N/A	1	To Whom it May Concern, Contrary to the EIS, "human sensitive receptors" like my ears hear the sonic booms from the already existing launches regularly, and I live far from Lompoc or the "area surrounding VFSB". My heart goes out to those forced to live there, with no choice or voice in this matter. My neighbors all complain of being woken up at night from the sonic booms, their houses shaking. There is plenty of evidence to support the physiologic harm of loud noise to human health including hearing loss, sleep disruption, stress, cardiovascular disease, and cognitive impairment. That is why the EPA (Environmental Protection Agency) has set Maximum Permissible Sound Level Readings for motorcycles at 80 decibels and also why supersonic jets were	N-01, N-03, N-08, N-10, N-11, AQ-05, T-01

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				banned in 1973, after the US Navy received 40,000 complaints about the negative impact of the loud sonic booms. Given this, I have the following feedback and requests for your consideration. 1. Use the appropriate measurement standard for Sonic Booms, shifting from an FAA/OSHA average to an EPA standard of Maximum Permissible Sound Level Reading. It makes no sense that Vandenberg is measured according to FAA/OSHA standards, which were intended for average noise thresholds over extended periods of time in communities facing sustained air traffic noise. If a sound as loud as a gunshot wakes you up in the middle of the night in a startled panic, it is nonsensical to average or spread out that impact over the subsequent 24 hours. 2. Implement a Best Management Practice that all launches should follow a Dog Leg trajectory, sending the sonic boom carpet over the ocean before launching into orbit, rather than directly over communities. It may lead to smaller payloads and cost more money, but this will reduce the physiologic and emotional impact of the noise on human communities. 3. Initiate prospective community-based research on the human impact of sonic booms for individuals living within the boom carpet. This could include distribution of ANSI type 1 sound meters to individual homes or a collaborative study with Kent Gee from BYU who is already studying acoustic impact of SpaceX launches in other communities. In addition to the above, evidence also exists of negative impacts on wildlife - already stressed to the limit in a warming and acidifying ocean - and of negative impacts on space itself. Projects like this are contributing directly to turning space into a massive junkyard: this is the legacy you	

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				will leave for your children. This project should also account for its climate change impacts. While this area is too new for legal thresholds for GHG (according to the EIS), it should nevertheless abide by net zero carbon policies. Thank you, Javiera	
Electronic Form	Barber, Deborah	N/A	1	I am a resident of Shell Beach. I strongly oppose the Falcon Launch Program's exponential expansion. The draft EIS does not include important multi year studies of the impact of past launches on wildlife, public health, greenhouse gases and general recreation. The sonic booms are particularly disturbing. In addition I care about the effects on endangered species. Our Central Coast is a beautiful and diverse community. Let's keep it that way! Thank you for your attention to this matter.	NP-01
Electronic Form	Bates, Lori	N/A	1	I am against increasing the amount of rocket launches from Vandenberg. Already we are impacted by the number of launches. Along with the noise and damage it has done to our home ,there is concern of the amount at toxins that are released. I have watched the trails remain longer and longer in the sky. The increase in carbon dioxide is a real problem. Our oceans and air are already taxed by an excess of pollution. Knowing when the rockets launch does not stop my heart from racing every time there is a sonic boom. I feel that there are already way too many rocket launches. It is already challenging to camp at Jalama beach with so many closures. The launches have compromised our health, the health of our planet and our right to recreate in public areas. Thank you for reconsidering the amount of rocket launches per year.	AQ-02, N-08, P-01
Electronic Form	Beals, Beth	N/A	1	Good Afternoon, I am a local Carpinteria who is commenting from the stand point of how the launches impact residents (both wildlife and human) .	N-01, N-02, N-03

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				I do not have extensive knowledge in many of the listed categories suggested to comment on. So here is just my average every day person viewpoint. I have be shaken awake late in night from a deep sleep with the sound of a launch. My bedroom window rattles and I have felt so ill from the adrenaline that shoots my body for hours after because it (by imagination only) sounds and feels like a bomb has been dropped. I have been outside by the ocean mid day enjoying the beach and had the exact same experience. I can tell you it impacts the animals because every bird on the beach was gone in a flash. I can only imagine how it impacts the sea life. I have witnessed a number of blaze trail in the sky following and thought what chemicals are dropping into the ocean or upon us? I have two to three cracked bathroom tiles from the sound impact. This does not promote heath and well being for anyone living within range of hearing this kind of impact regularly. I would encourage not adding more launches and instead reducing them. Respectfully, Beth Beals	
Electronic Form	Beebe, Dennis	N/A	1	See uploaded file, Beebe Comments on Draft EIS	See responses to D. Beebe substantive comments below
Electronic Attachment	Beebe, Dennis	N/A	2	Why isn't SLO County included in air quality analysis? I'm aware that a past VSFB launch failure resulted in debris falling in SLO County property. I would think pollutants in the air that reach SLO County a much more likely phenomenon.	The region of influence (ROI) for air quality impacts of the Proposed Action includes three air pollution control districts: the Santa Barbara County Air Pollution Control District (APCD), Ventura County APCD, and Los Angeles County APCD (See Section 3.3.1.3 of the EIS). The predominant winds at VSFB are North and Northwest, which pushes air to the south, away from San Luis Obispo County.
Electronic Attachment	Beebe, Dennis	N/A	3	The Lompoc valley has hundreds of farms and ranches and yet no assessment of the impacts of	N-05

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				Falcon operations on these enterprises is included in the EIS. There are hundreds, perhaps thousands, of farm and sport animals that will be affected by these operations but not mentioned in the EIS	
Electronic Attachment	Beebe, Dennis	N/A	4	The EIS provides no data regarding the number of fairing parachutes or parasails that might impact the ocean and not be recovered. Space X apparently has difficulty recovering these devices but no estimate of numbers is provided. One hundred launches will produce 200 parachutes and 200 parasails. The EIS should provide an estimate of the number that may reach the ocean.	DE-01
Electronic Attachment	Beebe, Dennis	N/A	5	I saw no mention of the impact this program may have on the physical mental health of the people who live in close to the launch sites. This concern was most commonly heard subject during the public hearing in Lompoc. Speakers mentioned lack of sleep, nervousness, and fear. The EIS states that, most of the time, the thresholds for dangerous levels of sonic booms, noise and other parameters will not be breeched. But these analyses are for individual events. There is no mention of the effect near-continuous bombardment of all of these parameters. These potential long-term effects should be addressed. Even though it will impact launch scheduling, the DAF should seriously consider requiring Space X to conduct all proposed operations during daylight.	N-01, N-03
Electronic Attachment	Beebe, Dennis	N/A	6	Although media reports state that the CCC current objection to 100 launches per year is political, if their objection to 100 launches per year has any environmental aspects, these aspects should be addressed in the EIS. In any event, the EIS does not mention the CCC after November 2024. It should.	CO-01
Electronic	Beebe,	N/A	7	The estimated need for housing that began at State	The EIS (Section 3.12) evaluates the potential

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
Attachment	Dennis			levels has little to do with the socioeconomic impact of this project. These same numbers would have come down from the State, to be allocated to local jurisdictions, are independent of the local economy or the effects of this project. The EIS should address the economic impact of the value of local housing instead of numbers of new housing units that might happen in the future. The real socioeconomic impact may very well be the departure of residents who cannot live with the environmental impacts and the resultant loss of property values throughout the Lompoc area.	socioeconomic effects of the Proposed Action, including workforce demands and housing availability. While the Regional Housing Needs Allocation projections are used to describe baseline housing conditions and planning context, they do not serve as a substitute for analyzing project-specific impacts. The EIS found that environmental impacts would remain below thresholds of significance and are not expected to adversely affect the livability of surrounding communities such as Lompoc. NEPA does not require analysis of market-based economic fluctuations in property values unless they result from direct environmental effects.
Electronic Attachment	Beebe, Dennis	N/A	8	The statement that “pavement deterioration is influenced by more than truck traffic”, although true, neglects to state that the increases of truck traffic is the dominant cause in this case. The weather effects remain constant as do other effects. At a minimum, the project will double the number of truck traffic.	The DAF acknowledges truck traffic as a contributor to pavement wear and notes that pavement deterioration is influenced by multiple factors, including environmental conditions. The anticipated increase in truck traffic from the Proposed Action remains within the capacity of roads designed for heavy-duty use and no significant impacts are expected.
Electronic Attachment	Beebe, Dennis	N/A	9	3.14.1.2. Your definition of the ROI is confined to the areas near the SLCs and is completely inadequate. The people who live near VSFB are already subject to disturbing effects on their health and safety due to sound and sonic events that can occur throughout the day. This project will double those effects. Why is this being ignored?	N-08; The ROI for each resource was determined by the propensity for effects to be experienced. For noise the ROI was defined in Section 3.4.1.2 of the EIS as all areas with the potential to be affected by noise from the Proposed Action.
Electronic Attachment	Beebe, Dennis	N/A	10	Page 26/200 (and elsewhere) states that the Western Range is used for "geostationary orbits". Really? If this is true, and Falcon launches from either SLC-4 or SLC-6 will be used for geo missions, I would think the entire EIS should be revised significantly. Launch Azimuths from VSFB that result in a geo orbit must go	As stated in Section 2.1.2.3 of the EIS, launch azimuths would range from 140 to 325 degrees. While reaching a geostationary orbit is possible from VSFB, it is not "typical" and will be removed from the text.

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				almost directly East. These azimuths are not included in the EIS.	
Electronic Attachment	Beebe, Dennis	N/A	11	In the early 1980s, as Vandenberg was being prepared for Shuttle operations, NASA conducted numerous studies and tests on the sonic damage that could occur to structures due to local weather phenomena. In essence, if an explosive event should occur at SLC-6, a local inversion layer could focus the sonic energy and deliver damaging effects to structures far farther than previous estimated. I remember windows being taped on NVAFB to limit the predicted damage. This study or this effect is not included in the EIS but should be.	S-01
Oral Comment Lompoc	Beebe, Dennis	N/A	12	The air -- the Space Force uses the term cadence, and it's used more than once in the EIS. But cadence implies a repetitive, routine beat. And that's not how launches go. I had some experience in the launch business, and they include spurts, not one launch per week or in this case, two launches per week -- although that's the average. That's not how it works. There are problems. Launches are delayed. And then the developer or the launch agency has to catch up. So they go to spurts where the interval between launches decreases. Now, if you look at the proposed development of a second launch site, the time between events, be they launches or tests or recoveries, can decrease markedly over what we know about SLC-4 operations. So I'm talking about spurts with even decreased periods of time between the events. I don't know what the minimum is, but this hasn't been looked at in the EIS. The EIS looks at all these wonderful environmental impacts based upon single events, all sorts of patterns from noises and impacts and sonic booms. That's a single event. What if they went, "boom, boom." It could happen	PA-03

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				with two -- two launch complexes. I don't know what the impact is, because it wasn't studied. So I'm recommending that the reality of what I'm calling spurts, rapid launches from one or both of these launch complexes be included in the EIS. It's -- it's reality and it should be looked at. ...What are the environmental impacts if these operations are only hours apart rather than days. What if there were 3-4 operations within one week? How about 5-6 operations? The DAF should establish a minimum time interval between operations to enable recovery.	
Electronic Form	Beety, Nina	N/A	1	Please find attached my comments on the DEIS on changes to the Falcon launch program at Vandenberg SFB. Sincerely, Nina Beety	Please see responses to N. Beety substantive comments below
Electronic Form	Beety, Nina	N/A	2	Please post the transcripts of the June public comments hearings and recordings. Thank you.	Responses to substantial comments received during the public hearings are provided in this table with the Final EIS
Electronic Attachment	Beety, Nina	N/A	3	There is no independent oversight, and as stated in the EIS, the Pentagon has succeeded in getting layers of review, CEQ NEPA, eliminated. The Department of the Air Force (DAF) wrote the EIS on its own proposal in order to authorize itself to expand launches. This is decision-based evidence making, cherry-picking data to reach the desired conclusion like tobacco science. The FAA's flawed decision that there would be no significant environmental impacts and that the proposal "will not significantly impact the quality of the human environment" was based on a brief environmental assessment (EA) which failed to address known impacts from existing launch cadence. The FAA considered a more in-depth Environmental Impact Statement (EIS) unnecessary, ignoring the research and public testimony of negative impacts.	Launches conducted at VSFB occur under the jurisdiction of multiple agencies, including the DAF and the FAA, which provide independent regulatory oversight of the NEPA process. As such, the assumption that this NEPA process lacks independent oversight is incorrect. Environmental compliance, including hazardous waste management, air and water discharges, and species protections, is also overseen by federal and state resource agencies. While the comment raises concerns about the quality of the data used in analyses, the DAF has used best available science in the preparation of the EIS. After completion and acceptance of the NEPA process, the FAA may issue its own Record of Decision to support the issuing, modifying, or renewing of a license to SpaceX and approving related airspace closures. The FAA will draw its own conclusions

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					from the analysis presented in this EIS and assume responsibility for its environmental decisions and any related mitigation measures. The DAF and FAA will continue to coordinate with oversight agencies to ensure full compliance with all applicable environmental and safety regulations.
Electronic Attachment	Beety, Nina	N/A	4	However, in 2024 the California Coastal Commission did not approve SpaceX increase to 50 launches per year (from 36 launches per year, which SpaceX had already exceeded), and stated that SpaceX should apply for a Coastal Development Permit as a commercial activity, not through the DAF, under cover of federal action. That situation is still unresolved; SpaceX has not taken the action requested by the Coastal Commission, and the DAF has ignored the Coastal Commission by increasing launches anyway. DAF has not sought Coastal Commission approval or authorization for a consistency determination for the current increase to 70 launches, putting it at odds with California state rules and jurisdiction. As a result, an additional request by the DAF to the Coastal Commission for further increased cadence to 100 launches to include Falcon Heavy will likely not gain an adopted consistency determination from the California Coastal Commission.	CO-01, CO-02
Electronic Attachment	Beety, Nina	N/A	5	Failed to delay this proceeding and reschedule scoping meetings despite nearby LA fires – Failed to post virtual EIS comment meeting details on the website for advance notice, and failed to respond to my email asking about virtual meeting details. – Apparently failed to provide public notice widely of this proceeding, despite the widespread impacts of these launches affecting Americans and all Earth. I	NP-02

Source	Last, First Name	Organization/ Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				found no notice in Monterey County newspapers on this proceeding, despite that the county is in the landing zone, and county residents can see pollution plumes from rocket launches.	
Electronic Attachment	Beety, Nina	N/A	6	My scoping memo comments, in general, were not addressed. I said the EIS must examine: Jet stream interference, Ionosphere interference, Magnetosphere interference, Climate change, extreme weather, and global warming from long-lived stratospheric pollution, and satellite EMF/RF interference, Ozone destruction by the multiple mechanisms from rocket launches, de-orbiting, and stratospheric pollution, Ozone layer replenishment problems due to these rockets and satellites, ... Debris fallout and fire dangers.	AQ-01, AQ-05, DE-06, S-02, U-01
Electronic Attachment	Beety, Nina	N/A	7	The EIS did not acknowledge or evaluate EMR-microwave from SpaceX Starlink and other satellites, and ground telemetry which harm the Earth and living beings. The toxicity of microwave radiation is well known, including by the Pentagon. Starlink equipment EMF emissions may be harming the ionosphere, magnetosphere and stratosphere, affecting and destabilizing weather and Earth's natural electric circuit which regulates weather, lightening, and ion exchange. The violence of weather in recent years may be connected to this destabilization, but there was no examination of it.	U-01
Electronic Attachment	Beety, Nina	N/A	8	Air impacts were very narrowly addressed, but not atmospheric impacts over California. All of this pollution falls out in the air we breathe, the land, the waters, agriculture, communities, and wildlife.	AQ-02
Electronic Attachment	Beety, Nina	N/A	9	Launch safety was not assessed in detail, given the frequent accidents at the Boca Chica facility. Hazardous materials and solid waste did not mention that explosions would spew hazardous materials and	S-01, S-03

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				debris over a wide area including over Santa Barbara and Ventura County populated areas. The Boca Chica debris fields are extensive, impacting wildlife, but not near towns or agricultural fields as Vandenberg is. There are a lack of safeguards for beach users, including birds. DAF testimony to the Coastal Commission was that evacuation is only done over a certain number of humans. Under that number, and many of the launches are at night, they are not evacuated, despite that if a rocket explodes, they could be injured or killed by debris.	
Electronic Attachment	Beety, Nina	N/A	10	Water use, including from inundation equipment, was only partially addressed. The EIS discounted the impacts to local and state groundwater. State water supplies are far from secure, and if that system goes down for any reason, including extended droughts, the base must rely on local groundwater.	WR-02
Electronic Attachment	Beety, Nina	N/A	11	The EIS geology and soils section failed to consider earthquake risks from the vibration of the launches due to high decibel levels and resonance, risks that would increase with increased launches.	N-12
Electronic Form	Benefield, Jane	N/A	1	Noise is the primary issue for our town in Carpinteria. Whenever there's a launch, the houses rattle, the animal scurry, and your nerves are shot to hell for hours on end. In the middle of the night it is particularly harrowing. These booms have been known to produce wall cracks in my mobile home, terrifying everybody within launch hearing. It has to stop and if it can't stop due to the need for profit, it should be modified to very few a year not one a week or two a week or pretty soon it'll be every day and we might as well kiss our homes goodbye. It's unconscionable that one person Elon Musk has the right to disrupt hundreds of thousands of lives. Say no to this say no. And since you can't say no apparently,	N-02, N-03, N-09

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				how about really determining how the noise affects the community???	
Electronic Form	Biewener, Mary Ann	N/A	1	I'm Mary Ann Biewener living in Midtown Ventura, CA. I support the No Action Alternative. I have not seen any written need for additional launches for defense. 80% of current launches are for Commercial purposes. SOUND and NOISE The Draft EIS only uses estimates of Cumulative Sonic Boom Levels instead of Actual Launch Data. The modeling summarizes that people are not likely to even notice a Falcon Heavy Launch Sonic Boom. (Page 57) and on Page 66 Falcon launches from SLC-4 and SLC-6 would generate sonic boom footprints that are entirely over the ocean. This is Not Accurate. As many people have stated before, we hear launch Sonic Booms all the time in Ventura. And all the Vandenburg Falcon Launch notices warn of Possibility of hearing One or more Sonic Booms. MITIGATION AND MONITORING - P 3-47 Section 3.4.2.5 In order to minimize any potential disturbance to human populations, SLD30 provides notification prior to each launch This is not a mitigation, nor is it monitoring the intensity of the BOOM. Sonic Booms can Occur on All 100 launches Plus 24 landings a year. OUR NOISE MITIGATION REQUESTS: 1) No launch or landings between the hours of 10PM and 7AM the Community Noise Equivalent Level (CNEL) adds 10-times weighting to each operation at these hours (section G-3) 2) Set-up multiple monitors in Coastal Cities to record the Sonic Boom Levels. Review every 3 months. If the Boom Levels exceed Modeled levels, then we need additional mitigation. 3) Mitigation Option - Best Management Practice is for all launches to follow a Dog-Leg trajectory sending the sonic boom carpet over the oceans before launching into orbit, rather than directly over communities.	N-01, N-06, T-01

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
Oral Comment Virtual	Biewener, Mary Ann	N/A	2	So our noise mitigation request, no launch or landings between the hours of 10 PM. and 7 AM. That's related to community noise equivalent level, which adds 10 times weighting to each operation.	N-01
Oral Comment Virtual	Biewener, Mary Ann	N/A	3	The best management practices for all launches to follow a dogleg trajectory, sending a sonic boot carpet over the oceans before launching into orbit rather than directly over our communities.	T-01
Electronic Form	Blaugrund, Michael	N/A	1	My concerns about The Expansion and increased number of launches revolves around the following. 1. The EIS report dose not take into account the environmental impacts from non-Space X launches, ie. additional space companies who are already in conversation with VSFB. Since the EIS report is based on the Merlin engine, and not other engines used by other companies. 2. Since Ventura County's air quality is already in the Non-attainment area, based on the SCAQMD, increased emissions by the EIS results and unstated Commercial companies would push the air quality to unhealthful. Also stated in EIS report section S.3.1.12 dose not take this into account.. 3. Increased launches allowing commercial space companies do not support National Security objectives, by nature of being for commercial reasons 4. A letter dated May 22, 2025 from Nancy J. Balkus to SAF/IEE states" The proposed action will not result in any new or additional Violations" indicating that at the current max 50 launch cadence, violations are already incurring. Since this is the case, it would be against regulations to increase to 100. 5. The average CNEL stated only averages over day time and night time, but in fact there four levels which each having a different CNEL level. This indicates that the result findings are based on inconclusive date. Sonic Booms also do not have a base line to compare to, and	AQ-02, PN-04, S-01, S-02; The referenced letter from N. Balkus is the draft General Conformity Determination (GCD). The language in the letter was not meant to imply that there are any existing violations. The GCD was completed in compliance with the General Conformity Rule as set forth in South Coast Air Quality Management District (SCAQMD) Rule 1901 to ensure that there are not violations.

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				results again can not be used as positions of non Human Health effect. 6. The EIS dose not mention or take into account Human Tragedy and property loss which will occur if a launch or reentry malfunctions and can not be reset causing a crash. What are the safe guards? This is important because VSPB is allowing launches over populated areas, a policy which got modified to this from the original position that launches would be over non populated areas. In conclusion, I'm very thankful for the opportunity to participate in this very important process which will change our living environment moving forward. Please remember protecting the people dose not mean harming the people in the process. I strongly support the "NO ACTION ALTERNATIVE" based on the framework I have outline above. Thank you	
Oral Comment Ventura	Blaugrund, Michael	N/A	2	Also, there's no indication in the report about where the sonic boom measurements were taken. It talks a lot about the Los Angeles area, but I don't see anything in the report about any location specifically in Ventura or Santa Barbara where an actual sonic boom measurement has been taken. So it's hard to imagine that the levels that were talked about in the report, which I'm thankful it that included those, may not be completely accurate and more on the downside of the real degree of sonic boom that we experience here in Ventura.	N-02, N-06
Oral Comment Ventura	Blaugrund, Michael	N/A	3	Also, the report -- and I have to thank you for this, that at the first meeting we had I think in January it was discussed a lot about folks having cracks in their homes or situations that current people are expressing. I understand that, but there's no indication of anybody coming out and doing any type of a field work in the counties to find out exactly about these cracks. It was just stated that it was	N-02, N-11

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				probably due to bad material, old material, or houses that are not maintained by the owners. But I can tell you that in the Ventura and Santa Barbara area the cost of housing to own a home, people take care of their homes because it's very unfortunate that we would not be able to move and purchase another home in the area. So that part of the discussion is absolutely incorrect about care of the homes. And I think that a field study needs to be increased in these areas to get a really full picture of that.	
Oral Comment Ventura	Blaugrund, Michael	N/A	4	When rockets launch from Vandenberg, the exhaust from the engines comes down and settles over Ventura into the hill. And I can smell that exhaust fume coming over my house and can watch that cloud come down from the sky, come and settle above my house, and then drift into the mountain. I think that that definitely has to be addressed because that's the most important environmental effect for the people of Ventura which is not being addressed in the EIS.	AQ-03, AQ-06
Oral Comment Lompoc	Blevins, Janet	N/A	1	I live in a wonderful home. It is not rickety and old. However, it is suffering significant damage from the launches. The cracks in my stucco are getting longer and wider, and more numerous after every launch. I can't stand there and watch the -- the increased damage every time there's a launch, but I will forward the information about the damages to my home. We have brand new windows. They're double-paned. They clatter like crazy. Nothing has broken and I don't think they will. My house where we live and where we pay a sizeable mortgage, and it is being damaged and I resent the heck out of it.	N-02
Oral Comment	Blischke, Joerge	N/A	1	So my question is, even though I haven't read fully the EIS, I would like to see if that can be addressed or	N-01

Source	Last, First Name	Organization/ Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
Lompoc				how to minimize launches at night.· And from my understanding, most of the launches that SpaceX ·conducting are commercial in nature, not as many on the ·national security side.· So I don't understand why ·launches cannot happen during the day when they're ·commercial in nature. And so my request is to minimize launches at night and include this also in a discussion in the EIS ·in case it hasn't been addressed.·	
Electronic Form	Borello, Judith	N/A	1	My family and I live in Nipomo and we can see the rockets launch and re-enter from our back yard. It used to be one or two launches a year, now the launches are many. We don't bother looking anymore because they are disturbing and annoying. We know when they occur because the windows of our two story home rattle loudly during take off and re-entry. I worry about what my family breathes and so I close the windows. I read that, Depending on the type of model and fuel used, rockets can produce soot (black carbon), nitrogen oxides, alumina particles, chlorine, hydrochloric acid and water vapour. Rocket launches used to be rare enough that pollution wasn't much of a concern. The rockets have become negative progress. We are against more rocket launches, they are a nuisance and I feel they are harmful. Judith	AQ-01, AQ-02
Electronic Form	Bremer, Kathy	N/A	1	The EIS conducted to study the doubling or tripling of launches from Vandenberg does not adequately address the impact on marine mammals. There is compelling evidence that the existing launches are adversely impacting harbor seals at their pupping beach in Carpinteria. The launches are causing the seals to panic and rush into the ocean. The launch noise is causing premature birth and miscarriage as well as thinning the seal population at this important beach. This issue is not adequately addressed in the	BI-01

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				EIS. The impact on marine mammals was dismissed in the EIS as being temporary, without further study and glossing over observable behaviors that could permanently chase the seals away from one of their four pupping beaches in Southern California. This oversight must be remedied immediately. It is a major flaw in the EIS. Thank you for considering my comment.	
Oral Comment Lompoc	Buchanan, Amy	N/A	1	Earth's magnetosphere shields us from harmful solar radiation, but rocket launches create temporary holes in the ionosphere, weakening our vital protection. Satellite reentries now contribute more mass to the upper atmosphere than natural meteorites, leaving aluminum dust that lingers for years. This dust increases ionospheric conductivity, intensifying geomagnetic storms, and generating stronger telluric currents. These storms can overload our power grids, disrupt communications, and worsen extreme weather.	AQ-01, AQ-02
Oral Comment Lompoc	Buchanan, Amy	N/A	2	Scientists now warn of a tipping point, Kessler syndrome, a chain reaction of satellite collisions that can make earth's orbit unusable for generations. If that happens, future exploration, emergency monitoring, and global connectivity would be lost, not by nature, but by your own recklessness. This impacts the whole world, not just this community.	DE-06, U-02
Oral Comment Lompoc	Buchanan, Amy	N/A	3	Rocket activity is already affecting sensitive habitats. Launch vibrations and noise disrupt wildlife and nesting cycles. Late night and early morning launches violate noise ordinances, disturbing children, veterans, and pets. These impacts on homes and ecosystems remain unaddressed.	BI-04, N-01
Oral Comment	Buchanan, Amy	N/A	4	I strongly urge you to reduce the frequency of launches, include indigenous voices in decision	CR-01

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
Lompoc				·making, and ensure true accountability for ·environmental impacts.	
Oral Comment Lompoc	Buchanan, Pamela	N/A	1	I just wanted to add a comment kind of associated with the possibility of the rockets crashing ·and setting our community on fire. · Years ago, when ·launches were barely increasing, there was a huge study ·being done about the fuel tanks that come, not just ·through our community, to get here from whatever route ·they're coming. So with increasing launches, of course these toxic flammable fuels are that much increased also. ·And we are a fire -- high fire risk area. · So I think ·that really needs to be addressed. · It doesn't just ·affect Lompoc. · It's wherever those fuel tanks are ·traveling. ·	As discussed in Section 3.15.1.3 of the EIS, the transportation of hazardous materials to and on VSFB would adhere to Department of Transportation (DOT) regulations for interstate and intrastate shipment of hazardous materials (Title 49 Code of Federal Regulations [CFR] Parts 100–199). The DAF and SpaceX adhere to all federal and state regulations and requirements for the transport of hazardous materials, and under the Proposed Action commodity deliveries would continue to use existing, permitted transportation routes and protocols. DOT-certified commercial transporters would convey hazardous material used in or resulting from the Proposed Action.
Electronic Form	Caldwell, Kristeen	N/A	1	*Launch noise in my neighborhood often causes dogs & cats to run away. Desperate neighbors post on Ring looking for their beloved pets. *Structural Damage - the majority of Lompoc houses are older. The violent shaking that happens to our houses feels like earthquakes except they last much longer. Would like to see seismographic information for the city of Lompoc. *All this in addition to the already large number of current launches. It will definitely be much harder on our houses. *Water - Recent explosion and fire in Texas shows that areas as susceptible to unexpected fires. Lompoc does not have a fire department big enough and equipment new enough to handle such a disaster. Also amount of water needed does not seem available. *Ocean - in less than 10 months there have been several mishaps with rockets exploding this cannot be considered "Light" with no effects. *Geology - Why is it okay "to	N-02, N-12, S-02, S-03 WR-03, WR-04

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				continue polluting the grounds"? Please stop the pollution and look at other alternatives!	
Electronic Form	Camp, Jean	N/A	1	See attached letter	See responses to J. Camp substantive comments below
Electronic Attachment	Camp, Jean	N/A	2	In the EIS, Section 5.3.L.2 on Noise, using daily or weighted averages is not sufficient! When a bomb goes off an individual's hearing is immediately and often forever impacted and lost over the one-time incident. Noise from sonic booms should be considered the same way and considered a single event (not only a daily average) and when they can generate over 65 dBA at our house or other inhabited areas, the launches and landings at VSFb should not be allowed!	N-10
Electronic Attachment	Camp, Jean	N/A	3	Figure 3.4-9 on page 3-37 suggests that our home in its location on your map would experience 2.00 to 2.99 pounds/sq ft sonic boom levels for Falcon 9 - obviously that number would be much higher during a Falcon Heavy launch and landing! For the EIS to state that 65 dBA is only happening near Vandenberg is absolutely incorrect. Should Alternative 1 be allowed to proceed, I want a commitment that SpaceX (and its insurance company) and the government agree to pay for all damage which will include, but not be limited to, changing out ALL my single pane windows and exterior glass doors on three structures on my property if any/some single pane glass is broken AND to re-stucco all three buildings. Additionally, should Alternative 1 be allowed to proceed, NO launches should be allowed during night time hours when people are sleeping (say 10 pm to 8 am).	N-01, N-02, N-04; The EIS presents the Community Noise Equivalent Levels (presented in A-weighted decibels) separately from the individual sonic boom levels (pounds per square foot) to illustrate the use of two separate noise metrics, one being a 24-hour average level, and the other the instantaneous level of a sonic boom event. The two metrics are not meant to be equivalent.
Electronic Attachment	Camp, Jean	N/A	4	In the EIS Section 5.3.1.4 on Marine Biological Resources, it states that it's OK to unintentionally take small numbers of marine mammals by Level B	BI-01

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				Harassment during launches. This is wrong on so many levels and will obviously increase the number of marine mammals affected by having more and heavier rocket launches. I have already witnessed behavioral changes and how will you prove that the changes are temporary and would not kill, injure more mammals or send these mammals away for good?	
Electronic Attachment	Camp, Jean	N/A	5	I understand that the FAA must issue or modify the operator license for SpaceX to allow commercial launches and landings and to issue temporary airspace closures. The EIS should specify the exact impacts to our local infrastructure, transport, accessibility, including but not limited to: local flights, traffic/road closures, beach and ocean access and closures, etc. Commercial launches should NOT be allowed at Vandenberg. These activities are not federal agency activities and only negatively impact our west coast environment, population, animals, resources, habitat, quality of life, etc.	The EIS analyzes potential transportation impacts, including traffic, access restrictions, and airspace impacts. Under the Proposed Action, there are no significant impacts anticipated to transportation or accessibility. Temporary road closures would occur on VSFB during launch windows for safety. Surf Beach and Ocean Beach Park would only be closed up to 12 times per year. Jalama Beach County Park evacuations would not be issued for more than 12 times per year. The Proposed Action would not significantly impact commercial flights, as airspace restrictions are temporary and managed by the FAA. As stated in Section 3.4.2.1.7 of the EIS, the FAA's analyses have concluded minor impacts from commercial space launches and the FAA has rarely, if ever, received reportable departure delays associated with launches at VSFB. Overall, impacts to local infrastructure would be minor and not significant under NEPA. As stated in Section 1.3 of the EIS, the Proposed Action fulfills (in part) 10 United States Code (USC) Section 2276(a), "Commercial space launch cooperation," authorizing the Secretary of Defense to: maximize the use of the capacity of the space transportation infrastructure of the Department of Defense (DOD) by the private sector in the United States (U.S.);

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
					maximize the effectiveness and efficiency of the space transportation infrastructure of the DOD; reduce the cost of services provided by the DOD related to space transportation infrastructure and launch support facilities and space recovery support facilities; encourage commercial space activities by enabling investment by covered entities in the space transportation infrastructure of the DOD; and foster cooperation between DOD and covered entities . Implementation of the Proposed Action would support the DAF's statutory obligation to ensure capabilities to launch and insert necessary national security payloads into space (10 USC Section 2273). This would be accomplished through Falcon operations at VSBF, including Falcon Heavy, with a focus on heavy-lift missions supporting the DAF, DOD, and other National Security Space Launch requirements and objectives. SpaceX currently launches U.S. Government and commercial payloads using the Falcon 9 from SLC-4. SpaceX supports, and is under contract for, the full spectrum of U.S. Government space mission requirements, including spacecraft launches for National Aeronautics and Space Administration (NASA) and the DOD. The introduction of Falcon Heavy at SLC-6 would return heavy-lift capability at VSBF to the U.S. Government, which has been absent since the final flight of Delta IV Heavy in 2022.
Electronic Attachment	Camp, Jean	N/A	6	I did not see a section on the potential environmental impacts of these satellites in space and the debris left behind/or space trash that will be generated as these satellites fail. Our atmosphere and space are part of our environment. The EIS must address the	DE-06, U-02

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				environmental issues of the satellites, debris, pollutants in our atmosphere, oceans and space.	
Email	Cantu, Christopher	N/A	1	1. The EIS Fails to Analyze Documented, Widespread Harm to the Human Environment. For a family with a child on the autism spectrum, for a combat veteran with PTSD whose startle response can be dangerously activated, or for an elderly resident with a heart condition, the sudden, explosive force of a sonic boom is a direct threat. While the Draft EIS acknowledges that noise can disrupt sleep and increase stress, it improperly dismisses these impacts by concluding that the "frequency of these events would not be expected to cause chronic health problems". This conclusion fails to recognize that for vulnerable populations, acute, high- stress events are the primary harm. This harm is widespread and documented. A sonic boom on June 8, 2025, resulted in reports of property damage in eastern Ventura, and peer-reviewed research confirms these booms are felt up to 100 miles away. The EIS fails to analyze these far-reaching impacts, as well as the unanalyzed economic costs borne by our community through lost productivity from disrupted sleep, as documented by the RAND Corporation.	N-01, N-03, N-08; Section 3.4.2.1.5 of the EIS considered and analyzed sonic boom impacts in northwestern Los Angeles, Ventura, and southern Santa Barbara counties, approximately up to 150 miles from VSFB (see Figure 3.4.9 of the EIS).
Email	Cantu, Christopher	N/A	2	2. The EIS's Risk Assessment is Legally Deficient by Willfully Ignoring Catastrophic Failure. This proposal seeks to import SpaceX's operational culture of high-risk testing to the Central Coast. The Draft EIS justifies its failure to analyze this risk by stating that a "launch failure would be an extremely low probability and would represent an off-nominal, worst-case scenario and is not assessed in detail for these reasons". This is a gross dereliction of the "hard look" doctrine required by NEPA, as it willfully ignores readily available, real-world data. The operator's Starship	S-01, S-03

Source	Last, First Name	Organization/ Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				program in Texas is a case study in catastrophic failure. The June 18, 2025, Starship explosion on the launch pad scattered flaming debris, ignited multiple fires, and scattered nearly two tons of wreckage across protected wetlands and into the Rio Grande. This "fail fast" approach, with its devastating environmental consequences, is the direct, foreseeable risk that the EIS refuses to analyze. To approve this project without assessing the documented consequences of the operator's methods is unconscionable.	
Email	Cantu, Christopher	N/A	3	The EIS's claims of insignificant harm are directly contradicted by a pattern of documented damage to our ecosystem and a flawed consultation process. Documented Harm to Wildlife: The EIS claims that "there are generally no substantial behavioral disruptions or anything more than temporary affects" to pinnipeds. This is demonstrably false. On June 11, 2025, news reports documented that a sonic boom caused a panicked stampede at the Carpinteria harbor seal rookery. Furthermore, the Starship explosion in Texas led to documented reports of a mass die-off of fish, dolphins, and endangered sea turtles. The EIS's failure to include and analyze such events renders its conclusions on biological resources unreliable.	BI-01, S-03
Email	Cantu, Christopher	N/A	4	Violation of Tribal Sovereignty: The EIS claims to have engaged the Santa Ynez Band of Chumash Indians (SYBCI) but proves the inadequacy of its consultation by concluding there would be "no significant impact on cultural resources" while simultaneously admitting that as of April 30, 2025, the SYBCI had a pending site visit request to identify effects on a "perceived traditional cultural landscape". A finding of no impact cannot be legally reached while the consultation	CR-01

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				process to identify those very impacts is incomplete	
Email	Cantu, Christopher	N/A	5	The operator's history in Texas—including repeated defiance of the Clean Water Act and abruptly withdrawing from a public land-swap deal after cultivating years of public trust—demonstrates an undeniable pattern of behavior. This history, which the EIS fails to consider, makes any promise of future corporate responsibility on the Central Coast impossible to believe.	The EIS analysis is focused on the environmental consequences of activities that would result from the Proposed Action, not on the corporation or activities in Texas. The DAF and the FAA provide independent regulatory oversight of launch activities at VSFB. As such, the assumption that launch operations lack independent oversight is incorrect. Environmental compliance, including hazardous waste management, air and water discharges, and species protections, is also overseen by federal and state resource agencies. The environmental monitoring requirements identified during consultations with these agencies are made conditions of the FAA license. The DAF will continue to coordinate with oversight agencies to ensure full compliance with all applicable environmental and safety regulations.
Email	Cantu, Christopher	N/A	6	The current process must be halted. A lawful Final EIS must include: A Lawful Health & Cumulative Impact Assessment: Conduct a new, thorough assessment that specifically evaluates the psychological and acute impacts on vulnerable populations, as required by NEPA. An Honest and Expanded Analysis: Create sonic boom and vibration maps that extend to at least 100 miles. A Wildfire Readiness Plan: Require the operator to fund seasonal, on-call fire crews and a network of remote-sensing cameras to detect and respond to any launch-sparked fires. A Community Mitigation Fund: Require SpaceX to fund a program, administered by an independent	N-01, N-02, N-03, N-07, S-02; Section 3.4.2.1.5 of the EIS considered and analyzed sonic boom impacts in northwestern Los Angeles, Ventura, and southern Santa Barbara Counties, approximately up to 150 miles from VSFB (see Figure 3.4.9 of the EIS). The SLD 30 Fire Department at VSFB actively monitors every launch on VSFB and would respond to any fires caused by launches.

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				third-party, to provide soundproofing and vibration repair. Full Transparency: Require the public release of data from the PCBoom and SpaceX 1122 models. Real-World, Public Monitoring: Place noise monitors on the Channel Islands and inside representative coastal homes, with all data made public in real-time. A Nighttime Curfew: Prohibit routine launches between 10 p.m. and 7 a.m. to protect public health.	
Electronic Form	Citrin, Ana	Gaviota Coast Conservancy	1	Please see attached comment letter	See responses to Gaviota Coast Conservancy substantive comments below
Electronic Attachment	Citrin, Ana	Gaviota Coast Conservancy	2	It's important that the EIS fully describe the global biological and ecological significance of VSFB and other areas of impact including the broader Gaviota Coast, Santa Barbara Channel, and Channel Islands, and use that description to inform the identification and analysis of impacts.	The DAF recognizes the ecological significance of the region. However, an encyclopedic level of detail is not commensurate or necessary to perform a sufficient analysis of potential impacts. When applicable to analyzing potential impacts of the Proposed Action on biological resources, this information was considered.
Electronic Attachment	Citrin, Ana	Gaviota Coast Conservancy	3	Biological and acoustic monitoring is presently underway, to help evaluate how the increase from 6 to 50 annual launches is impacting sensitive wildlife species at the individual and population levels. It is important that this data be fully analyzed in the EIS to ensure an accurate impact assessment. Data collected during breeding, nesting, and other times when sensitive wildlife species are most vulnerable is particularly important, and we urge DAF to accommodate the collection and evaluation of this data in its timeline for drafting and release of the EIS.	BI-05
Electronic Attachment	Citrin, Ana	Gaviota Coast Conservancy	4	The US Fish and Wildlife Service has identified at least 11 Conservation Recommendations in its August 28, 2024 Biological Opinion that function to minimize or	The conservation recommendations included in the USFWS Biological Opinion (BO) are discretionary agency activities and, as a result, the

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				avoid adverse effects of rocket launch activity from VSFB on federally listed species and critical habitat, and to help implement recovery plans. These Conservation Recommendations should be evaluated in the EIS and required as mitigation measures to help lessen impacts to protected wildlife.	DAF has no obligation to evaluate them under NEPA. However, the DAF considers these recommendations when developing management plans and objectives under the Integrated Natural Resources Management Plan.
Electronic Attachment	Citrin, Ana	Gaviota Coast Conservancy	5	The EIS should identify one or more additional alternatives to the proposal that have reduced environmental effects and also advance DAF's purpose and need, including a reduced launch cadence alternative, a no-Falcon Heavy alternative, and/or an alternative that phases-in launch increases over a longer period of time.	PN-02
Oral Comment Santa Barbara	Citrin, Ana	Gaviota Coast Conservancy	6	In our scoping comments, we requested that the document expressly identify the protection of habitat values on and around Vandenberg as a key objective, and formulate a workable alternative that protects those habitat values while simultaneously advancing the department's operational and security objectives. We requested that the EIS include a reduced launch cadence alternative, a no Falcon heavy alternative, and an alternative that phases in launch increases over a longer period of time. Unfortunately, the draft EIS does not identify any alternatives that reduce as opposed to increase environmental effects, other than the no project alternative. ...We request that an additional alternative be included in a revised document that reduces impacts.	PN-02
Oral Comment Santa Barbara	Citrin, Ana	Gaviota Coast Conservancy	7	We're also concerned that the analysis prematurely determined that the increase in frequency of rocket launch noise and sonic booms will not significantly impact biological resources, including protected species when the effects of the increase to 50 annual launches is still being monitored and evaluated.	BI-05

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				Data collected during breeding, nesting, and other times when sensitive species are most vulnerable is critical, and we request that the analysis be revised to include all that information and appropriate avoidance measures.	
Electronic Attachment	Collazo, Nicole	Ventura County Air Pollution Control District	1	Page 3-11, 3rd paragraph. VCAPCD has met the 2008 ambient ozone standards since October 7, 2022, as certified by EPA. This can be found in Page 4 of the 2022 Air Quality Management Air Plan. Please delete the non-attainment reference of the 2008 ozone standard and elsewhere, such as in Table 22 of Appendix F (air technical report). In addition, although a technicality, it is not air districts that meet the 2015 attainment standards but geographical regions. Please correct the wording to state that the non-attainment area is Ventura County, excluding Anacapa and San Nicholas Island. A map of the 2015 ozone designation areas can be found here.	The Final EIS has been amended to reflect the non-attainment references. This has been updated in the EIS Air Quality Technical Report (Appendix F of the EIS).
Electronic Attachment	Collazo, Nicole	Ventura County Air Pollution Control District	2	Page 26, Appendix F, Air Quality and Greenhouse Gas Emissions Technical Report, 5th paragraph. Please clarify why the assumption of 10.7 hours per day within Los Angeles County and 20 hours per day within Ventura County was used in the document.	The time spent in each jurisdiction is based on actual trip data and accounting for potential weather and/or traffic delays. The methodology in Appendix F of the Final EIS has been updated to reflect this.
Electronic Attachment	Collazo, Nicole	Ventura County Air Pollution Control District	3	Table 3.3-4. The proposed emissions quantified assumed a certain number of Tier 3 and Tier 4 off-road marine diesel engine equipment (PDF Page 204 of 592 in Appendices Volume II May 2025). There should be an enforcement mechanism, such as a permit condition, that the project will utilize the engine type and unit amounts it assumed and modelled so as not to potentially exceed the de minimis thresholds. The NOx emission factor for a Tier 4 diesel engine is 1.8 g/kW-hr as compared to a Tier 3 engine, which is 5.21 g/kWh, or almost 5x as more pollutant-emitting (source here).	As analyzed in Section 3.3, emissions from Falcon 9 and Falcon Heavy launches were modeled and evaluated for the proposed cadence increase. The analysis determined that the Proposed Action would not result in violations of federal or state air quality standards and would not exceed general conformity thresholds under the 2016 Air Quality Management Plan. The assumptions for the emissions calculations used are required per the applicable Santa Barbara County APCD permitting, based on conservative, representative equipment profiles that comply with regulatory

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
					requirements. The Proposed Action will comply with all applicable federal, state, and local air quality regulations and permit requirements, including those governing the use of off-road diesel engines.
Electronic Attachment	Collazo, Nicole	Ventura County Air Pollution Control District	4	Appendix F, Pages ix and 19. The statement that emissions within 12 nautical miles of the coast were assessed under NEPA is found in the Dudek Air Quality and Greenhouse Gas Emissions Technical Report and not the in body of the EIS document. The air quality section in the EIR should clarify whether emissions beyond 12 nautical miles were included in the evaluation and whether any activities related to the project occur beyond 12 nautical miles, as well as adding this clarifying information in the Air Quality and Greenhouse Gas Emissions Technical Report (Appendix F). For example, the “Payload Fairing Recovery” activities seem to occur outside of 12 nautical miles offshore, but it is not clear whether these emissions were included in the proposed emissions (Page 26).	The EIS Air Quality Technical Report (Appendix F of the EIS) has been revised to clarify that Proposed Action impacts of air pollutants emitted by activities in the Pacific Ocean, bays, and inland locations in U.S. territorial seas (i.e., up to 12 nautical miles [nm] from the coast) are assessed under NEPA. Appendix F has been revised to clarify that Falcon first stage landings occur outside of 12 nm.
Mailed	Cook, Tyler	N/A	1	I’m worried the draft EIS doesn’t include comprehensive multi year studies of the impacts it has on local people and wildlife.	NP-01
Electronic Attachment	Cooksey, Ryan	Santa Barbara County Parks Division	1	In its prior scoping comment letter (dated January 16, 2025), Parks stated that an analysis should be conducted demonstrating that the project will not impact access to or use of Jalama Beach. Parks prior comment letter also stated that if such impacts would occur, an analysis should be conducted describing, defining and quantifying such impacts, and explaining the efforts made to minimize such impacts. The DEIS does indicate the Department of the Air Force (DAF) would continue to comply with the existing closure agreement with Santa Barbara County, which allows	P-01; The DAF completed a detailed analysis of potential impacts on Jalama Beach County Park in Section 3.2.1 of the Consistency Determination for the Proposed Action (see Appendix D of the EIS). Section 3.2.1 also outlines efforts the DAF undertakes to minimize potential impacts to the park. Compliance with the existing closure agreement ensures no additional impacts to public access or use of Jalama Beach, therefore a separate analysis is not warranted.

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				for a maximum of 12 evacuations per year. However, the aforementioned analysis is not provided. Accordingly, Parks now reiterates the need for this analysis.	
Electronic Attachment	Cooksey, Ryan	Santa Barbara County Parks Division	2	Santa Barbara County has entered into an MOU with Space Launch Delta 30 and Space Exploration Technologies Corp. (SpaceX) to obtain a waiver from the Federal Aviation Administration allowing visitors to remain at Jalama Beach County Park during launches. Parks requests that an analysis be conducted demonstrating how the project would comply with aforementioned documents. If needed, Parks can provide these documents upon request.	The waiver effort is in progress to allow members of the public who elect to participate to remain at Jalama Beach County Park during certain launches instead of evacuating and would be implemented accordingly. SLD 30 will comply with all current agreements, including MOUs regarding access to Jalama Beach County Park during launches.
Electronic Attachment	Cooksey, Ryan	Santa Barbara County Parks Division	3	To the north of VSFB, Santa Barbara County owns Brown Road/Point Sal Road, which provides access to public beaches, such as Point Sal State Beach. Parks seeks to ensure the road remains open and accessible to support current and future recreational opportunities. Please confirm if the proposed project would impact access to or use of the road. If so, Parks requests that an analysis be conducted demonstrating how the proposed project would impact access to or use of the road, as well as explaining efforts to minimize such impacts.	The Proposed Action would not impact access to or use of Brown Road/Point Sal Road
Electronic Attachment	Cooksey, Ryan	Santa Barbara County Parks Division	4	The DEIS indicates that the project would result in the evacuation of the County's Ocean Beach Park, as well as Surf Beach. Page S-6 states a maximum of 12 annual evacuations, while page 3-100 states a maximum of 17. Please confirm the maximum number of annual evacuations and provide evacuation plans.	Ocean Beach County Park would be closed a maximum of 12 times per year. Section 3.10.2.1 has been revised to correct the administrative error to be consistent with 12 times per year, not 17.
Electronic Attachment	Cooksey, Ryan	Santa Barbara County Parks Division	5	To offset impacts to public coastal access resulting from the evacuation of Ocean Beach Park and Surf Beach, Parks recommends the DAF coordinate with the County to facilitate its coastal access	Mitigation is not commensurate with the Proposed Action.

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				improvements for the Point Sal region.	
Oral Comment Ventura	Cuellar, Natalia	Wishtoyo Chumash Foundation	1	According to the United States Environmental Protection Agency website, the average family use -- of four uses about 400 gallons of water per day. A single Falcon Heavy launch uses about 1.5 million gallons of water per launch. This is the amount of water that could suffice for a family for over a decade. This isn't just about a single family, though, this is about being diligent in the allocation of vital resources and protecting viability.	While 1.5 million gallons may appear large in household terms, it represents a small fraction of regional water use and is sourced from existing permitted supply systems serving VSFB. The DAF has confirmed that adequate supply exists to support the Proposed Action without adversely affecting municipal or residential water users. Furthermore, Falcon Heavy launches constitute a small portion of total annual launches proposed (up to 5 per year), limiting the frequency of high-volume events. The EIS concludes that the Proposed Action would not significantly impact local or regional water availability, and VSFB will continue to manage water use efficiently in coordination with local water providers and regulatory agencies.
Oral Comment Ventura	Cuellar, Natalia	Wishtoyo Chumash Foundation	2	The Falcon 9 and Falcon -- and Heavy launches deplete both state and groundwater resources as well as ensure an increase in concentration of pollutants already prevalent in our cities. This is not just one family, this is many including the roughly estimated 3,767 individuals on base who are closest to these freshly admitted pollutants. This isn't just about business. We need to consider those that actually call our coastal cities home.	As detailed in Section 3.7.2.1.2 of the EIS, launch-related water use is limited in frequency and drawn from permitted sources that do not deplete regional or state groundwater supplies. The Proposed Action would not significantly affect long-term water availability for the base or surrounding communities. Regarding air quality, Section 3.3.2 of the EIS includes a detailed emissions analysis using conservative assumptions. While launch activities produce temporary increases in pollutant concentrations, these are short-lived, highly localized, and do not exceed National Ambient Air Quality Standards (NAAQS). The health and safety of VSFB personnel and nearby communities remain a top priority, and the DAF will continue to comply with all applicable air and water quality regulations to ensure ongoing protection of public health and

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					environmental resources.
Electronic Form	de Guzman, Francisco	N/A	1	Please see attached pdf file for my comment.	See responses to F. de Guzman substantive comments below
Electronic Attachment	de Guzman, Francisco	N/A	2	Request: - Reevalue the acoustic impact modeling to reflect actual resident experiences, not just dBC thresholds. - Include soundproofing grants or mitigation funds for homes within a 15-mile radius of SLC-6.	N-02, N-06
Electronic Attachment	de Guzman, Francisco	N/A	3	Request: - Expand air quality modeling to measure long-term deposition patterns over Lompoc and nearby farmland. - Require regular independent atmospheric sampling and public reporting.	AQ-06
Electronic Attachment	de Guzman, Francisco	N/A	4	The EIS underrepresents the quality-of-life degradation for nearby communities: - Lack of real-time public notification systems for launches and landings. - Insufficient studies on sleep disturbance, mental stress, or property devaluation caused by frequent launches. Request: - Create a dedicated community liaison office to address resident concerns year-round. - Require baseline public health impact monitoring for Lompoc and VAFB-adjacent areas.	N-07, NP-01
Electronic Attachment	de Guzman, Francisco	N/A	5	I urge the U.S. Space Force and environmental authorities to pause finalization of this EIS until: - Independent assessments are completed on noise, air pollution, and health risks; - Mitigation strategies are made enforceable; - And residents of Lompoc are guaranteed meaningful input in future operational planning."	N-06, NP-02
Electronic Form	Dolan, Nancy	N/A	1	We live in Hollywood Beach and regularly hear and feel these launches. Even with advance warning, the sonic booms are jarring, shaking the glass doors and making us wonder if there's an earthquake. Also, these rockets fly in the sky above us or very nearby; how long before	S-01, S-02; Regarding overflights of populated areas, once clear of VSFB, no rocket launch trajectories are approved for overflight of mainland areas of California.

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				something goes amiss as it has in Florida, and they land in our neighborhoods? For these reasons, I'm opposed to any expansion of the launch schedule. Thank you.	
Electronic Form	Dóñez, Francisco	Environmental Protection Agency Region 9	1	Please see attached EPA's comments on the Draft EIS for Authorizing Changes to the Falcon Launch Program at Vandenberg Space Force Base, California. Please let me know if you have any questions or would like to discuss any of our comments.	See responses to EPA Region 9 substantive comments below
Electronic Attachment	Dóñez, Francisco	Environmental Protection Agency Region 9	2	We appreciate confirmation during our conversation on June 26 that the source for the 21 million gallons of annual water usage is expected to be a combination of both State Water and groundwater from the San Antonio Creek Basin, depending on State Water Project allocations.	VSFB's primary water source is State Water, and the DAF only switches to base well water if the circumstances warrant it. These circumstances include the following: - State Water curtailment due to severe drought conditions - State Water curtailment due to State Water Project (SWP) or Central Coast Water Authority (CCWA) emergency shutdowns - State Water curtailment due to the annual CCWA system maintenance each November, which typically lasts between two to three weeks Only in extreme cases will VSFB blend the two water sources together, as blending can cause operational disruptions and water chemistry challenges.
Electronic Attachment	Dóñez, Francisco	Environmental Protection Agency Region 9	3	To better inform the impact analysis of water withdrawal, the Final EIS would benefit from a discussion of the base's contracted amounts from the State Water Project and limitations of local groundwater use pursuant to the monitoring and measurable objectives outlined in the GSP. The EPA is specifically concerned about the possibility of saltwater intrusion and subsidence that could result from extensive groundwater pumping at a basin near the ocean.	WR-02
Electronic	Dóñez,	Environmental	4	Recommendations: To improve understanding of	WR-02

Source	Last, First Name	Organization/ Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
Attachment	Francisco	Protection Agency Region 9		environmental impacts, in the Final EIS identify a range of gallons used from each water supply source relative to current State Water Project distributions in dry, normal, and wet water years. Include a description about contract water delivery at Vandenberg during past and current drought conditions. Describe the GSP terms for the San Antonio Creek Basin and how they may impact water availability for the proposed project.	
Electronic Attachment	Dóñez, Francisco	Environmental Protection Agency Region 9	5	Provide an updated analysis of the impacts on biological and water resources and to other water users from the potential ranges of annual pumping – up to 21 million gallons – of water from the San Antonio Creek Basin. Describe the potential for saltwater intrusion and subsidence in the basin from project groundwater withdrawals.	The Western Management Area Groundwater Sustainability Plan (GSP) identifies a moderate risk of seawater intrusion near the coast. However, VSFB's active groundwater wells are located inland, more than 3 miles from the coastline, and are situated above known intrusion fronts. Groundwater elevations at VSFB wells have remained well above sea level, providing a positive hydraulic gradient away from the coast, and projected withdrawal rates would not alter groundwater gradients enough to induce upward or lateral movement of saline water. Additionally, due to the geologic formations and bedrock upwelling at Barka Slough, saltwater intrusion is not expected to be an issue for the San Antonio Basin. Therefore, based on current data and modeling, the risk of saltwater intrusion from the Proposed Action is considered negligible. No recorded subsidence has occurred.
Electronic Attachment	Dóñez, Francisco	Environmental Protection Agency Region 9	6	The proposed quantity of water to be used for launches is inconsistent between this Draft EIS and the 2023 and 20184 EAs for Falcon 9 launches at SLC-4. The Draft EIS states that the proposed project "would continue to utilize approximately 70,000 gallons of water per launch at SLC-4 in the flame bucket and as deluge to suppress noise and	Section 2.2.1.3 of the 2023 SEA states that SpaceX reduced the amount of water needed in the SLC-4 flame duct per launch from 200,000 gallons to 70,000, consistent with Section 2.1.4 of the 2024 Environmental Assessment (EA) incorporated in the EIS which explains water is no longer used for landings.

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				vibrations” (p. 2-9; emphasis added). However, the previous analyses indicate the flame bucket and deluge system together total 100,000 gallons of water usage, with 70,000 gallons of water used in the flame bucket (p. 2-5, 2023 EA) and 30,000 gallons of water used for the deluge system (p. 4-29, 2018 EA). We also note that while the Draft EIS does not mention the quantity of water used for landings, the 2023 document estimates 40,000 gallons of water use per landing (p. 2-5, 2023 EA). Recommendation: In the Final EIS, clarify the amount of water needed for each launch and landing and how they relate to the overall expected project use of 21 million gallons of water.	
Electronic Attachment	Dóñez, Francisco	Environmental Protection Agency Region 9	7	Water flow through launch facilities, planned water sampling, and proposed discharges to the environment from SLC-4 and SLC-6 operations are unclear in the Draft EIS. The 2023 EA provides a brief description of water operations and discharges to the environment at SLC-4. The document indicates that operational water is directed to a retention basin, where it is sampled prior to discharge to the environment via a spray field (p. 4-45, 2023 EA). The Draft EIS does not discuss these water structures but does note that the launch company would continue to maintain v-ditches to ensure that water does not reach Spring Canyon and would continue to assess whether additional water diversion structures are necessary (p. 3-91). The Draft EIS does not describe the flow path associated with v-ditches or other diversion structures, nor the planned path of associated discharges to the environment. The Draft EIS provides a general description of stormwater features at SLC-6, including culverts, concrete v-ditches, pipes, earthen channels, and rip-rap channels	WR-04

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				directing water flow into drainages that empty into the Pacific Ocean (p. 3-83). The document notes that the launch company “would ensure that there is no overland flow reaching the south drainage as a result of water ejected from the flame trench” (p. 3-87) but does not provide details as to where water would be directed. The document describes potential sampling of accumulated water both in the flame bucket and retention basin (p. 3-88) and generally describes discharge from the retention basin to an infiltration area or spray field, but it does not provide further details. The Draft EIS also does not describe the requirements for process water discharges currently specified by the Regional Water Quality Control Board under the General Waiver of Waste Discharge Requirements for SLC-4. The EPA understands that the launch company would also seek a General Waiver for Specific Types of Discharges for any discharges from the SLC-6 flame bucket (p. 3-88), however, further information about potential discharge requirements at SLC-6 are not provided in the Draft EIS. Recommendations: To improve the discussion and impact assessment, in the Final EIS, provide a clear description of water flow through the space launch facilities, including during launch, landing, and static fire operations. We recommend including a simple visual depiction of water structures and expected water discharge locations from SLC-4 and SLC-6. Describe when and where water sampling would occur and the parameters that must be met for discharge to the environment, including to ocean-bound drainages.	
Electronic Attachment	Dóñez, Francisco	Environmental Protection Agency Region	8	The EPA is concerned about the potential for migration of exhaust contaminants in deluge water vapor to nearby surface water drainages and soil. The	As discussed, the DAF has reviewed recent soil sampling results from Spring Canyon and concluded that the low levels of hydrocarbons

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		9		2023 EA states that the cloud formed during launches by the exhaust plume and deluge water vapor could travel and condense in areas that may affect surface water drainages (p. 4-43, 2023 EA). The document states that the exhaust cloud would likely consist of steam and small amounts of hazardous materials from Rocket Propellant-1 (RP-1), the fuel used in Falcon launches. The EPA notes that recent soil sampling by the Air Force indicates that low levels of hydrocarbons that are consistent with RP-1 have been found in Spring Canyon, south of SLC- 4.5 The EPA appreciates learning during our June 26 meeting that Air Force personnel have examined the soil samples and concluded that contamination is likely from historical sources, potentially associated with the Environmental Restoration Program (ERP) site located in Spring Canyon (p. 114, 2016 EA6), rather than current operations at SLC-4. The EPA understands that, based on this conclusion, the Air Force does not expect an increase in contaminant levels in Spring Canyon or migration of contamination via deluge water vapor to areas near SLC-6 from the Proposed Action. Recommendations: Append Spring Canyon sampling results to an appendix or the main body of the Final EIS. Map the sampling locations and concentrations. Discuss how the Air Force concluded that contaminants found in Spring Canyon are not associated with current operations at SLC-4. Discuss whether the Proposed Action may result in the migration of any remaining contaminants at the ERP site. Identify a sampling methodology to monitor potential hydrocarbon and other contaminant concentrations in nearby soil to confirm that current operations are not resulting in soil contamination.	identified are consistent with historical contamination associated with Environmental Restoration Program (ERP) Site OT-28, not with current or proposed launch operations at SLC-4. This conclusion is based on the location of sampling sites in relation to known ERP areas and historical records of legacy fuel operations in that area from decades prior to current SpaceX operations. The detected hydrocarbons are consistent with historic contamination patterns related to past fueling operations and not indicative of ongoing deposition from current SpaceX activities at SLC-4. The metals content of surface soils in Spring Canyon are consistent with naturally occurring background concentrations established for VSFB of aluminum and boron. Very low concentrations of hydrocarbons were detected in the soil samples in the carbon chain range consistent with the refined kerosene range rocket propellant-1 (RP-1) fuel used for SpaceX launches at SLC-4. No hydrocarbons were detected that were greater than residential screening levels. SLC-4 has been used for space launch since 1964. SLC-4 has supported the Atlas-Agena D, Titan III, and Titan IV. The Titan program utilized the launch pad from 1971 through 2005, and the last Titan launch occurred on 19 October 2005. The site was vacant between 2007 and 2011. SpaceX acquired a lease for the site in 2011 and upgraded the site for Falcon launch operations, including constructing a v-ditch concrete curb inside the SLC-4 fence line that prevents surface flow to Spring Canyon. The Falcon launch vehicles operate with RP-1, a further-refined kerosene, and liquid oxygen,

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					which combine to propel the rocket and form water and carbon dioxide, a mild acid. If the RP-1 fully oxidizes, the potential impact to soil, surface water, and groundwater may be minimal. This has been demonstrated by empirical data gained from testing conducted at SLC-3 and SLC-4 on VSFB. In contrast, ammonium perchlorate used in solid rocket fuel oxidizes primarily to water and hydrochloric acid (HCl), a strong acid. If this ammonium perchlorate propellant fully oxidizes, impact to soil, surface water and groundwater is likely, due to metals mobilization from HCl coming in contact with infrastructure surfaces and soil (i.e., pH changes often mobilize certain metals). This has been demonstrated by empirical data gained from testing at SLC-3E. If ammonium perchlorate propellant does not fully oxidize, perchlorate is released, impacting soil, groundwater, and surface water. This has been demonstrated by empirical data obtained from testing soil, groundwater, and surface water seeps along the coastline at SLC-4, documenting perchlorate impacts, years after a Titan 34D rocket with solid rocket motors was detonated in April 1986. Section 3.7.1 of the EIS discusses water resources (Section 3.7.2.1.1 surface water and Section 3.7.2.1.2 groundwater). Section 3.7.2.5 includes Environmental Protection Measures (EPMs) to protect water resources at SLC-4 and SLC-6. SLC 4 has active compliance requirements in place - SWPPP, annual reporting, sampling, and BMPs, permitted by the Central Coast Regional Water Quality Control Board. Deluge water remaining after launches and stormwater that accumulates is tested for

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					pollutants. If regulated pollutants are encountered, the contents would be pumped out and disposed of per state and Federal regulations. If the water is clean enough to go to grade, it would be discharged to an infiltration area or spray field. With the implementation of the EPMS outlined in the EIS, there will not be an increase in contaminants from the Proposed Action. The EPMS include measures such as stormwater best management practices (BMPs), hazardous materials handling protocols, and deluge water management strategies to prevent the mobilization of potential contaminants. The Final EIS will not be revised to include the sampling data, maps, or additional analysis related to this issue since it is outside the scope of the Proposed Action. The soil sampling referenced is managed under a separate regulatory framework from this NEPA analysis. The findings do not indicate a connection between current launch activities and soil contamination, and no change to the environmental impact conclusions presented in the EIS is warranted. However, the DAF remains committed to environmental stewardship and regulatory compliance. ERP site monitoring will continue in coordination with appropriate oversight agencies. Any exceedances or indications of new contaminant migration will be addressed under the established ERP protocols.
Electronic Attachment	Dóñez, Francisco	Environmental Protection Agency Region 9	9	The Draft EIS discusses emergency response procedures for hazardous material spills, and notes that the company conducting launches would be responsible for reporting hazardous material and hazardous waste spills to comply with Santa Barbara	As discussed in Section 3.15 of the EIS, emergency response and spill reporting responsibilities are addressed in site-specific plans in compliance with all applicable federal, state, and local regulations. These include the sheen rule under 40 CFR §

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				County's Community Awareness and Emergency Response requirements (p. 3-125). The EPA notes that there are also federal spill reporting requirements to be considered in emergency response planning, and that oil spills that meet the "sheen rule" ⁷ and hazardous substance releases that equal or exceed the Reportable Quantity must be reported to the National Response Center immediately. ⁸ We appreciate that Appendix J describes immediate notification to the National Response Center for launch site accidents. Recommendation: We recommend that the Final EIS clarify procedures to meet federal reporting requirements for oil spills and hazardous substance releases, in addition to potential launch site accidents.	110.3 and reportable quantity thresholds under 40 CFR § 302.4. The DAF and SpaceX remain responsible for compliance with all relevant hazardous materials and hazardous waste management and reporting requirements. NEPA documents are not required to duplicate information or compliance processes that are addressed under other environmental laws. The DAF and SpaceX comply with existing regulatory frameworks—including the Resource Conservation and Recovery Act, the Emergency Planning and Community Right-to-Know Act, and the Clean Water Act—for hazardous materials management and spill response oversight. These matters fall outside the scope of the NEPA analysis, which focuses on the potential for significant environmental impacts rather than operational compliance under other statutes. No changes to the EIS are warranted, as the existing regulatory context and mitigation framework adequately address the issues remain.
Letter	Dóñez, Francisco	Environmental Protection Agency Region 9	10	In the Final EIS, clarify how the 1 in 1,000 damage claims prediction is calculated. Consider providing figures that depict the cumulative potential for structural damage each year, accounting for up to 100 launches, 50 static fire tests, and 24 landings. Consider opportunities for the public to engage with the Air Force's sonic boom study and document how public feedback is received, considered, and implemented. The EPA recommends the Air Force expand the opportunities that the public can use to report claims, such as adding a dedicated phone line and mailing address.	N-02, N-11; In Section 3.4.2.1.5 of the Final EIS, the DAF reworded text regarding the structural damage potential estimates to "Hershey and Higgins (1976) used statistical modeling techniques to estimate the following is a summary of the following structural damage potential for overpressure levels of 2.0 and 4.0 psf:" Because the sonic boom levels and impact locations vary depending on mission specific trajectories and atmospheric conditions, any estimate of cumulative damage would be based on speculative assumptions about future missions. NEPA does not require such speculation.
Electronic	Dóñez,	Environmental	11	In the Final EIS, to support communication with the	The DAF would communicate an increase in

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Attachment	Francisco	Protection Agency Region 9		public and decisionmakers about anticipated cumulative noise impacts from planned launches, clarify whether the total predicted number of space launches from Vandenberg Space Force Base may increase beyond 110 annual launches and the potential timing for this increase. If timing for future changes may not be precise, the public would benefit from a qualitative discussion of the Department of Defense's need for additional launches and the status of any planning with specific launch companies. Describe the process for communicating these additional increases to the public. Consider expanding Draft EIS Table 3.4-3 to include the projected number of launches for each launch facility.	launch cadence for Falcon 9 or Falcon Heavy rockets through the NEPA process as implemented in the DAF's current Environmental Impact Analysis Process. The 110 launch cadence referred to is VSFB's current estimate provided to regulators of total launches per year from the base including all launch providers. There is no increase in that cadence predicted at this time.
Electronic Attachment	Dóñez, Francisco	Environmental Protection Agency Region 9	12	Clarify in the Final EIS and Final Conformity Determination that emissions would occur in 2031 and beyond and commit to an additional conformity determination for emissions in 2031.	The EIS Air Quality Technical Report (Appendix F) has been revised. Following engagement with SCAQMD and internal review of emissions values, the DAF determined that NOx emissions from the Proposed Action are <i>de minimis</i> . Therefore, the Proposed Action would have an insignificant impact on air quality within the SCAQMD and a GCR determination is not required.
Electronic Attachment	Dóñez, Francisco	Environmental Protection Agency Region 9	13	The Draft EIS describes the 2016 AQMP set-aside allowance of 31.26 tons per year of nitrogen oxide (NOx) emissions, while the expected NOx emissions from the proposed project would be 28.58 tpy. The document presents the difference of 2.68 tons fewer emissions than the allowance as a negative number that seems to indicate that the emissions associated with the Proposed Action would decrease 2.68 tons per year from the baseline of existing conditions (p. 3-13). Recommendation: To improve clarity, consider comparing the project's expected emissions against	The EIS Air Quality Technical Report (Appendix F) has been revised to remove the use of negative numbers in reflecting the change in emissions.

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				the set-aside allowance without reporting a negative number as the projected change in NOx emissions.	
Electronic Attachment	Dóñez, Francisco	Environmental Protection Agency Region 9	14	The Draft EIS does not discuss the emissions associated with RP-1 fuel use compared to other fuel types used by medium and heavy-lift launch vehicles. Recommendations: In the Final EIS, describe the different fuel types used by medium and heavy-lift launch vehicles, including the expected emission products for each fuel type and associated environmental impacts. Describe the Proposed Action's selection of launch vehicles that use RP-1 and discuss associated emissions of black carbon, even if only a qualitative description is possible. As part of this analysis, disclose all predicted air emissions of the Proposed Action above 3000 feet.	The EIS analyzes the potential environmental impacts of the Proposed Action, which involves use of existing Falcon launch vehicles that operate with RP-1 and liquid oxygen. Comparative analysis of other fuel types used by unrelated launch systems is outside the scope of this NEPA analysis, as the Proposed Action does not include consideration of alternative vehicles or fuel technologies. As stated in the EIS section 3.3.1.4.1, the air quality analysis includes emissions below 3,000 feet, which are relevant to ground-level impacts. Emissions above this altitude are not subject to conformity requirements and are therefore excluded from detailed analysis. Air pollutants emitted more than 3,000 feet above ground level are considered to be above the atmospheric inversion layer and, therefore, do not affect ground-level air quality. Emissions released above this altitude are often too highly dispersed within the atmosphere to impact pollutant concentrations over land and the surface of the water in the lower atmosphere, measured at ground-level monitoring stations, upon which federal, state, and local regulatory decisions are based. However, since all of the sources of pollutants are mobile, and it is difficult to determine where exactly emissions would be released within the ROI, all emissions occurring under 3,000 feet are considered when comparing against the de minimis thresholds. As stated in EIS section 3.3.2.1.3, the DAF examined the research that has been published on black carbon to date and determined the necessary data and tools do

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					not exist to accurately estimate emissions of black carbon from rockets and any associated effects. There is a lack of concrete observational data and in-situ measurements as they relate to rockets such as the Falcon vehicles, which use a kerosene and liquid oxygen. A discussion of the different types of payload fuels and their emissions has been added to the EIS Air Quality Technical Report (Appendix F).
Electronic Attachment	Dóñez, Francisco	Environmental Protection Agency Region 9	15	To enhance public disclosure, consider including in the Final EIS an updated overview of the state of the science related to the stratosphere, the ozone layer, and potential impacts of launch vehicle emissions and reentry debris on the ozone layer.	AQ-01
Electronic Attachment	Dóñez, Francisco	Environmental Protection Agency Region 9	16	To better inform the environmental impact analysis in the Final EIS, use the recent history of Falcon launches from Vandenberg Space Force Base to estimate the approximate annual number of satellites that would be launched into orbit each year. Describe the complete lifecycle of the second stage, interstage, and payload after launch, such as planned satellite burn-up in the atmosphere, and describe associated environmental impacts, including to the stratospheric ozone layer.	AQ-01, DE-06, U-02
Electronic Attachment	Dóñez, Francisco	Environmental Protection Agency Region 9	17	To clarify the Air Force's commitment to continued research and adaptive strategies, the EPA recommends that the Final EIS include a description of the Air Force's approach to integrating new and emerging information about the environmental impacts of current operations, including potential impacts to stratospheric ozone and radiative forcing, into decision-making and project implementation through the life of the project. Consider further describing in the Final EIS an adaptive management framework that balances changing environmental	The DAF uses the most complete, scientifically-sound, and available data at the time of our NEPA assessments. NEPA does not require the development of new research. The DAF cannot commit to any environmental research and adaptive strategies; however, opportunities to pursue such initiatives shall be taken into consideration.

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				needs with the need for continued access to space, and that includes opportunities to collaborate with specialists who are advancing our understanding of potential impacts. Identify current industry and academic efforts to model, measure, and monitor impacts of continued rocket launches on the upper atmosphere.	
Written	Dunagin, Paula	N/A	1	It would be helpful to have a public announcement of launches, radio, TV, news outlets. This would also help the elderly. I appreciate knowing a text alert is available. I do have an app but sometimes the clock resets 59 seconds, then 5 minutes, but 10 minutes later we will hear the boom. I care for children and dogs and they are easily upset when we are not prepared. It would be nice not to have a boom late at night or early in the morning on a weekend, when we could catch up on rest. I think public broadcasting would also help police departments not be inundated with calls.	N-01, N-07
Electronic Form	Duncan, Patricia	N/A	1	I am a Solvang resident and am regularly disturbed by launch shock waves which shake my windows and doors disrupting sleep and causing damage (settling and cracks around window frames, breaking window seals etc;). During day launches I regularly witness particulate matter trailing rockets: a gray plume which eventually falls into our environment- blown by prevailing winds. Apart from national defense, privately owned launches (Space X) are increasingly and negatively effecting and polluting our environment and all the species that share this habitat. My concern is that eventually an 'unplanned rapid disassembly' will occur at Vandenberg spreading toxic materials, fire and destruction over our public lands and ocean. Odds are this will happen, as we have witnessed at the Texas launch site. The	N-02, S-01, S-02

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				safety and risk assessment of the planned expansion of rocket launches at Vandenberg SFB must include this sobering and frightening possibility. Having grown up near the Santa Susana Rocketdyne Field Laboratory which is still considered a Superfund site, I have legitimate concerns- and hope you take our comments seriously. Thank you, Patricia Duncan	
Electronic Form	Erdmann, Lindsay	N/A	1	After reviewing the draft EIS, I have a few concerns regarding noise. Under the Proposed Action, noise produced from all operations were found to be insignificant. I disagree with assessment and urge the DAF to consider the health of community members that are frequently woken up and disrupted by launches that occur at night. Although described as a potential "annoyance", frequent sleep disruptions (i.e. ~50 launches at night) can increase the risk of Alzheimer's, stroke, and cognitive decline. As Lompoc is the closest city to the launch, you have to consider the magnitude sleep disruptions will cause to the community and how negative feedback will return to the VSFB through community outrage and lack of employee retention. In addition to sleep disruptions, the EIS fails to consider the financial and emotional burden launches cause if property damage occurs. Although the responsibility is put on SpaceX when this occurs, the process is long and hard for a community member to go through. This process is also near impossible for immigrant families and non-English speakers, so any property damage will result in a makeshift re-do that will cause property value to decrease. In 2023, Lompoc's median income was reported as \$57,071. The ability to renovate or remediate their house to accommodate the potential damage from these launches is not possible with the current prices for construction in this economy. To	N-01, N-02, N-08

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				summarize, please consider an option that has the launches reduced or stay at the current 50 launches/year and also consider to have launches be placed strictly in the daytime to not disturb residents within the three counties.	
Electronic Attachment	Escalante, Salvador	N/A	1	To Whom It May Concern: I am a resident of Santa Barbara County and I am writing to express my profound concern regarding the proposal to increase the Falcon launch cadence to as many as 100 launches per year from Vandenberg Space Force Base. The proposed increase poses a serious threat to our region's wildlife and the long-term health of our coastal environment. I have seen recent news reports and videos from the Carpinteria Seal Watch which clearly show harbor seal colonies flushing into the ocean in panic in response to launch-day sonic booms. One video disturbingly shows blood in the water as the seals frantically flee. This occurs during their critical pupping season. The Draft EIS appears to significantly downplay these severe impacts. The report concludes that while pinnipeds "would be disrupted by noise and visual disturbance, there are "generally no substantial behavioral disruptions or anything more than temporary affects". Nonetheless, the Draft EIS itself acknowledges the potential for serious long-term consequences. It states that an increased launch tempo "could potentially be a corresponding increase in effects such as long-term habitat avoidance and decreased reproductive success. Given this admitted uncertainty and the potential for irreversible harm, approving a threefold increase in launch frequency seems premature and reckless. Classifying these events as mere "Level B Harassment" fails to address the potential for declining populations, site abandonment, and the	BI-01

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				chronic stress being inflicted upon our marine wildlife. I urge you to reconsider this proposal. I request a more thorough and realistic assessment of the cumulative, long-term impacts on wildlife before moving forward. The draft EIS does not appear to adequately weigh the observable distress and potential for irreversible environmental damage. Our coastline is a fragile ecosystem, and we have a responsibility to be its careful steward. Thank you for the opportunity to comment. Sincerely, Salvador Escalante A Concerned Santa Barbara Resident	
Electronic Form	Evans, Melody	N/A	1	Re the impacts of these launches, I do not see structural damage to homes as a result of these launches. We have lived in the same home a short distance from the historic Santa Barbara Mission for over 55 years. As the number of launches has increased and the noise/sonic booms and resulting shaking has increased, we have lots of new cracks and fissures in our interior plaster walls. We have major concerns about the impact of these launches on the structure of our home.	N-02, N-09
Electronic Form	Evans, Melody	N/A	2	You are proposing to DOUBLE the number of launches and additionally, launch heavier rockets. I have read the draft EIS and am opposed because of the increased frequency of noise pollution, impact on historic buildings and homes as well as environmental/biological impacts. Our home is about 1/2 mile away from the Santa Barbara Mission. We have lived here for 55 years. Every time a rocket is launched our windows rattle and shaking is felt to varying degrees. I am offended by the paragraph in your report that says older homes with plaster in well-maintained condition should not suffer extensive damage. The implication is that if your plaster cracks or structural damage occurs over time, it is the fault	BI-01, N-02, N-08

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				of the homeowner. We have always taken great care to maintain our home, yet cracks have developed as a direct result of some larger sonic booms. We know what cracks exist in our home, we watch and patch them carefully. Within the last few years, with rocket launches that literally shake our house, there are cracks where they never existed before. Over time, it would seem the structural integrity of homes and historic places like the Mission will be compromised. The impact on human beings must be considered. For those with PTSD or anxiety disorder, these sonic booms cause great distress. As a healthy human being who has lived in Santa Barbara since 1966, I have experienced a shift from a tranquil environment to one that at times feels and sounds like a war zone. For what? To enrich Elon Musk? The shift at VAFB towards more commercial ventures does not align with what I consider the military's job to be. Marine mammals are of concern to me as well. We happened to be up in San Simeon during a launch and witnessed all the elephant seals startle and rush for the water even before we felt the sonic boom! I read an article where someone said, "They will get used to it over time." What a callous and thoughtless attitude. I doubt that my opinion counts for much, nor that of my friends and neighbors. It feels like you are going to go ahead and do these things, while deflecting the real human/biological/structural/environmental impacts with your facts. What happens when a chunk of debris or exploding rocket kills people?	
Electronic Form	Evans, Rhys	N/A	1	Entire document: In several locations, the EIS discussed "east" or "eastern" launch trajectories. For better understanding, this should be replaced in (likely) all usages as "southeast." Section 2.4.3 Alternative landing zones at SLC-6 should be	N-01; The DAF reviewed the language used in the EIS to describe trajectories and determined that "easterly" was consistently used to describe the eastern extent of potential Falcon trajectories; therefore, no change is necessary. As discussed in

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				reconsidered, as notable removal of native vegetation would be required under the proposed action. Understanding the parameters described in the EIS for distance and direction from launch site, etc., I believe that there are several within-parameter alternatives nearby, to include grazing pasturelands and the abandoned wastewater holding ponds that are only about 100 meters from the corner of the proposed alternative. Section 3.4 In the appendix "public coordination" section as well as in Section 3.4, it is indicated that 700 comments were received during the draft phase of this project, expressing concern about the frequency of launches scheduled during night hours. Yet there is no apparent decision or discussion of this that I was able to find in the final draft document. There should be at the very least discussion and ideally an agreement by SpaceX to limit launches between (approximately) 10 p.m. and 6 a.m. It would likely be acceptable for there to be 5-10 of these per year, when specific satellite orbits much be reached. Most of the local community is tolerant of nighttime launches, as they have been occurring for decades, but rarely no more than 2 or 3 times per year until about 2015. Section 3.5-9 While it is not currently a special status species, the Arguello slender salamander (<i>Batrachoseps wakei</i>) is a very narrowly distributed species believed to be endemic to a very small portion of the Point Arguello area, and it is quite likely too new (only recently described to the herpetological community in the last few years. It is possible that it will be a listed species in the near future. While this commenter would tend to agree that the proposed actions will have no to minimal impact on this species, it probably warrants 2-3 paragraphs in the EIS to describe the species, its	Section 2.4.3 of the EIS, the DAF objectively evaluated reasonable landing zone alternatives to the Proposed Action, including alternatives that the DAF eliminated from detailed study in accordance with 32 CFR 989.8(c). Sites other than those listed in Section 2.4.3 were evaluated by the DAF but eliminated due to operational constraints and/or reduce refurbishment efficiency and result in additional impacts on VSFB roadways, as the boosters would need to be transported further from the landing zones to Building 398. The DAF acknowledges the concern over the Arguello slender salamander. Although a specific analysis for this species was not performed or warranted, it would, conservatively, be expected to experience impacts similar to other wildlife species, as analyzed in Section 3.5.2.1.2 of the Draft EIS. The mitigation is not commensurate with the Proposed Action given the analysis in the EIS did not find significant impacts. The DAF determined that noting that the tidewater goby is under consideration for delisting is not warranted as there is no certainty that decision will be made. since it has been under review for over 10 years. The northern elephant seal's peak abundance on VSFB was noted in Appendix I. DAF will continue monitoring of pinnipeds on VSFB under the requirements of the LOA and monitor population levels. The Draft EIS found that impacts to marine mammals and other biological resources as a result of the Proposed Action would not be significant; therefore, the suggested mitigation is not commensurate with the Draft EIS conclusions.

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				habitat requirements and importantly, its fossorial behavior (which tends to mean the project impacts are decreased, as the species is underground perhaps greater than 90% of the time. Terrestrial biological resources: Table 3.15 correctly lists the tidewater goby as Federally Endangered, but it would likely be worthwhile to include discussion that the northern sub-population of this species (including all individuals and habitats at VSFB) have been under consideration for delisting (full removal) from ESA or at least downlisting from Threatened to Endangered since approximately 2014. Marine mammals: It should be noted that Northern elephant seals are on VSFB beaches often between the months of (about) November to May. Importantly, this includes the beach immediately adjacent to the VSFB harbor. The final draft EIS states the pinnipeds are not hauled out during high tides (which is generally true in regard to California sea lions and Pacific harbor seals). Considerations of the so-called Department of Government Efficiency and other factors specifically unknown to this commentor resulted in funding for a multiple year study of Northern elephant seals conducted by researchers affiliated with the California Polytechnic State University, San Luis Obispo being discontinued in 2025. With the ironic factor that Elon Musk of SpaceX is significantly responsible for the cancellation of this funding, SpaceX should consider funding the continuation of this valuable research. There was a notable, one-year decrease in the number of Northern elephant seal pups being born on Vandenberg in 2025. One year of declines is of course too little information to propose scientifically valid conclusions, but this research should be continued. 3.9.1 Coastal Resources Access	

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				to Vandenberg beaches is essential for several reasons, including socioeconomic factors as well as public access being a primary consideration of the California Coastal Commission. SpaceX should contribute engineering expertise, funding and coordination with the County of Santa Barbara and Union Pacific Railroad to improve public access at Surf Beach. This should include construction of stairs and/or a ramp as well as replacing the fencing around Surf Station. SpaceX should contribute engineering expertise, funding and coordination with the County of Santa Barbara to repair the failed concrete west of the Union Pacific Railroad tracks at Ocean Park. It is apparent that SB County Parks and Recreation cannot allocate funds to this project, as access to the area has been impaired for nearly three years.	
Oral Comment Virtual	Fishel, Cleo	N/A	1	what the environmental impact and the impact is on snakes and reptiles because Here in Lompoc we have gophers and ground squirrels turning much of the town into potentially a sinkhole. And, owls as well do that work, but I think that. Snakes and owls both of which lay eggs and both of which are much more highly attuned to sonic aspects of existence than human beings and probably more so than rodents.	The potential impacts resulting from the Proposed Action on wildlife are discussed in Section 2.5.1.2 of the EIS. As stated in that section, launch, landing, or static fire events may elicit a startle response in individuals may either see, hear, or sense vibrations caused by these activities. Individuals that are at SLC-4 or SLC-6 during launch, landing, or static fire events may experience temporary or permanent shifts in hearing thresholds (the range of noise frequencies that species can perceive), depending on the species sensitivity to noise, length of exposure, and the intensity of the noise.
Oral Comment Virtual	Fishel, Cleo	N/A	2	Can we bring this to a vote? Can we put this on the ballot locally?	NP-04
Electronic	Ford, Wendy	N/A	1	The launches cause a very loud bang and my entire	N-01

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
Form				house shakes like there was an a strong earthquake. Sometimes (especially the late at night launches) it is extremely frightening - even when knowing a launch is expected. Is it possible to only launch in daylight hours for the peace of the public?	
Electronic Form	Foster, Wendy	N/A	1	Because of fallout due to launch residue into the air of the community, launch requirements include funding to Power Wash Quarterly Vandenberg Village and The City of Lompoc, California sidewalks, parking lots, and streets and any other recommended air quality needs to ensure flowers, plants, and indigenous trees recover and flourish so that Lompoc, California and surrounds is recognized as the cleanest, thriving city in California and the USA. A true positive partnership with Space Exploration and Thriving Earth.	AQ-06
Email	Frost, Erik	California Geological Survey	1	Geologic hazards at Vandenberg SFB. In Section 3.17.1.3, the draft EIR states geologic hazards at Vandenberg SFB include “the potential for surface erosion, landslides, seacliff retreat, streambank erosion, tsunamis, and liquefaction.” CGS has not yet evaluated the Vandenberg SFB area with respect to earthquake-induced landslides or liquefaction, although maps and data regarding tsunami hazard are available here: https://maps.conservation.ca.gov/cgs/informationwarehouse/ts_evacuation/#data_s=id%3AdataSource_3-1918f9f263a-layer-15%3A20 For any of the above-referenced geologic hazards, the EIR should consider including references to specific studies that have mapped and assessed the hazard (especially for landslides and liquefaction).	VSFB is aware that the California Geological Survey (CGS) has not evaluated VSFB for earthquake induced landslides or liquefaction. The statement in the EIS was to generally describe potential hazards that may exist. The statement has been reworded as follows: "Other potential geologic hazards at VSFB may include surface erosion, landslides, seacliff retreat, streambank erosion, tsunamis, and liquefaction, although CGS has not assessed the area for risk of earthquake-induced landslides or liquefaction at this time. "
Email	Frost, Erik	California Geological Survey	2	Fault activity. In Section 3.17.1.3, the draft EIR discusses faults proximal to Vandenberg SFB. This discussion characterizes faults as “active” or	Section 3.17.1.3 has been edited to reflect CGS comments on proper characterization of faults

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				“inactive” and references the CGS Fault Activity Map of California as a source. However, what the Fault Activity Map of California actually describes is the age of last activity for each fault. The draft EIR should be revised to omit characterizations of “inactive” faults, and instead describe faults by their age of last activity (e.g., the late-quaternary Honda fault).	
Electronic Form	Gill, Brooke	N/A	1	My husband and I are very very concerned and upset about these excessive launches!!We strongly feel they are terrible for wild life and the environment!!The noise and shaking is bad enough but to propose many more in the future is unbelievable!!We also think it is littering our atmosphere! We should at least be able to vote and have a say in what happens to our planet!Please stop the greed!Save our animals and precious Earth!@Brooke and Don Gill	NP-04
Mailed	Gilman, Andy	City of Ojai	1	Community Impact: Repeated exposure to launch noise exceeding 100 decibels can cause permanent hearing damage and significantly impact quality of life for our residents. The City is particularly concerned about impacts to our residential neighborhoods, schools, and businesses. The analysis should include detailed noise contour maps showing all affected municipal areas and sensitive receptors within City limits, along with projected implications for compliance with our noise ordinance.	The anticipated sonic boom noise levels for Falcon 9 missions are depicted in Figure 3.4-9. Sonic boom modeling is performed for each mission using various meteorological profiles appropriate for the mission's launch date. The atmospheric conditions introduce significant variation in where and at what levels sonic booms may impact. As such the DAF cannot provide definitive contours with a degree of certainty. Figure 3.4-9 is the best current representation of potential noise levels and locations. Ojai would occasionally receive sonic booms with estimated levels between 0.25 and 3.0 psf. Although the DAF acknowledges that these sonic booms may startle people, the frequency of these events would not be expected to cause chronic health problems, including hearing loss. In addition, as shown in Table 3.4-2 of the EIS, the percentage of model estimates exceeding 2.0 psf for easterly trajectories is very

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
					low in Ventura County and only a proportion of annual missions would utilize the easterly trajectory.
Mailed	Gilman, Andy	City of Ojai	2	Sonic Boom Effects: All launch vehicles-including boosters-generate their own sonic booms during ascent and potential return phases. The Falcon Heavy's three boosters produce additional shockwaves upon descent, compounding the effect. The EIS inadequately addresses the cumulative impact of multiple sonic boom events on our municipal infrastructure and community assets: - o Structural integrity of municipal buildings and residential structures, particularly in our historic districts - o Disruption to municipal services and emergency response capabilities - o Impact on our local tourism and hospitality sectors - o Wildlife displacement from municipal parks and open space areas - o Agricultural operations within and surrounding our city limits - o Human health effects from repeated sonic boom exposure on our vulnerable populations	BI-04, N-02, N-05, N-08, N-09
Mailed	Gilman, Andy	City of Ojai	3	Unique Topography: The Ojai Valley's unique east-west orientation and steep terrain can amplify shockwaves as they reflect off the valley walls. This can increase the perceived intensity and potential damage of sonic booms throughout the valley.	While there could be local influences on received sound levels from topography and vegetation (either slight increases or decreases in received noise levels), data collection throughout the counties have shown high accuracy to the modeled received boom levels. Additionally, due to the logarithmic nature of sound, if two reflected waves of the same intensity were to meet (which also could be interpreted as two sound events of the same intensity) the resultant combined wave would only increase by approximately 3 decibels (dB). It is not anticipated

Source	Last, First Name	Organization/ Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
					that local topography or vegetation would significantly increase local received sound levels.
Mailed	Gilman, Andy	City of Ojai	4	Recommendation: The City requests no launches to avoid these impacts. If additional launches are approved, the City requests establishment of comprehensive noise monitoring protocols at multiple locations within our municipal boundaries, implementation of a community notification system with adequate advance warning before each launch, and development of a structural damage assessment and compensation program for municipal and private properties.	N-02, N-07, N-09, N-11

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
Mailed	Gilman, Andy	City of Ojai	5	Launch Plume Emissions: The combustion products from rocket launches pose significant air quality concerns that require more rigorous analysis: • Particulate Matter: Rocket exhaust contains fine particulate matter that can travel significant distances and impact air quality in surrounding communities. The EIS should include detailed dispersion modeling under various meteorological conditions. • Chemical Emissions: Launch vehicles emit various pollutants including: - o Nitrogen oxides (NOx) contributing to ground-level ozone formation - o Carbon monoxide and carbon dioxide - o Aluminum oxide particles that can persist in the upper atmosphere - o Potential toxic compounds depending on fuel composition • Cumulative Air Quality Impact: With increased launch frequency, the cumulative impact on regional air quality must be thoroughly assessed, particularly regarding our city's ability to maintain compliance with National Ambient Air Quality Standards and our local air quality management objectives. The City is concerned about potential impacts on our residents with respiratory conditions and our elderly population.	AQ-01, AQ-02
Mailed	Gilman, Andy	City of Ojai	6	Recommendation: The City requests no launches to avoid these impacts. If additional launches are approved, the City also requests implementation of real-time air quality monitoring stations within our municipal boundaries with direct data sharing to our environmental health department, establishment of emission limits consistent with Clean Air Act requirements, and development of protocols for	AQ-03; Through the analysis presented in Table 3.3-5 of the EIS, the DAF has demonstrated that activities within Ventura County would not exceed the DAF insignificance thresholds. In addition, EPMs would be implemented to further minimize emissions from exhaust and dust. In addition, as discussed in Section 3.3.1.4.1 of the EIS, air pollutants emitted more than 3,000 feet above

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				launch postponement during poor air quality conditions.	ground level are considered to be above the atmospheric inversion layer and, therefore, do not affect ground-level air quality. Falcon vehicles typically pass 3,000 feet altitude within approximately 10 seconds from liftoff. As discussed in Section 3.3.1.4.1 of the EIS, air pollutants emitted more than 3,000 ft above ground level are considered to be above atmospheric inversion layer and therefore, do not affect ground level air quality. The Falcon vehicles reach 3,000 feet well before the City of Ojai, which is approximately 75 miles south of VSFB.
Mailed	Gilman, Andy	City of Ojai	7	Water Pollution Concerns: The proximity to sensitive marine environments requires enhanced protection measures: • Surface Water Contamination: Potential contamination from launch residues, fire suppression chemicals, and stormwater runoff containing rocket fuel components and combustion byproducts. • Groundwater Protection: Assessment of potential groundwater contamination from fuel storage, handling operations, and accidental spills. The analysis should include detailed hydrogeological studies and long-term monitoring protocols. • Marine Ecosystem Impact: Launch activities over the Pacific Ocean may deposit combustion products and debris in marine environments, potentially affecting: - o Marine protected areas and critical habitats - o Commercial and recreational fisheries - o Marine mammal migration corridors - o Seabird nesting and foraging areas Recommendation: The City requests no launches to avoid these impacts. If additional launches are approved, the City also requests that a	WR-01, WR-04, HM-01; As discussed in Section 3.3.1.5.1 of the EIS, air pollutants emitted more than 3,000 feet above ground level are considered to be above the atmospheric inversion layer. Falcon vehicles typically pass 3,000 feet altitude about ten seconds from liftoff. Therefore, the majority of launch-related emissions occur well above 3,000 feet and disperse rapidly into the upper atmosphere and would not affect the marine environment.

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				comprehensive water quality monitoring programs is established and that a contingency plans for rapid response to contamination events is developed.	
Mailed	Gilman, Andy	City of Ojai	8	Waste Stream Analysis: The EIS must provide detailed analysis of hazardous waste generation and management: • Fuel-Related Wastes: Proper characterization and disposal methods for rocket fuel residues, contaminated materials, and associated hazardous waste streams. • Launch Infrastructure Wastes: Assessment of waste generated from launch pad operations, vehicle processing, and maintenance activities. • Long-term Storage and Disposal: Evaluation of on-base storage capacity and off-site disposal options, ensuring compliance with Resource Conservation and Recovery Act requirements. Recommendation: The City requests no additional launches to avoid these impacts. If additional launches are approved, the City requests a comprehensive hazardous waste minimization plan is developed and a transparent reporting of waste generation and disposal activities is established.	HM-01
Mailed	Gilman, Andy	City of Ojai	9	Emergency Response Coordination: The City is particularly concerned about our municipal emergency response capabilities and coordination requirements: • Municipal Emergency Services: Assessment of impacts on our fire, police, and emergency medical services during launch activities and potential accident scenarios • Evacuation Planning: Coordination with our emergency management department for evacuation procedures and shelter-in-place protocols • Resource Allocation: Potential strain on municipal emergency response resources and need for mutual	S-01, S-02; All proposed trajectories are well offshore so there is extremely little likelihood of the potential for any launch anomaly to affect the Ojai area.

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				aid agreements • Public Safety Communication: Integration with our emergency alert systems and public information protocols	
Mailed	Gilman, Andy	City of Ojai	10	Environmental Catastrophe Potential: • Terrestrial Impacts: Wildfire risk from launch failures, particularly during high fire danger periods. Assessment should include burn probability modeling and firefighting resource availability. • Marine Environmental Disaster: Potential for large-scale marine contamination from vehicle failures over ocean areas, including: o Impact on marine protected areas and critical habitats o Contamination of commercial fishing grounds o Effects on endangered species including marine mammals and seabirds o Long-term ecosystem recovery timelines • Space Debris: Atmospheric pollution and disruption of astronomical observations, in discordance with our dark sky ordinance. Additionally, climate change exacerbates the problem, leading to increased orbital lifetimes of debris.	DE-06, S-01, U-02
Mailed	Gilman, Andy	City of Ojai	11	Wildlife Impact Assessment: • Noise-Related Wildlife Displacement: Chronic noise exposure can cause permanent displacement of sensitive species from critical habitats • Direct Mortality Risk: Assessment of bird and bat strike potential during launches • Habitat Fragmentation: Cumulative impact of increased human activity on wildlife corridors and breeding areas. Recommendation: The City requests no launches to avoid these impacts. If additional launches are approved, the City requests development of comprehensive emergency response	BI-04; The DAF determined that the risk of bird or bat strikes during launch is negligible because these animals would be expected to move away from the vehicle due to noise and visual disturbance during launch.

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				plans with regular coordination meetings and joint training exercises involving our municipal emergency services, establishment of clear protocols for municipal notification and resource coordination, and provision of funding support for enhanced municipal emergency preparedness capabilities.	
Mailed	Gilman, Andy	City of Ojai	12	The current Draft EIS does not adequately address the full scope of potential impacts on our community welfare, infrastructure, and private property, nor does it provide sufficient mitigation measures to protect our residents and municipal assets. The City respectfully requests that the alternative - no additional launches is approved to avoid impacts to our community and Ventura County.	N-02, N-08, N-09
Mailed	Gilman, Andy	City of Ojai	13	The City also requests the Final EIS address these concerns with enhanced technical analysis, more stringent mitigation measures, comprehensive municipal coordination protocols, and robust long term monitoring programs with meaningful municipal involvement.	The Final EIS includes refined technical analysis where appropriate, and the Proposed Action incorporates mitigations consistent with federal environmental requirements and agency best practices. While NEPA does not mandate specific monitoring or coordination protocols beyond the scope of the environmental analysis, the DAF remains committed to maintaining communication with local jurisdictions and will consider opportunities for continued engagement as project implementation advances.
Mailed	Gilman, Andy	City of Ojai	14	We request formal consultation status in the ongoing environmental review process and establishment of a permanent municipal liaison committee to ensure ongoing coordination between Space Force operations and our city government. The Space Force has the opportunity to demonstrate environmental leadership and community partnership by implementing the highest standards of environmental protection and municipal coordination while maintaining operational capabilities.	The DAF appreciates the request and values the ongoing interest and participation of local governments in the environmental review process. While formal consultation under NEPA is reserved for agencies with regulatory authority or expertise, the DAF welcomes continued coordination with municipal partners. The DAF will consider opportunities to enhance communication to support transparency and community engagement. The DAF remains

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
					committed to environmental stewardship and responsible operations that reflect national security priorities and local community values.
Oral Comment Ventura	Grier, Cynthia	N/A	1	The very first launch that ever happened I live in Ojai, California. The very first launch that ever happened was right during the era when North Korea was threatening to bomb us. So my first reaction was when North Korea was bombing us. And I want to know how do we distinguish between being bombed by an enemy and being bombed by the sonic boom from a launch? Every time that that -- those launches happen, again, I now have PTSD from this because I feel like every time I hear it -- I don't know, is it a North Korean rocket, is it an enemy rocket shooting at us?	N-03, N-08
Oral Comment Ventura	Grier, Cynthia	N/A	2	I have tried to sign up for the notification from the Air Force or whoever that's supposed to come from but I've not received anything. But I do use a third-party app that notifies me.	N-07
Electronic Form	Griffith, Kathleen	N/A	1	I am very concerned about the increase in launches and bringing the Falcon Heavy to VSFB for several reasons. Please note my concerns about damage to my real property from the frequency and type of launches at VSFB. Please note my concerns about damage to my mental health and the emotional trauma caused to all sentient beings by the frequency and type of launches at VSFB. Please note my concerns about damage to my physical health caused by the frequency and type of launches at VSFB. My letter goes into further detail on these matters.	See response to K. Griffith substantive comment below
Electronic Attachment	Griffith, Kathleen	N/A	2	I understand that any damage to our homes *might* be covered by the entity who was launching. Many of us are unclear whether SpaceX has sufficient insurance for damage caused by their launches.	N-02

Source	Last, First Name	Organization/ Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
Electronic Form	Haider, Laura	N/A	1	I oppose the changes. The at risk communities should include downwind areas of Los Angeles and Ventura County. Particulate matter can accumulate. Ozone travels to other air basins. You need to include toxicological risk screening for HAPs and address the cost structure and accountability of emission mitigation. What if an accident occurs resulting in explosion or fuel leakage? Rocket testing also uses energy and water which is in short supply.	AQ-04, AQ-06, S-02; Water and energy use were analyzed in Section 3.14 of the EIS and the quantities needed would not have significant impacts on regional supplies.
Oral Comment Lompoc	Hankins, Sally	N/A	1	One of the issues I haven't heard mentioned yet has to do with the study of this ·rocketry and the San Andreas fault.· I'm a native Californian.· I've dealt with earthquakes all my ·life.· And I wonder about this -- the thrust in ·vibrations that are just going to be increasing.· And I think it'd be important to study any ramifications on ·the San Andreas fault.· There's Diablo Canyon up above ·us.· We have this fault running all along the ·coastline, which is where Vandenberg Air Force Base resides.	N-12
Oral Comment Lompoc	Hankins, Sally	N/A	2	I also am a homeowner for 38 ·years.· My house was built before our world knew that ·we were going to be facing this.· It's in very good ·condition, but cracks are forming.· And the issues that ·everyone else has mentioned is happening in my home.	N-02
Oral Comment Lompoc	Hankins, Sally	N/A	3	But then in addition, the rocket blast is over, the windows calm down, everything's kind of going ·back to normal.· And then there's this enormous boom, ·that for me now, it's -- I find it frightening.· So ·like it affects my inside out because it's unexpected. ·I haven't heard that talked about either.	N-03
Electronic Form	Hardcastle, Kim	N/A	1	I oppose the proposed launch increase at Vandenburg Space Force Base as each launch creates a massive shake equivalent to an earthquake at my house where they have not only caused numerous cracks in	BI-04, N-02, N-08

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				our walls, but also caused PTSD as each launch feels like an earthquake. I am also opposed to the massive potential environmental impacts on coastal wildlife due to sonic booms, air pollutants and the possibility of explosion.	
Electronic Form	Havlicek, Robert	Housing Authority of the County of Santa Barbara	1	Please see the attached response letter.	See responses to Housing Authority of the County of Santa Barbara (HASBARCO) substantive comments below
Electronic Attachment	Havlicek, Robert	Housing Authority of the County of Santa Barbara	2	Temporary Workforce Housing Impacts. While the EIS concludes that new employment generated by the project will fall within the 850-job growth projection identified in SBCAG's RHNA Plan and the Dudek 2024 Housing Impact Study, this conclusion fails to distinguish between permanent and temporary workforce needs. Attachment 1 provides a recommended approach to establishing a significance threshold for temporary housing impacts in the Final EIS. • Temporary labor, including heavy equipment operators, electricians, concrete workers, and biological monitors, will be required for launch pad construction, trenching, and utility extensions, including to the new SpaceX hangar. These are defined in Table 3.4-1 of the Draft EIS. • The Davis-Bacon Act requires unionized labor, and specialized trade workers will likely be brought in from outside the County. The EIS assumes these positions will be filled locally but offers no occupational or census-based data to support that assumption. • Notably, the 1,100-unit loss of off-base military housing adjacent to VSFB between 2000–2017, documented in SBCAG's RHNA Supplemental Report, reduces available inventory and makes short-term rental fluctuations even more consequential for low-income households. Proposed Mitigation Measure: To reduce	SE-01; Regarding the HASBARCO's proposed mitigation measure to develop modular workforce housing that could later transition into affordable housing: the DAF acknowledges the innovative nature of this proposal and recognizes its alignment with long-term regional housing objectives. However, the Proposed Action does not involve significant on-base residential development and does not authorize construction of new housing. The DAF is not currently positioned to sponsor or construct temporary housing infrastructure, and the mitigation is not commensurate with the Proposed Action given the analysis in the EIS did not find significant socioeconomic impacts. The EIS recognizes that impulsive noises, including sonic booms and engine ignitions, may disrupt human and wildlife behavior, particularly in areas located within the 55 dB Lmax impact zone. However, as discussed in the EIS, the DAF has assessed noise impacts based on existing modeling and established thresholds, and these analyses have been conducted in accordance with federal guidelines for acceptable noise levels. While the DAF acknowledges that impulsive sounds like sonic booms can be disruptive, mitigation strategies in the form of

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				pressure on the local rental market, HASBARCO recommends that the Final EIR include a housing mitigation measure, specifically: • That VSFB and its contractors work with HASBARCO to develop modular workforce housing on or near the base that can later be repurposed into permanent affordable housing, preserving long-term community benefit. • This solution addresses the immediate need for temporary labor accommodations while contributing to the region's ongoing affordable housing capacity.	retrofitting existing housing or providing financial assistance for noise improvements are outside the scope of this NEPA analysis. The Proposed Action does not include provisions for retrofitting residential properties, as the DAF is not in a position to directly fund housing retrofits or assist with Community Development Block Grant (CDBG) loans for impacted communities. As such, the request for CDBG loans or similar financial assistance for noise mitigation retrofits have not been incorporated as part of the Final EIS. Instead, the DAF will continue to coordinate with local agencies and stakeholders, including HASBARCO and other regional entities, to explore opportunities for addressing noise-related concerns through community engagement. Additionally, public notification procedures will remain in place, ensuring that residents and property owners are informed of upcoming launches and potential noise impacts. The HASBARCO references temporary workforce housing measures implemented by SpaceX at its Starbase facility in Texas. While noted, the Starbase project involved construction of entirely new launch infrastructure in a remote location with limited housing and utility services. In contrast, the Proposed Action at VSFB would involve renovation and increased utilization of existing facilities and infrastructure, including reuse of an existing launch pad. The scale and setting of the Proposed Action differ significantly from the circumstances at Starbase and are therefore not directly comparable. Furthermore, VSFB is located near multiple established communities with existing housing supply and

Source	Last, First Name	Organization/ Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
					transportation infrastructure. The base also maintains on-installation contractor support areas that can accommodate some project-related needs. VSFB is one of the largest employers in Santa Barbara County and plays a key role in the regional economy. The installation routinely supports mission-related construction, infrastructure upgrades, and contract activities, and is accustomed to accommodating a variable workforce through existing regional labor pools, commercial lodging, and on-base contractor support facilities. The magnitude and duration of temporary labor demand associated with the demolition and construction of SLC-6 phase of the Proposed Action is within historic norms for the installation and is not anticipated to exceed local housing or service capacity. Based on the scope of activities and the availability of regional housing and base support facilities, the DAF does not anticipate significant impacts to temporary housing resources. Accordingly, the DAF concludes that the mitigation measures proposed by the HASBARCO, such as provision of modular housing for temporary workers, are not commensurate with the nature or magnitude of impacts as analyzed in the EIS. The temporary workforce associated with the Proposed Action is not expected to create housing shortages, displace existing residents, or otherwise result in a significant adverse impact under NEPA. The DAF values the perspective of the HASBARCO and its participation in the NEPA process and remains open to continued dialogue and coordination regarding housing needs and regional planning efforts.

Source	Last, First Name	Organization/ Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
Electronic Attachment	Havlicek, Robert	Housing Authority of the County of Santa Barbara	3	Noise Mitigation for HASBARCO Properties Community concern regarding sonic boom noise and percussive launch events is significant, especially with the anticipated increase in annual launches from 50 to 100. The Draft EIS acknowledges that acoustic events may startle wildlife and humans but does not propose concrete mitigation strategies for surrounding neighborhoods or multifamily housing. • HASBARCO owns multiple housing developments in proximity to VSFB, many of which lack basic noise attenuation, such as insulated windows or acoustically treated structures. • There is a qualitative difference between continuous sound and sudden, startle-inducing events like engine ignition and sonic booms. These impulsive acoustic events elicit involuntary physiological and psychological responses, especially among sensitive populations. The Draft EIS minimizes these effects on human residents, offering comparisons to everyday ambient sounds rather than accounting for the disruptive nature of launch-related noise. • This form of sound modeling understates the disruptive nature of percussive sound events. These are not ambient or predictable noises but acoustic shocks that can disrupt sleep, concentration, and overall well-being, particularly for low-income households in older, uninsulated structures. Proposed Mitigation Measure: We recommend that the Final EIR incorporate a mitigation measure to provide financial assistance, such as low-interest Community Development Block Grant (CDBG) loans, to retrofit existing homes located within the projected 55 dB Lmax impact zone. Eligible improvements may include: • Window replacements • Enhanced building envelope insulation •	N-02, N-09, SE-02

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				Soundproofing retrofits for common areas and sleeping quarters. These upgrades will protect tenant health, sleep, and long-term housing stability, aligning with the Space Force's responsibility to reduce environmental and social externalities.	
Mailed	Head, Lexi	N/A	1	It is occurring too quickly and not including the comprehensive, multi-year studies on the impacts of the launches, not just for the endangered snowy plover, but also for the humans that live near the base.	NP-01
Electronic Form	Hebert, Donna	N/A	1	Please see attachment.	Please see responses to D. Herbert substantive comments below
Electronic Attachment	Hebert, Donna	N/A	2	Ventura County is and has been in non-attainment for ozone for decades. Therefore, there really should be no level of emissions for this pollutant that should be considered de minimis. The Proposed Action will further diminish the already bad air quality in Ventura County	The Ventura County APCD is in serious nonattainment for the 2008 and 2015 8-hour ozone NAAQS. As shown in Table 3.3-5 and Table 3.3-6 of the EIS, the net annual emissions from the Proposed Action within Ventura County would not exceed the General Conformity Rule de minimis thresholds for volatile organic compounds or nitrogen oxides. Therefore, the Proposed Action would have an insignificant impact on air quality within the Ventura County APCD.
Electronic Attachment	Hebert, Donna	N/A	3	I am concerned that the potential effects of rocket launches on O3 levels and emissions in the upper atmosphere may be similarly ignored. The Proposed Action should not be approved until the science has developed to allow definitive evaluation of the Proposed Action's effect on the upper atmosphere.	AQ-01
Electronic Attachment	Hebert, Donna	N/A	4	The noise thresholds used in the EIS were not designed to take into account the impact of irregular sonic booms on human physiology and psychological health. While our ears may not be damaged by the Proposed Action, our nervous systems suffer currently from these rocket launches due to noise	N-08, N-10

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				and vibration and this will increase substantially.	
Electronic Attachment	Hebert, Donna	N/A	5	What about marine animals that also come to the surface such as whales? These animals would be impacted by noise levels in the water and air.	BI-02
Mailed	Hendricks, Kathlyn	N/A	1	My husband and I have been residents of Ojai since early 2002, and in that time, especially during the last few years, the sonic booms from Vandenburg have become increasingly loud, very loud, and have shaken the ground, the house, and sometimes the windows. Our cats become alarmed, and my nervous system, which has been through live earthquakes on three occasions, goes into adrenaline distress. And that's just one family. I'm concerned about structural damage, wildlife disruption, pollution and other unintended consequences from even heavier and more frequent launches.	N-01, N-02, N-03, N-05, N-08
Electronic Form	Henshaw, Jenny	N/A	1	I am against increasing the number of rockets launches in Santa Barbara County. One of my biggest concerns is the impact on wildlife. These launches are loud and disruptive, and I worry about the stress they cause to animals in the area. It's not something they can adapt to easily, especially in already fragile ecosystems. I also think about our veterans who live with PTSD. Sudden, loud noises like rocket launches can be really triggering for them, and I don't think that should be overlooked. At home, my own pets get very stressed whenever a launch happens. I also have friends with young kids and babies who are regularly woken up by the noise, which messes with their sleep and routines. For these reasons, I don't support increasing the number of launches.	BI-04, N-01, N-08
Electronic Form	Howard, Dolores	N/A	1	Please see attached file.	See responses to D. Howard substantive comments below
Electronic Attachment	Howard, Dolores	N/A	2	The subject of risks to the low earth orbit, the atmosphere and earth, including space debris, air	AQ-02, DE-04, DE-06, WR-01

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				pollutants, contamination of waters, entanglement with and ingestion of debris by wildlife including dolphins, sea turtles and fish, in US waters and in the waters of other countries, habitat degradation due to marine debris, exacerbation of climate change, and ozone depletion should have been thoroughly addressed in the DEIS, given the global harms that this proposed action poses.	
Electronic Attachment	Howard, Dolores	N/A	3	The DEIS does not fully address the regional and local impacts of the recent increases in launches nor the proposed increase in the number of launches on noise, water, ocean health, public health, air quality and GHG emissions, wildlife, public health, enjoyment of beaches by community members, cultural resources and tribal communities.	These resources are addressed in the relevant resource sections in Section 3 of the EIS.
Electronic Attachment	Howard, Dolores	N/A	4	The DEIS does not fully incorporate: • Full accounting of greenhouse gas emissions, including upstream activities such as fuel production and transportation. • An estimate of social costs associated with greenhouse gas emissions, particularly those that would exacerbate existing burdens for frontline communities.	AQ-05
Electronic Attachment	Howard, Dolores	N/A	5	Although residents in communities along the coast have reported property vibrations, disrupted sleep, and stress-related health impacts from the current level of launches, the DEIS does not sufficiently address accurate metrics of peak noise levels, how noise travels and the cumulative effects of noise on wildlife and human populations.	N-01, N-06, N-10
Electronic Attachment	Howard, Dolores	N/A	6	The DEIS does not fully address the impacts to land or marine wildlife from sonic booms launches and landings for this Proposed Action. It is sorely lacking in impacts resulting from the recent increase in the number of launches to Western Snowy Plover and California Least Tern, amongst other species. The	BI-04

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				cumulative effect of nighttime fallback retrieval and sonic booms on nesting nocturnal seabirds and San Miguel Island caliche forest was not sufficiently addressed in the DEIS.	
Electronic Attachment	Howard, Dolores	N/A	7	The DEIS does not present sufficient data on the impacts to wildlife on land and in the ocean at the largest sonic boom level 2.21 – 5.70 psf, in particular, on northwest Santa Cruz Island, most of Santa Rosa and San Miguel Islands, and out beyond the channel. There are no studies on whether whales may be affected by these pressure waves at levels up to 11 times the psf reported by humans on land to be terrifying to their pets.	BI-02; Figures 3.4-10 through 3.4-13 are presented as example sonic boom model outputs. Maximum potential levels that species would be potentially exposed to are discussed in the text of the BA (Appendix B of the EIS). Appendix A of the BA also includes numerous example sonic boom outputs.
Electronic Attachment	Howard, Dolores	N/A	8	The DEIS does not state that necropsies have been or will be performed on marine wildlife that are found dead, to determine if organs, including auditory organs, are damaged. There are no results of necropsies performed since the number of launches has increased from 6 to 36 and 36 to 50.	As required under the NMFS Letter of Authorization, SLD 30 reports all observations of dead or injured marine mammals to the Office of Protected Resources, NMFS and to the West Coast regional stranding network as soon as feasible. NMFS or NMFS-affiliated researchers may perform necropsies on these animals under their own discretion. The DAF is not aware of any necropsy results indicating a death or injury was related to launch activities.
Electronic Attachment	Howard, Dolores	N/A	9	There is no mention in the DEIS of underwater monitoring data regarding potentially fatal impact of sonic booms on cetaceans at or near surface. This despite the California Coastal Commission's assertion that "... sonic booms are detected to depths of 50 meters below ocean surface."	The DAF has not been provided any data indicating that sonic booms were detected 50 meters below the ocean surface. None of the in-air noise levels associated with the Proposed Action exceed NMFS thresholds for temporary or permanent hearing thresholds in marine mammals and thus, even if a portion of the noise energy is transmitted into water, would be substantially below any level that would cause death or injury to submerged animals.
Electronic Attachment	Howard, Dolores	N/A	10	Without having published underwater monitoring data related to the recent increases in the number of	BI-02; Although the DAF is aware of some underwater acoustic survey efforts at the Channel

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				launches, it is clear that the DAF has failed to evaluate the impacts of what this acceleration in the number of launches means to marine wildlife.	Islands, these data have not been made available to the DAF. The DAF welcomes additional data that would better inform impact analyses.
Electronic Attachment	Howard, Dolores	N/A	11	The DEIS fails to fully address the ecological or local and community impacts from marine debris due to the recent rapid increase in launches or the proposed doubling of the number of launches and landings, and the addition of heavy rocket launches and fails to detail sufficiently how recovery of marine debris will or will not occur.	DE-01, DE-02, DE-05
Electronic Attachment	Howard, Dolores	N/A	12	Impact to the Channel Islands from the recent increase and proposed increase in launches was not sufficiently addressed in the DEIS, including the impact to island visitor experience of natural quiet and night skies, as well as the impact to wildlife on the Channel Islands. Since the DEIS lacks comprehensive data, complete studies, and sufficient analysis of impacts to the Channel Islands National Park from recent increases in launches, this statement found in the DEIS should not have been made: "Although launch trajectories overfly the Channel Islands National Park, impacts would not be so severe that the activities, features, or attributes that qualify the Channel Island National Park for protection under Section 4(f) are substantially impaired."	BI-04; Procedures requirements for complying with Section 4(f) are set forth in Appendix B-2 of FAA Order 1050.1F. Impacts on Section 4(f) resources would be significant if the FAA's Proposed Action involves more than a de minimis physical use of a Section 4(f) resource or constitutes a constructive use based on an FAA determination that the Proposed Action would substantially impair the Section 4(f) resource. The concept of constructive use is that a project that does not physically use land in a park, for example, may still, by means of noise, air pollution, water pollution, or other impacts, dissipate its aesthetic value, harm its wildlife, restrict its access, and take it in every practical sense. Constructive use occurs when the impacts of a project on a Section 4(f) resource are so severe that the activities, features, or attributes that qualify the property for protection under Section 4(f) are substantially impaired. Both rocket engine noise and sonic booms are classified as short-duration, intermittent events. Given the short duration of increased sound levels during a launch and the small area impacted, the FAA has determined that noise generated during launches

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					or landing would not substantially diminish the protected activities, features, or attributes of any of the potential Section 4(f) resources, including the Channel Islands, and therefore would not result in a constructive use of any potential Section 4(f) resource.
Electronic Attachment	Howard, Dolores	N/A	13	The DEIS does not provide sufficient data to assess and properly mitigate the impacts from cumulative loss and fragmentation of native uplands and wetland habitats on wildlife breeding, roosting or foraging from increasing the launch cadence from 6 to 36 per year, or from 36 to 50 per year. In fact, the DEIS states in regards to the 100+ launches being proposed, “cumulative loss and fragmentation of native upland and wetland habitats may cause long-term effects on wildlife breeding, roosting, or foraging, particularly of individuals with limited mobility and those without corridors to another suitable habitat.”	BI-04
Electronic Attachment	Howard, Dolores	N/A	14	The DEIS did not fully address additional impacts from the existing increase in launches to cultural and historical resources. The DEIS reflects an omission of meaningful engagement with local indigenous people, with only flimsy mentions at superficial efforts that do not represent full engagement with native peoples who have the greatest responsibility for the Vandenberg lands, including the Chumash people who have not extinguished title over the lands where Vandenberg Space Force Base is located.	CR-01
Electronic Attachment	Howard, Dolores	N/A	15	The analysis in the DEIS of beach closure issues, at the increasing level of launch frequency from 6 to 36 to 50 per year and the proposed level of over 100 is insufficient, particularly in examining the equity impacts of closures on inland communities.	See Section 3.10 of the EIS for a detailed analysis. Under the Proposed Action the number of beach closures would not increase over those that have previously been approved in prior NEPA documents and agreements with Santa Barbara County and the California Coastal Commission. A

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					maximum number of 12 closures per year would occur at Ocean Beach County Park, Surf Beach, and Jalama Beach County Park. Closures of Ocean Beach County Park and Surf Beach do not necessarily coincide with closures of Jalama.
Electronic Attachment	Howard, Dolores	N/A	16	This EIS should more thoroughly detail the No-Action Alternative,	The No Action Alternative was detailed in Section 2.2 of the EIS and identified as the environmentally preferable alternative. However, the No Action Alternative does not meet the purpose and need of the Proposed Action
Electronic Attachment	Howard, Dolores	N/A	17	Marine debris was not properly assessed in the DEIS, as it lacked quantifiable debris recovery rates and did not conduct a new assessment of quantities of debris expected from 100+ launches but rather used the outdated 2023 SpaceX Supplemental Environmental Assessment quantifying 17,700 pounds of annual marine debris for 36 launches	DE-01, DE-02, DE-05
Oral Comment Santa Barbara	Hunter, Katherine	N/A	1	and -- so we don't know what the future trajectories will do or if they'll increase noise or they'll be farther out or closer in or how that will affect us. And so that -- that's a concern of mine, is how that's going to affect us in the future.	Launch trajectories are determined based on mission-specific orbital requirements and safety constraints. While some missions may use trajectories that direct vehicles over open ocean, this is not feasible for all launches due to payload limitations, safety margins, and national security considerations. Safety remains a priority in all launch planning, and alternate trajectories are considered on a case-by-case basis in coordination with the FAA and U.S. Space Force.
Oral Comment Santa Barbara	Hunter, Katherine	N/A	2	Also, the trajectory matters to me in referring to the Channel Islands National Park. There's fuzzy language in here that don't adequately address some of the public concerns about sea life and the conditions on the Channel Islands, which is a national treasure and needs to be carefully monitored.	BI-01, BI-10; Section 3.6.2.1.7 of the EIS describes that the Proposed Action would not result in significant impacts on marine reserves, including the Channel Islands National Marine Sanctuary. This conclusion is supported in the analysis by detailed modeling of acoustic effects (including sonic booms) on marine resources and DAF's informal consultation with the NMFS, which

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					resulted in concurrence that the Proposed Action “may affect, but is not likely to adversely affect” ESA-listed marine species.
Oral Comment Lompoc	Isaacson, Sally	N/A	1	I'm concerned about the effect of launches on the structural integrity of local historic buildings, several of which are on the National Registrar of Historic Places. The Point Conception Lighthouse, 1856; the Spanne house, 1875; the Lompoc Museum, 1910; La Purisima Mission; Lompoc Veterans Memorial Building, 1936; the San Julian Adobe; other local adobes, and more may be vulnerable to damage.	CR-02
Written Comment Lompoc	Isaacson, Sally	N/A	1	Effects on Structures: I live in an old redwood farmhouse near Jalama Road that was built in 1910. The house is right under the flight patch of the rockets, and it rattles loudly during both the launches and sonic booms. After every launch, my pictures are crooked on the walls. On one occasion, a large and historical family painting from 1800s fell off the wall and ripped irreparably. Also, new cracks seem to be appearing in the plaster of the walls.	N-02, N-08
Written Comment Lompoc	Isaacson, Sally	N/A	2	Effect on Historical Buildings: Based on my personal experience, I am concerned about the effect of launches on the structural integrity of local historic buildings, several of which are on the National Register of Historic Places. Point Conception Lighthouse (1856), the Spanne House (1875), the Lompoc Museum (1910), La Purisima Mission, Lompoc Veterans' Memorial Building (1936), San Julian Adobe, other local adobes, and more may be vulnerable to damage.	CR-02
Written Comment Lompoc	Isaacson, Sally	N/A	3	Effect on Domestic Animals and Wildlife: It is quite clear due to their agitated behavior that my dogs, cats, horses, and cows are terrified by the launches. The animals sense one even before I do. My chickens also make a terrible racket during a launch. Judging by the effect that launches, as well as sonic booms, have on	BI-04, BI-05, N-05

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				domestic and farm animals, I believe that they must be harmful to local wildlife, including ground dwelling animals such as the American badger, which is a species of special concern in California. Also, foxes and all mammals that have burrows and dens. Vandenberg has a history of protecting the threatened western snowy plover and the endangered California least tern during the nesting season. I suggest that studies should be conducted on the effects of launches on these two species. Effects on other birds that reside in the area, including our protected golden eagles, should also be investigated. The Central Coast is part of the Pacific Flyway, one of four critical North American bird migration routes from Alaska to Patagonia in South America. It is a route for at least a billion birds each year. Studies associated with the Florida space program suggest negative effects on migratory bird populations. Our area is part of the California Floristic Province, one of 36 Global Biodiversity Hotspots. This is a huge reason why activity at Vandenberg that negatively affects animals and plants should be avoided. The hotspots represent just 2.5 percent of the earth's surface and are places where success in conserving species can have an enormous impact in securing global diversity. I suggest that an extensive study is needed to determine the effects of launches on a diversity of wildlife species, including mammals and birds.	
Written Comment Lompoc	Isaacson, Sally	N/A	4	Effect on Sleep Patterns of Residents: Launches that take place at night are incredibly disruptive to sleep patterns for all residents ranging from babies and school age children to working people and the elderly. It would be much better if launches were confined to daylight hours.	N-02

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
Electronic Attachment	Iverson, Jon	California Department of Conservation, Geologic Energy Management Division	1	Public Resources Code (PRC) section 3208.1 establishes re-abandonment responsibility when previously plugged and abandoned oil, gas or geothermal wells will be impacted by planned property development or construction activities. Local permitting agencies, property owners, and/or developers should be aware of, and fully understand, that significant and potentially dangerous issues may be associated with development near previously abandoned oil, gas, and geothermal wells. The California Geologic Energy Management Division (CalGEM) has received the above-referenced project. To assist local permitting agencies, property owners, and developers in making safe and practical land use decisions regarding potential development near oil, gas, or geothermal wells, CalGEM provides a table in the attached enclosure of the wells within the parcel boundary or in its vicinity, based on CalGEM's Well Finder database (https://maps.conservation.ca.gov/doggr/wellfinder/) The wells listed below are reported to be located within and nearby the parcel boundary and may have future access impeded. API No. 083-03977, Well Name: Sudden 1	SLD 30 is aware of the Sudden Well in the vicinity of the project area. The general location will either be avoided or a petroleum engineer will be consulted if necessary.
Mailed	Jensen, Darcee	N/A	1	I am concerned that the draft EIS does not include comprehensive multi-year studies of the impacts of preexisting launches, particularly on endangered species, tourism and recreation, greenhouse gas emissions, and public health and wellbeing.	NP-01
Electronic Form	Johnson, Eric	Amphibian Refuge	1	Amphibian populations are declining worldwide, and amphibians are experiencing high extinction rates due to habitat loss, chytrid fungus, pollutants, pesticides, invasive species, and climate change. Amphibians are the most threatened class of vertebrates. The proposed action has the potential to	The potential impacts to species protected under the ESA were analyzed in Section 3.5.2.1.3. The DAF initiated Section 7 consultation with the USFWS for ESA-listed species and would adhere to the terms and conditions of the resultant BO, including any monitoring, minimization, and

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				affect two special status amphibian species: California red-legged frog (Federal Threatened and California Species of Special Concern) and western spadefoot (Proposed for Federal listing and California Species of Special Concern). Noise, visual disturbance, and potential vibrations may affect these amphibian species. Amphibian Refuge recommends that the US Air Force conduct population monitoring surveys for the California red-legged frog and western spadefoot. Protected areas should be established for these species. Thank you for this opportunity to comment. References: Catenazzi, A. 2015. State of the Worlds Amphibians. Annual Review of Environment and Resources, 40: 91-119. Collins, J.P., and M.L. Crump. 2009. Extinction in Our Times: Global Amphibian Decline. New York, NY: Oxford University Press. International Union for the Conservation of Nature. 2024. Amphibian Conservation Action Plan. Gland Switzerland: International Union for the Conservation of Nature. Kolbert, E. 2014. The Sixth Extinction, an Unnatural History, Chapter 1. New York, NY: Bloomsbury. Luedtke et al. 2023. Ongoing Declines for the Worlds Amphibians in the Face of Emerging Threats. Nature, Volume 622, 12 October 2023, 308-314. McCallum, M.L. 2007. Amphibian Decline or Extinction? Current Declines Dwarf Background Extinction Rate. Journal of Herpetology, Volume 41, Number 3, pp. 483-491.	avoidance measures. As a result, the DAF determined that there would not be a significant effect on wildlife species, including ESA-listed species. In addition to the required monitoring of California red-legged frog (CRLF) populations under the expected BO, the DAF has performed annual baseline population monitoring for CRLF in various watersheds and suitable habitat across VSFB for the past 14 years and regular surveys for western spadefoot on VSFB. Although the DAF cannot set aside land in perpetuity, the DAF has performed numerous habitat enhancement projects for CRLF to benefit the species.
Electronic Form	Jones, Melanja	N/A	1	I live in Carpinteria and the launches are already too loud and too many. The sonic booms regularly rattle the condo windows where i live and I have seen the booms scare the seals at the sanctuary during pupping season. In addition to the Sonic booms, I am concerned about the effects of all the emissions from these launches and heavy metals is puts into the air. I	AQ-02

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				feel like these have not been fully researched for those of us in the launch zone Please deny the request to increase the launch frequency Cadence. We are already suffering enough in the launch zone from the effects of these launches	
Electronic Form	Kadota, Marian	N/A	1	Attached are my formal comments to the Draft EIS. This is Part II of II response on this site.	Please see responses to M. Kadota's substantive comment below.
Electronic Attachment	Kadota, Marian	N/A	2	Based on the P&N, a reasonable alternative would be to put the project out for bid to allow competition (as stated in the P&N). During scoping, I requested this alternative be considered, but it was ignored. I feel the decision to not address a reasonable alternative that better addresses the P&N makes this document in non-compliance with 32 CFR 989.8.	U-02
Electronic Attachment	Kadota, Marian	N/A	3	The proposed action (and Alternative 1) does not provide basic information one would expect in a project description (e.g., what type and number of DAF authorizations are proposed (e.g., leases, easements), the term (length of the authorizations), who the authorizations are for (i.e., Space X) and what will be authorized (in the Introduction it describes what would be authorized but it is not addressed in the Proposed Action description). The proposed action also does not state that this is a proponent driven project. The authorizations are not even included in Table 2.5-1 and does not clearly state the number of "authorizations" DAF would authorize. Several tables give the impression the authorizations will expire sometime between 2028-2030 but the project description does not state the expiration date for the authorizations. The term of this project could have more significant environmental effects (directly, indirectly and cumulatively) that needs to be addressed in the environmental consequences (effects would differ	PA-01

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				greatly from 3, 5 or 30+ year terms). The Draft EIS addresses the “proponents” project-specific Emergency Response Plan (the only location I could find the project is proponent driven).	
Electronic Attachment	Kadota, Marian	N/A	4	The description also does not address connected actions, such as, the expected number of space improvements (e.g., satellites) that will be installed in space during the term, the life of these improvements and what will become of them when they are abandoned. It also does not break out what portions of the project are for commercial private benefit and for national security.	DE-06, PN-01, U-02
Electronic Attachment	Kadota, Marian	N/A	5	The analysis should include the federal costs and the proponent’s fees (for the lease/authorization) as income and what portion of the launches are for national security and what portion is for personal private commercial benefit. These items were not included in the analysis and based on this new emphasis on use of federal funds and income to the national treasury, I would think the administration would expect the analysis address this to help make an informed decision on whether to implement the project or not.	PN-01; Federal costs and proponent fees are also not analyzed under NEPA.
Electronic Attachment	Kadota, Marian	N/A	6	This project provides no information on the length of the project, the approximate number of additional satellites or space structures that will be added to space from this project and what will become of the abandoned “structures”. The numbers, abandonment of the satellites and length of the project could have global impacts but because this information is not addressed, it is impossible to determine what those effects would be. ...Depending on how many space “structures” are installed in space for this project and cumulatively, it could also affect the risk of collisions or affect the timing of launches, globally (and could	DE-06, PN-03, U-02

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				affect national security for the USA and other countries). None of these potential effects were addressed in the analysis as required in the regulations.	
Electronic Attachment	Kadota, Marian	N/A	7	The document's introduction says the authorization will include the booster landings in these international waters but does it also include expendable parachutes, parafoils and approximately 10 percent of the boosters? And how does a federal agency authorize something(s) in international waters?	By definition, international waters are not subject to the jurisdiction of a state, and activities may be authorized there provided they do not violate applicable provisions of international law or treaty.
Electronic Attachment	Kadota, Marian	N/A	8	Using these 3 noise measurements does not appear to be appropriate given the length of impact over a 24-hour period.	N-10
Electronic Attachment	Kadota, Marian	N/A	9	The analysis says, "the frequency of these events would not be expected to cause chronic health problems" but there is no reference to a scientific paper that came to that conclusion or even a basis of how the conclusion was made.	N-08
Electronic Attachment	Kadota, Marian	N/A	10	The mitigation provided was to notice people of future launches via text, emails or social media. Seriously? Will that stop babies, children or pets from waking adults? Or reduce significant effects to long-term health? A mitigation measure more appropriate would be to prevent launches during normal sleeping hours (e.g., 2000 to 0700 –military time).	N-01
Electronic Attachment	Kadota, Marian	N/A	11	The NOA was published May 23 and a public notice was sent on June 2 (a loss of 10 days of the 45-day comment period). I saw no articles in the local papers or local TV news informing the readers of this 45-day comment period and only found out about the public hearings by pure accident (a few days before they were to occur). I requested in my scoping comments to be included in the mailing list and received no	NP-02

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				notice. To give VSFB the benefit of the doubt, I suspect the email went to spam. I suspect I am not the only one that did not see the notice via their email. A post card at a minimum would have been appropriate given the poor outreach through the media.	
Electronic Attachment	Kadota, Marian	N/A	12	Reading the cumulative effects section, I found it interesting only 10 additional launches per year are expected during the term of this project given the number of privately owned space companies in the USA and the recent DAF contracts awarded to 4 other private companies this spring. With only 2 space force bases in the nation where are these companies going to implement their contracts?	SLD 30 manages the launch manifest of the Western Range (VSFB). SLD 30 has determined that the Range can support up to 110 rocket launches annually and would determine how to allocate those to the various launch service providers operating at VSFB. The Proposed Action includes up to 100 Falcon launches per year, which would be encompassed within the overall 110 launches annually and may or may not be achieved in any given year depending on mission needs of other launch service providers. Currently VSFB and Cape Canaveral Space Force Station in Florida and NASA's Kennedy Space Center in Florida, form the primary launch locations for both space missions in the U.S.
Oral Comment Santa Barbara	Kadota, Marian	N/A	13	So -related to the purpose and need, nowhere where in the -purpose and need does it specify the proposed action is -to address SpaceX's proposal.- And in fact, several -purposes of the project are to promote competition and -reduce dependency on singular systems, the opposite of -what the proposed action appears to be.	Section 1.1 of the Purpose and Need chapter in the EIS identifies the Proposed Action as DAF's authorization of the redevelopment of SLC-6 to support SpaceX Falcon 9 and Falcon Heavy operations, including launch and landing at VSFB; DAF's authorization of an increase in Falcon 9 launches and landings at VSFB and downrange landings in the Pacific Ocean; and the FAA's licensing SpaceX Falcon operations at VSFB and approval of related airspace closures. The DAF and FAA prepare similar NEPA documents (EAs and EISs) to evaluate authorization and licensing of other launch service providers which promotes competition, innovation, and reduces reliance on

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					singular systems.
Oral Comment Santa Barbara	Kadota, Marian	N/A	14	The need also states a project is needed because there are less reliable -- reliably available locations for these types of launches. But these types of launches are presently occurring in Florida and Texas, too. I also hope to see possibly an alternatives considered but eliminated section of the EIS, an alternative that addresses why these and possibly new launch sites are unacceptable and less reliable.	PN-03
Oral Comment Santa Barbara	Kadota, Marian	N/A	15	Since Vandenberg is a federal facility where I would think national security projects take priority, it appears a number of satellites being added to the lower orbit is jeopardizing our national security by affecting open windows for national security launches.	The purpose of this NEPA review is to evaluate the potential environmental impacts of authorizing up to 100 Falcon launches annually from VSBF, rather than to assess downstream impacts of orbital operations, which are regulated and reviewed under separate statutory authorities.
Oral Comment Santa Barbara	Kalp, Kathleen	N/A	1	Much has already been said about the various negative impacts of the Vandenberg rocket launch schedule, which has increased beyond expectations in recent years. Noise pollution and stress for humans and wildlife are chief among the valid concerns. I have also seen the videos of how terrorized pets become and how exasperated people get from lost sleep and frayed nerves. Some point to damage in their homes. Life is interrupted until the noise subsides. So it follows that adding more launches aggravates an already compromised quality of life in Lompoc and the surrounding areas. Yes, sharing the schedule ahead of time is helpful to take precautions, but launches don't always go off on time.	N-02, N-08
Oral Comment Santa Barbara	Kalp, Kathleen	N/A	2	So here's the question, who among us would buy real estate in Lompoc under these circumstances and a situation that will get worse over time? And how many more residents will leave? Is Vandenberg	N-02, S-03, SE-01

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				prepared to compensate the public for real estate losses that are out of their control? The chaos is not in the interest of a thriving and healthy community or property values, and assures Lompoc in particular will suffer. I also wonder how SpaceX, the manufacturer of the Falcon rockets under consideration, passes the government due diligence process when their equipment has failed on occasion, casting a dangerous debris field across populated areas.	
Mailed	Keller, Janice	N/A	1	Any soil disturbance during construction, disasters at/or near the launch sites, debris from a launch site or near earth destruction of a rocket and/or booster will blow into/over Lompoc. Though these incidences may be rare, they have happened here and elsewhere. More research must be done on the potential air quality impact to Lompoc area residents, human and non-human. Furthermore, edible crops, some deemed organic, are grown between Lompoc and the launch site and they could be affected by even-temporary reductions in air quality. This too should be studied and considered.	AQ-02
Mailed	Keller, Janice	N/A	2	What needs to be researched is the effect of noise and vibrations on the mental health and quality of life of Lompoc area residents and animals domestic and feral.	N-05, N-08
Mailed	Keller, Janice	N/A	3	As for Socioeconomics and Transportation, this needs to be revisited. Lompoc will suffer the impacts, but see little of the positive economic benefits eluded to in the EIS. Construction workers for the most part will come from areas outside of Lompoc. Little of Space X's workforce is local. Our roadways will be impacted by additional traffic through our community. Was this even considered? Who and what communities will reap the benefits of this alleged "economic	SE-03; The potential impacts to transportation were analyzed in Section 3.13.2 of the EIS. The Proposed Action would have no significant impacts on transportation.

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				generator"? It will not be the residents of the community most impacted by additional launches and a new launch site. More analysis needs to be done regarding these impacts.	
Oral Comment Lompoc	Keller, Janice	N/A	4	The draft EIS uses words such as "annoyance," "not expected," and "could be avoided if." When referring to the impacts of the launches, language such as this is vague and indicates a lack of sufficient research and should not be the basis of decision making.	N-08
Electronic Form	Kinney, Elizabeth	N/A	1	I'll be brief. The EIR is woefully lacking in adequately describing the noise, vibration, "nuisance" factor, and potential for property damage resulting from Falcon Heavy launches. The simple diagram in the Report depicting the engines of the Heavy is not sufficient: the statement that the Falcon Heavy uses the same engines as the Falcon 9 is highly misleading, as the Falcon Heavy has three times the number of rocket engines as the Falcon 9, which will hugely increase disturbance of the public's peaceful enjoyment of their property and the potential for significant structural damage.	N-02, N-09
Oral Comment Lompoc	Kinney, Nile	N/A	1	I can see my windows oscillating. I can literally see them oscillating like a quarter inch in each direction. It's ridiculous. As a lawyer, I know that noise data can be highly misleading and can be presented in such a way as to seem legitimate and seem in compliance with noise thresholds. We're talking about a low frequency vibration, unbelievably low, at such an amplitude as to create the effects that I've just described.	N-09
Oral Comment Lompoc	Kinney, Nile	N/A	2	Now, the alternative I'm talking about is the launch trajectory. I understand, from somewhere I read, I wish I could cite it to you that these launches can be directed away from the communities and -- and	T-01

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				public, so as to greatly mitigate a lot of the effects - most of the effects that the people in this room are talking about. So the launch could go in direction A, and then at a point, turn and go into the desired, you know, vector that would promote the objective. So I'm not aware that's addressed in the EIS. It needs to be addressed. It's a reasonable mitigation measure. And if the company, if these private companies, including SpaceX, have to pay for it, so be it. They can afford it, but we can't afford to have our houses over a span of months, years or decades, eventually reduced to rubble by this vibration.	
Electronic Form	Kirkland, Debora	N/A	1	Please see attached comment letter opposing the proposed action due to inadequate scoping and analysis of effects and inadequate range of reasonable alternatives	See responses to D. Kirkland substantive comments below.
Electronic Attachment	Kirkland, Debora	N/A	2	The Environmental Impact Statement does not provide adequate reasonable alternatives to the proposed action that would meet the stated purpose and need. Because there was no analysis of the impacts or alternatives to the current level of launches, launches should be reduced to the level that has been adequately analyzed before increasing the frequency of launches.	PN-02
Electronic Attachment	Kirkland, Debora	N/A	3	There was no analysis of the impact to the human environment from sonic booms since 2018. There was no public scoping of the affected areas to solicit public comment on the potential impact from sonic booms.	N-06, NP-03; As stated in Section 1.5.2 of the EIS, Three in-person scoping meetings were held at the following dates, times, and locations: 14 January 2025 (5:00 p.m.–8:00 p.m. Pacific Time), Veterans of Foreign Wars Post 1679, Ventura, CA; 15 January 2025 (5:00 p.m.–8:00 p.m. Pacific Time), Westside Neighborhood Center, Santa Barbara, CA; and 16 January 2025 (5:00 p.m.–8:00 p.m. Pacific Time), Dick DeWees Community Center, Lompoc, CA. The locations and times were published in local newspapers (Lompoc Record,

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
					Los Angeles Times, Ojai Valley News, Santa Barbara Independent, Santa Maria Times, and Ventura County Star) and on the EIS website a minimum of 15 days prior to the meetings. A virtual meeting was conducted online at 6:00 p.m. Pacific Time on 23 January 2025. The meetings provided an opportunity for attendees to learn more about the preliminary description of the Proposed Action and Alternatives and provide an early and open process to assist the DAF and its Cooperating Agencies in determining the scope of issues for analysis in the EIS, including identifying significant environmental issues and those which can be eliminated from further study. During the in-person scoping meetings, project team members were available to provide information about the Proposed Action, and there was an opportunity to provide oral and written comments. Scoping meeting materials were provided in English and Spanish.
Electronic Attachment	Kirkland, Debora	N/A	4	The Department of Air Force acknowledged that “due to the unique atmospheric conditions of the Central Coast, including the marine layer, add to the variance in sound levels experienced for each launch event.” The modelling of sonic booms scope of impacts did not factor in these unique characteristics and therefore did not adequately analyze the impacts of the existing level of launches.	Sonic boom modeling depicted in Figure 3.4-9 utilized 308 historic atmospheric profiles collected from VSFB weather balloon data over a 10 year period and thus accounts for a wide array of potential atmospheric conditions in the region. This variance was considered when determining the ROI and potential sonic boom levels that may be experienced throughout the ROI.
Electronic Attachment	Kirkland, Debora	N/A	5	There has been no analysis of the effect of sonic booms of the geologic integrity of artificially compacted soft saturated soils. ...I have seen a significant increase in cracks to my walls and ceilings and external stucco since the launch frequency has increased. What is the impact to structural integrity of homes built on soft soils from repeated geologic	N-02, N-12

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				shaking from sonic booms equivalent to earthquakes just under the damage threshold? These potential impacts have not been analyzed in the Draft ...Environmental Impact Statement	
Electronic Attachment	Kirkland, Debora	N/A	6	The effects to federally protected whales and marine life breeding off the coast of Baja California in San Ignacio Lagoon in the vicinity of the SpaceX booster landing vessel near Isla Guadalupe have not been thoroughly analyzed. Sonic booms could be impacting the relative breeding success of federally protected and declining whale species. The location of the SpaceX landing vessel near the Isla Guadalupe is in the vicinity of valuable whale breeding habitat. Alternative locations for this landing vessel have not been proposed or analyzed to determine if impacts to breeding whales can be reduced or avoided. Increasing the frequency of SpaceX launches and booster landings will intensify the effects that have not been analyzed. Migratory whales benefit from a combination of international agreements and national laws in various countries they traverse during their migrations. The Marine mammal Protection Act prohibits the taking of any marine mammal by a U.S. citizen on the high seas. The Draft Environmental Impact Statement does not address nor analyze these effects or present alternatives to the proposed action that would reduce or eliminate these impacts to migratory marine mammals.	BI-02; SpaceX recovery operations are coordinated with NMFS under the Marine Mammal Protection Act. SpaceX reports all landing locations to NMFS annually. No recovery activities would occur within 12 nm of islands. Additionally, San Ignacio Lagoon is approximately 350 miles from where most downrange landing locations have occurred and would continue to be concentrated (around Isla Guadalupe off the coast of Baja California). The entire Proposed Action recovery area that the DAF completed consultation on with NMFS is included in the EIS as Figure 2.1-3. Appendix C of the EIS includes the NMFS Section 7 consultation and Letter of Concurrence (LOC).
Electronic Attachment	Kirkland, Debora	N/A	7	Not only can the Department of Defense and National Aeronautics and Space Administration activities be achieved at other alternative locations, SpaceX can also achieve low level orbit at the desired latitude from alternative locations, such as Eielson Air Force Base in Alaska. The use of this alternative site to meet	PN-03

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				the purpose and need of the action was not included or analyzed in the Draft Environmental Impact Statement.	
Electronic Attachment	Kirkland, Debora	N/A	8	There was no alternative presented to increase launches by a lower number and frequency than the level in the proposed action. A lower level of increase is a reasonable alternative that was not presented and analyzed in the Draft Environmental Impact Statement.	PN-02
Electronic Attachment	Kirkland, Debora	N/A	9	As stated above, alternative locations for the SpaceX booster landing vessel near whale breeding habitat in Baja California have not been presented or analyzed.	BI-02; SpaceX recovery operations are coordinated with NMFS under the Marine Mammal Protection Act. SpaceX reports all landing locations to NMFS annually. No recovery activities would occur within 12 nm of islands. Additionally, San Ignacio Lagoon is approximately 350 miles from where most downrange landing locations have occurred and would continue to be concentrated (around Isla Guadalupe off the coast of Baja California). The entire Proposed Action recovery area that the DAF completed consultation on with NMFS is included in the EIS as Figure 2.1-3. Appendix C of the EIS includes the NMFS Section 7 consultation and LOC.
Electronic Form	Knapp, Denise	N/A	1	50 launches per year are already too many, and I oppose the increase to 100 (support the no action alternative). The launches are highly disruptive to local and regional residents, with loud booms in the middle of the night scaring people and pets, and rattling houses to the point of cracking. It is also threatening the health of marine mammals, causing chronic stress, injury, and premature births.	BI-01, N-01, N-02
Electronic Form	Knaub, Tabitha	N/A	1	I am wholeheartedly against expanding the amount of launches at Vandenberg. The sonic booms that occur very often already shake our house, scare our children and cause local dogs to bark and howl. I am	BI-04, N-08

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				concerned what this has done to our local wildlife, especially birds. Please do not approve this proposal. Thank you	
Oral Comment Santa Barbara	Knox-Burns, Lisa	Housing Authority of the County of Santa Barbara	1	I'm particularly concerned with the socioeconomic aspects of the EIS. I feel that conclusionary. In other words, they don't state how they got to the rationale that no additional workforce would be necessary outside of the local workforce, which I believe that they would be having to bring in labor union people to do the expert work. And I believe that that might cause a rise in rents, and we have a difficulty as it is in placing our tenants in Section 8 units.	SE-01
Oral Comment Santa Barbara	Knox-Burns, Lisa	Housing Authority of the County of Santa Barbara	2	Secondarily, we have tenants who live in structures that are not soundproof, do not have double-paned windows, and I believe that their enjoyment and really their safe state of mind might be affected by all the noise, especially in the area of, I believe it's the western side of Lompoc, southwestern side of Lompoc where we have a pretty high concentration of housing units that were actually built by the Housing Authority and may cost additional expense. So we'd like to be looking to towards mitigation. If we have complaints or if our tenants are unhappy, we might need some sound mitigation funds as a mitigation.	SE-02
Electronic Form	Koppel, Cara	N/A	1	I am strongly opposed to more frequent launches taking place on our coast. The sonic booms have often negatively affected me as well as my pets. The effects on the environment and important Indigenous sites and animal and human population need to be taken into more careful consideration. The ever increasing number of satellites which I can see orbiting our night skies is truly depressing and concerning. The well-documented negative and harmful effects that the launches are having on the	BI-01, CR-01

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				California Coastal pinniped population are deeply disturbing and concerning to me. It is our obligation to protect the environment, Earth and our planet's inhabitants. Ever increasing rocket launches are not without harmful effects and need to be taken seriously. I am in support of the NO ACTION ALTERNATIVE. The idea of doubling the launch schedule is horribly upsetting to me and I feel that the current rate of activity is detrimental enough. Find somewhere other than the magnificent and delicate California Coast to launch your rockets from.	
Oral Comment Santa Barbara	Krieger, Lyn	N/A	1	I think first that you are dramatically understating the noise impacts of this project. Going from about a dozen to 150 launches, including adding (indiscernible), will make some of our neighborhoods virtually unlivable. My house is neither fragile nor brittle, and the shaking of the windows, the rattling, it feels like a pretty healthy earthquake is happening at our house. So no, that is not something easy to live with.	N-09
Oral Comment Santa Barbara	Krieger, Lyn	N/A	2	I know you're nearing the end of the process, but the outreach clearly could have been a little broader, and that raises concerns.	NP-02
Mailed	Krieger et al., Lyn	Santa Barbara Neighbors	1	The EIS summary, page 3, states that "With the increased launch cadence, the increased instances of ascent noise and sonic booms may increase human annoyance in affected communities, but are projected to remain within community noise thresholds for areas outside of VSFb." (emphasis added) We beg to differ. We do not believe the noise resulting from the launches is within community noise thresholds now. The EIS summary further states	N-02, N-10

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				that "lightweight or brittle building elements in poor condition, such as windows or plaster, could experience damage." Testimony at the June 11, 2025 meeting in Santa Barbara included comments that made it clear that the housing affected is not in poor condition, and still has suffered tremors and some limited damage under the current program.	
Mailed	Krieger et al., Lyn	Santa Barbara Neighbors	2	Even if you track the launch calendar, you cannot predict which of these launches will be of the most difficult type.	N-07
Mailed	Krieger et al., Lyn	Santa Barbara Neighbors	3	This does not include the impact of the addition of one million cubic yard of CO2 into our atmosphere, and its long-term effect.	AQ-05
Mailed	Krieger et al., Lyn	Santa Barbara Neighbors	4	It is unclear what "measures" might be adopted to deal with launch noise or sonic booms. Further, the effect of the noise related to launches on pets, local birds and mammals should not be ignored.	BI-04, N-05
Mailed	Krieger et al., Lyn	Santa Barbara Neighbors	5	While many launches occur successfully, some do not. Accidents are to be expected. We hear about them regularly in other locations. What happens to the debris from an unsuccessful launch that leaves the pad, but does not make the trajectory? Some of the launches go directly over us, or nearby. A failure with debris falling in residential areas would be a tragedy. And the risk in our area is not just of damage to houses or injury to people - we live in an extreme high fire zone. Any hot or burning debris could easily result in disaster. We have experienced this in the recent past, and are careful to minimize risk around our homes and neighborhoods. Given a projection of 100 launches per year, some with newer rocket models, raises concern about the potential for failure and debris.	S-01, S-02, T-02
Mailed	Krieger et al., Lyn	Santa Barbara Neighbors	6	We question how much of the expanded launch capacity is for the sole benefit of the US Government,	PN-01

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				and how much is for the independent operations/expansion of Space X or other "commercial needs."	
Electronic Form	Lang, Rachel	N/A	1	To Whom it May Concern: I serve as an Ojai City Councilmember and Mayor Pro Tem. The City of Ojai has officially submitted comments on the Draft Environmental Impact Statement (EIS) for the proposed Falcon Launch Program at Vandenberg Space Force Base. While I stand by our city's letter as a representative of outraged constituents, I am writing to you as a concerned citizen. While I understand the importance of space exploration, I am deeply concerned about the local impacts of increased rocket launches. My concerns include: 1. Excessive noise and sonic booms affecting homes, schools, and wildlife. Our community members talk of home settling and cracks. We've noticed it in our walls and sidewalks. 2. Degradation of air and water quality from launch emissions and debris. We have been proactive in implementing policies that protect our environment, and we would not want our efforts to be thwarted by an increase in launches. 3. Risks to marine ecosystems and protected species. 4. Inadequate emergency response planning. We saw what happened with the launch failure in Texas. We are concerned about similar issues happening here. 5. Hazardous waste without proper public oversight. Space debris is clouding our atmosphere. I'm deeply concerned about the effect to the atmosphere as well as the unknown effects down the road. I'm concerned that we're doing to the skies what we've done to our oceans. Climate change is already wreaking havoc on the Earth. We live in a fire-prone area and feel the effects firsthand in our warming temperatures. We need more guardrails up for commercial rocket	AQ-03, BI-04, N-07, S-02, HM-01; The request to perform water quality monitoring in the City of Ojai is not commensurate with the action. Speculative impacts are outside the scope of NEPA.

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				launches and space initiatives to slow down the rapid acceleration of climate chaos. I urge you to either select the no additional launches option or implement stronger protections for our community and environment. I also request: 1. Air and water monitoring stations within city limits. 2. A launch notification system for residents. 3. Clear emergency coordination with our first responders. 4. Wildlife and habitat protection measures 5. Transparent waste and risk management plans. Thank you for accepting my comment and hearing my deep concerns. Sincerely, Rachel Lang, City of Ojai	
Electronic Form	Lawless, Jasmine	Defend Them All Foundation	1	Comment in PDF.	See responses to J. Alexis of Defend Them All Foundation substantive comments above
Electronic Form	Lee, Linda	N/A	1	PUBLIC COMMENT ON LAUNCHES AT VSFB I wish to voice my opposition to increased launches from Vandenberg Space Force Base. As a property owner in Lompoc (since 1981) I have experienced a good deal of launch activity over the years. When I bought my property there were only a handful of launches per year. These launches were to put reconnaissance satellites into orbit and to test Minuteman missile reliability missions of vital importance to national security. Because the launches were so infrequent, the hazards posed to residents of Lompoc and surrounding areas were minimal and, on my part, acceptable. The hazards that concern me are: Degradation of Air Quality: by gases, etc. from launch vehicles Property Damage: from earth shaking Noise: mental and physical stress caused by sonic boom following some launches and general noise from the launches that are not associated with sonic boom. My property has sustained a good deal of fractures to the foundation and walls and I believe some of this deterioration is due to the increased launches from	AQ-02, N-02, N-08

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				VSFB. The frequency of fractures has increased in concert with launch activity. Every time there is a launch my windows rattle, the house shakes, dogs bark and normal peace and quiet is disrupted. As a resident of Lompoc the prospect of increasing this activity to an even greater level is totally unacceptable. I sincerely hope that the federal government can find an additional location from which to launch its satellites and/or space needs. VSFB should be reserved for what has been its traditional service: launching reconnaissance satellites and testing Minuteman missile capability.	
Oral Comment Santa Barbara	Lehmann, Eric	N/A	1	Increased rocket launches require increased liquid oxygen storage for propellant. I ask that the Space Force review safe liquid oxygen storage plans and emergency measures to prevent a conflict catastrophe, especially in the event of a major earthquake, which we're kind of due for.	The DAF and SpaceX comply with all pertinent federal, state, and local laws and regulations, and applicable DAF and SLD 30 plans would govern all actions associated with implementing the Proposed Action and would minimize the potential for significant impacts. SpaceX implements an Emergency Response Plan per the SLD 30 Installation Management Plan. This Plan ensures that adequate and appropriate guidance, policies, and protocols regarding hazardous material incidents and associated emergency response are available to and followed by all installation personnel and commercial entities. Launch commodities such as RP-1 and liquid oxygen are routinely used at VSFB for operations and are managed and stored under existing safety protocols, which include secondary containment and established response procedures for accidental releases or emergencies. Emergency response planning includes the installation of fire detection and suppression systems, remote monitoring, and emergency shutoff valves. Specific design and siting of new tanks at SLC-6

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					would consider safety criteria to mitigate risk.
Electronic Form	Lever, Jess	N/A	1	The noise is not a nuisance and it is not due to old buildings. We live in a new Rice Ranch house and the sound oscillates the windows, so the government saying it is simply a nuisance is a cop out. If the government wants to make more money by allowing private space flight, the government and private company must contribute back to the community. Right now, VSFB encourages it's members to live on base and shop on base at the commissary and BX, as a result it is an enclosed community where tax dollars are not even contributing to the community. They have their own schools on base and rarely interact with the community unless it is to try to force through more launches. VSFB has never build or contributed to Lompoc or Orcutt parks, fields, or tried to increase the overall living quality of the area, they focus on more launches, forcing through increased launches, and living within their base community. If they want more launches, they should be forced to contribute to increasing property/quality of life values that are diminishing with more launches. Force them to pay for more orcutt community trails, more parks, etc. Not just benefiting on base amenities.	SE-03
Electronic Form	Lewis, Heather	N/A	1	Please do not increase launches and please do not add the Falcon Heavy launches. These launches shake the walls of my home. What studies are being done on the impact of repeated shaking to home/structures? The shaking also triggers anxiety I have from earthquakes. The sonic booms from the launches wake my small children. There are so many negative impacts to the people who live here; increasing launches in such a populated area should not be allowed.	N-01, N-08, N-09
Mailed	Lodge, Ryan	Central Coast	1	The effect of drought conditions on water resources	As discussed in Section 3.7 of the EIS, VSFB

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
		Regional Water Quality Control Board		at VSFB must be accounted for. Specifically, the evaluation of water supply and water use must account for VSFB's reliance on the four water wells in the San Antonio Creek Basin during multiple consecutive drought years. During multiple consecutive drought years (sometimes up to seven years in a row), State Water deliveries to VSFB can be reduced by about 50% on an annual basis, during which time reliance on the four water supply wells is significantly increased from just two to three weeks a year to most months in a (prolonged) drought year.	obtains water through a combination of deliveries from the SWP and four on-base wells located within the San Antonio Creek Groundwater Basin. The EIS recognizes that during periods of reduced SWP availability, reliance on groundwater pumping increases, especially in prolonged drought conditions. While the maximum annual water demand from the Proposed Action is estimated at approximately 21 million gallons, this represents a small fraction of VSFB's permitted groundwater extraction capacity and basin-wide sustainable yield. Nonetheless, the DAF continues to coordinate with the Santa Barbara County Groundwater Sustainability Agency to remain in compliance with the Sustainable Groundwater Management Act and the GSP for the San Antonio Creek Basin, including ongoing monitoring of groundwater levels and indicators of overdraft, such as subsidence or saltwater intrusion.
Mailed	Lodge, Ryan	Central Coast Regional Water Quality Control Board	2	The area west of the Barka Slough, including 8.5 miles of San Antonio Creek and estuary at the edge of the Pacific Ocean, must be accounted for in the water use evaluation and the effect on the water levels and flow rates. It is not clear if the personal communication cited above accounted for these areas when arriving at the water level and flow rate conclusion stated in Section 3.7.2.1.1. The San Antonio Creek Valley Basin5 (i.e., Basin 3-014 in Bulletin 1186) as defined by the San Antonio Basin Groundwater Sustainability Agency (GSA) and the California Department of Water Resources (DWR) stops at the western edge of the Barka Slough. Basin 3-014 as defined by these agencies does not include the western most 8.5 miles7 of San Antonio Creek, nor does it include the estuary adjacent to the Pacific Ocean. Similarly, the	WR-06

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				groundwater basin modeling described in United States Geologic Survey (USGS) Scientific Investigations Report 2022-5001 Hydrogeologic Characterization of the San Antonio Creek Valley Watershed (Cromwell et.al., 2022)8 ends at the western edge of the Barka Slough and does not specifically model groundwater and surface water conditions in the 8.5 miles of San Antonio Creek between the Barka Slough and the Pacific Ocean. Any San Antonio Creek Basin groundwater-related evaluation performed in the EIS solely based on Basin Number 3-014, as defined in Bulletin 118, should be reevaluated as it is would not account for potential effects on down-stream habitat in the western-most 8.5 miles of San Antonio Creek that supports special status species (e.g., tidewater goby, unarmored threespined stickleback, as listed in EIS Table 3.5-8).	
Mailed	Lodge, Ryan	Central Coast Regional Water Quality Control Board	3	The EIS must evaluate potential water resource effects (accounting for diminished water deliveries by the state water system, and diminished groundwater basin recharge) from prolonged drought and water withdrawal from VSFB's four wells in the Barka Slough portion of the San Antonio Creek Valley basin 3-014 and the potential effects on the western-most 8.5 miles of San Antonio Creek. To account for the conditions listed above, the following sections in the draft EIS should be reviewed and modified, as necessary: a) Summary Sections S.3.1.5, Water Resources, and S.3.1.9, Utilities (i.e., editing may be needed). b) Section 3.11.2.4, Cumulative Effects (i.e., fire hydrant flush water conservation might not have a one-to-one relationship with water availability for launches). c) Section 2.1.2.6, Water Use (i.e., mention prolonged droughts in California/the southwest U.S.). d) Section 2.1.7, SLC-6 Modifications (i.e., Central	WR-03, WR-06; The approximately 22 million gallons/year that American Water Operations & Maintenance is saving by re-introducing potable water into the system during fire-hydrant flushing instead of disposing of the water in storm drains is not meant to be a mitigation for the Proposed Action, but to highlight that SLD 30 is actively working to conserve water where possible, which helps offset increases in demand across VSFB. However, this volume of water is approximately equal to the annual volume of water that would be used under the Proposed Action.

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				Coast Water Board request that a water reclamation/recycling system be constructed for launch wastewater at SLC-6, and if feasible, at SLC-4). e) Section 3.5.2.1.2, Wildlife Resources (i.e., the effects on wildlife within all of San Antonio Creek, including the western 8.5 miles beyond the Barka Slough leading to the Pacific Ocean, must be evaluated to account for VSFB's reliance on the four groundwater supply wells during prolonged drought periods). f) Section 3.7.1.4, Groundwater (i.e., update title from Ground Water to Groundwater, revise this section needs to clarify if the evaluation is based on the San Antonio Creek Valley Basin 3.014, or if it also includes the San Antonio Creek corridor from the Barka Slough to the Pacific Ocean). g) Section 3.7.2.1.1 Surface Water (i.e., update the last paragraph).	
Mailed	Lodge, Ryan	Central Coast Regional Water Quality Control Board	4	Sections 2.1.7 and 3.11.2.1 – Sections 2.1.7 and 3.11.2.1 indicate that a water reclamation system may be used to pump residual deluge water back into storage tanks. The Central Coast Water Board recommends that the launch water be reclaimed/recycled based on the following: a) The spray field at SLC-4 is currently at its maximum capacity as 2 out of 4 percolation tests conducted in 2025 failed. This 50% failure rate is representative of the spray field capacity with a 50 launch per year cadence. Increasing the launch cadence at SLC-4 from 50 launches per year to 95 launches per year will likely overwhelm the current launch wastewater/stormwater spray field at SLC-4. b) The soil in the SLC-6 area has limited percolation capacity compared to SLC-4. This understanding is based on drilling conducted in 2012 that encountered clayey sediments interbedded with silty sands, and bedrock	To clarify, there would not be 95 launches from SLC-4, an example scenario of the breakdown in cadence and estimated launch schedule between SLC-4 and SLC-6 is included in Table 2.1-1 of the EIS. However, the interpretation of the 2025 percolation test results as 50% failure is not accurate. SpaceX operations at SLC-4 do not overcome the spray field system and personnel have never observed ponding within the spray field. There is no anticipated limitation to the SLC-4 spray field capabilities under the increased launch cadence with the systems current rating. The EIS recognizes the importance of long-term water resource management and includes consideration of a water reclamation system at SLC-6 to support sustainability goals and accommodate increased launch cadence. In July 2025, SpaceX installed a water cooled diverter

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				typically encountered at 25 to 30 feet with the exception of one boring to 60 feet below ground surface where bedrock was not encountered, but groundwater was encountered at 54.5 feet below ground surface (site SA647, temporary well I-647-HB03).9 Soils are generally more coarse-grained and groundwater is deeper at SLC-4 than at SLC-6. c) Conserving water via reclamation/recycling will be needed in the long term due to the increased launch cadence at VSFB associated with the U.S. government National Security Space Launch (NSSL) and Assured Access to Space (AATS) Programs. The NSSL and AATS Programs intend to add United Launch Alliance (ULA) launches from SLC-3E, Blue Origin launches, and launches by other smaller companies.	system at SLC-4 with a 32,000 gallon tank to enable pumping water collected in the flame trench back to recycle for the next launch. The DAF is committed to ongoing evaluation of water reuse opportunities and will continue to coordinate with the Central Coast Regional Water Quality Control Board to ensure regulatory compliance. The DAF will continue to coordinate with the Central Coast Water Board and SpaceX on permitting requirements and infrastructure improvements, including the potential implementation of water recycling systems where feasible, to ensure that deluge and stormwater management practices remain protective of groundwater and surface water quality. No changes to the impact conclusions in the EIS are necessary, but this input will be considered in ongoing design and permitting for water management systems at VSFB.
Mailed	Lodge, Ryan	Central Coast Regional Water Quality Control Board	5	Section 3.7.2.1.1, page 3-87 – The heat and water emitted from launches can impact the nearby landscape and should not be underestimated. Circa 2011, Central Coast Water Board staff recalls a burn scar in the SLC-6 vegetation on the south side of the "south drainage" as defined in the Draft EIS and shown in Figure 3.7-1 and at the time it was believed to be from a fire started by a Delta Heavy launch. This suggests that there will be impacts from the launch at the ground level in the south drainage at SLC-6. Additionally, at SLC-4 there is significant erosion on the downslope (south) from the deluge channel/retention basin related hard-scape and into Spring Canyon. This erosion appears to be from the high-temperature steam impacting vegetation that if present would stabilize the soil. There may or may	The Delta IV Heavy rocket, which previously launched from SLC-6, is a different vehicle that would ignite before liftoff by the design of the liquid hydrogen-liquid oxygen RS-68 engine. While the burn scar does not necessarily indicate there would be impacts at the ground level in the south drainage at SLC-6 from Falcon launches, the DAF and SpaceX will continue to implement vegetation management and fire risk reduction measures, including the maintenance of firebreaks and coordination with local fire response agencies. While there is no overland deluge water flow into Spring Canyon under current operations at SLC-4, the erosion is acknowledged and the DAF and SpaceX are currently working to stabilize the soil.

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				not be overland wastewater flow from launch events that is resulting in the observed erosion, but it is readily apparent that there is erosion in this area specific to launches.	
Mailed	Lodge, Ryan	Central Coast Regional Water Quality Control Board	6	Section 3.7.1.5, page 3-84 – Based on a review of aerial imagery and the topography relationships observed, the SLC-6 area of wet soil conditions identified as a “seep” at the dirt access road appears to be present due to the adjacent cut slope intersecting shallow groundwater. This suggests that the cut slope on the east side of the proposed landing pad may also intersect shallow groundwater. Central Coast Water Board staff recommend that the proposed landing pad’s cut slopes to the east be designed to account for intersecting with shallow groundwater.	SLC-6 landing zone design will take into consideration the seep and intersection with groundwater.
Mailed	Lodge, Ryan	Central Coast Regional Water Quality Control Board	7	The EIS should consider the increased launch cadence’s impact on the Air Force Civil Engineering Center’s (AFCEC) Installation Restoration Program (IRP) contractors that conduct ground-intrusive site assessment and contamination cleanup actions at VSFB as funded by the federal Defense Environmental Restoration Account (DERA), contracted by Army Corps of Engineers/AFCEC, overseen by VSFB-based IRP staff, and with State oversight from the California Department of Toxic Substances Control (DTSC) and Central Coast Water Board. It is our understanding that ground-intrusive work (e.g., drilling soil borings, drilling/installing monitoring wells, excavating soil, etc.) is sometimes prohibited, especially near utilities, at VSFB in the hours leading up to launch windows, and in other instances equipment and personnel evacuation is required if within protective envelopes associated with certain launches. These prohibitions and requirements can limit the workhours and	The DAF conducts NEPA for all projects and the IRP staff are part of this process. DAF and SpaceX will continue to coordinate with IRP contractors to ensure access and remediation activities can occur.

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				workdays available to conduct necessary/contracted IRP-related ground-intrusive work, especially if the cumulative launch cadence is on the order of 100 launches per year. In addition, SpaceX and DAF must continue to coordinate with IRP contractors, allowing access and asset/well protection for required groundwater monitoring and remediation activities to continue at IRP site WP008, where legacy trichloroethene (TCE) and perchlorate releases overlap with SLC-4's footprint.	
Mailed	Lodge, Ryan	Central Coast Regional Water Quality Control Board	8	It should be noted that private lessees performing launches at SLC-6 will need to obtain a wastewater discharge permit from the Central Coast Water Board for future launch wastewater discharge events.	SpaceX would obtain the required wastewater discharge permit for SLC-6 from the Central Coast Regional Water Quality Control Board as noted in Section 3.7.2.1.1 of the EIS, and discharges would be managed per enrollment conditions. The DAF will continue to ensure that all launch operators on VSFb comply with applicable federal and state environmental requirements. The DAF values the ongoing collaboration with the Central Coast Water Board in evaluating and mitigating potential water quality impacts of launch operations at VSFb. Your agency's recommendations are instrumental in shaping environmentally responsible infrastructure and operational practices. The DAF welcomes the opportunity to continue discussions on permitting and adaptive management measures.
Mailed	Madeline, Schechter	N/A	1	I am very concerned that the draft EIS doesn't include comprehensive multi-year studies of the impacts of preexisting launches, particularly on endangered species, tourism and recreation, greenhouse gas emissions, and public health and wellbeing.	NP-01
Mailed	Manosar, Gregory	N/A	1	The draft EIS does not include comprehensive multi-year studies of the impacts of preexisting launches, particularly on endangered species, tourism and	NP-01

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				recreation, and public health and wellbeing.	
Mailed	Manosar, Lory	N/A	1	I am concerned that the draft EIS does not include a comprehensive multi-year studies of the impacts of preexisting launches, particularly on the endangered species, tourism, and recreation, green house has emissions and public health and wellbeing.	NP-01
Electronic Form	Marburger, Scot	N/A	1	I only have some concerns related to increasing the launch frequency, and that is noise. Most SpaceX launches rattle windows in my house, and when that happens when I'm trying to sleep I have a hard time getting back to sleep. Pretty much ruins the day after for getting much done. I also have a partner with a dog that lives in Lompoc. The noise from the booster is even louder there, and the dog panics. Its teeth chatter, it shakes all over, and it loses control of its bowels. What a mess. Both of us are also somewhat concerned about contaminants raining down over us, or debris falling off the rockets as they go over. I'm really surprised and disappointed that the flights are permitted so close to residential areas. When flights were only every few weeks this wasn't much of a problem. But now we're seeing multiple flights per week, and it's become a significant quality of life issue. I also worry about negative impacts to the value of my home and property. As a minimum, I would hope that SpaceX would restrict flights from Vandenberg to daylight hours only so as to avoid interrupting people's sleep. If that does not permit enough flights, I would like to see SpaceX use the facilities in Texas and Florida instead. Sincerely, Scot Marburger Orcutt, CA	N-01, S-02, T-02
Electronic Form	Martinez, Richard	N/A	1	Please see attached opposition letter. thank you.	See responses to R. Martinez substantive comments below
Electronic Attachment	Martinez, Richard	N/A	2	Socioeconomics: The report doesn't specifically address how much the community will benefit versus	N-02, SE-03

Source	Last, First Name	Organization/ Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				how much private interests will benefit and whether the economic cost (damage to property from repetitive launches primarily) will be fully borne by these organizations.	
Electronic Attachment	Martinez, Richard	N/A	3	Launch Safety: Your report fails to address the “low probability” details of a launch failure as its casually listed as extremely low probability. We should learn from the impact of many disasters (BP’s Deepwater Horizon explosion for a recent one) that have potential high impact even as their probability is viewed as remote. I’m quite confident that your base, personnel, contingency plans all document and address risks/procedures associated with launch failures, why is the same not offered to the general public which lives within the same risk vicinity?	S-02
Electronic Attachment	Martinez, Richard	N/A	4	Emergency Preparedness and Evacuation Risks. Launches often require temporary evacuations or shelter-in-place orders. This poses a serious risk for elderly residents who may have mobility issues or require medical equipment and assistance.	S-02
Electronic Attachment	Martinez, Richard	N/A	5	I urge the reviewing authorities to: • Limit the number of annual launches near residential areas and not approve the increase. • Mandate more inclusive environmental and health impact assessments. • Ensure full transparency and public accountability in the permitting process. • Provide mitigation plans for affected residents, especially seniors.	N-08, NP-01
Electronic Form	McCartney, Lindsay	N/A	1	Statement Regarding SpaceX Launch Impacts. City of Ventura I want to bring to your attention an issue that is increasingly affecting the peace and well-being of Ventura residents: the noise and vibration impacts from SpaceX rocket launches. During recent launches, the sound levels and shockwaves have been excessive	N-01, N-07

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				to the point that they shake my home. The vibrations rattle windows, move objects inside, and create a level of noise that is both disruptive and alarming. This is not occasional background noise; it is loud enough to feel intrusive and physically unsettling. While I support innovation and the work being done in space exploration, it should not come at the expense of our community's quality of life. Adding to the concern, these launches are often scheduled very early in the morning, late at night, or on weekends, times when families expect quiet in their homes. A simple 6 a.m. to 10 p.m. noise window is not appropriate for this type of extreme noise and vibration, particularly on weekends when many residents are home. I am asking the City of Ventura to: Investigate whether the current noise and vibration levels from launches are within acceptable limits for residential neighborhoods in Ventura. Engage with SpaceX, Vandenberg Space Force Base, and relevant regulatory agencies to advocate for mitigation measures to protect Ventura residents. Push for guidelines to ensure launches occur only during community-appropriate hours respecting local quiet hour ordinances and avoiding times when the community expects peace, particularly early mornings and weekends. Request better public communication in advance of launches so that residents can be prepared and adjust accordingly. Our community deserves to feel safe and comfortable in our homes and to not be jarred awake or disrupted by industrial-level noise at inappropriate hours. Thank you for your attention to this important quality of life issue.	
Electronic Form	McDowell, Madeline	N/A	1	Space exploration is inevitable. But, lack of attention to those impacted (humans, wildlife) shouldn't be. An increase in launches has and will impact the local	N-02, N-06, N-11

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				populations. An increase in launches should be conditioned on: 1. Constant independent monitoring of the impact of sound and reverberation on humans, property and wildlife 2. A compensation fund for property damage and wildlife loss, 3. Monitoring devices on actual properties to be independently analyzed, e.g., NOT hypothetical modeling. 4. An independent oversight committee including local input and concerned parties 5. An appeal process funded by the commercial party. In conclusion, while space is the next frontier, attention and comprehension of what humans have done to this frontier, Earth, should be a cautionary tale. Thank you. Madeline McDowell	
Mailed	Megan, Cannon	N/A	1	I am very concerned about the unknown consequences of these launches, including potential debris, air and water quality, impacts on local habitats and endangered animals in the sea or land. Please ensure the completion of the multi-year study before going forward.	NP-01
Mailed	Montgomery, Cathenne	N/A	1	. I am concerned that the draft EIS does not include comprehensive multi-year studies of the impacts of pre-existing launches, particularly on endangered species, tourism and recreation, greenhouse gas emissions, and public health and well being	NP-01
Electronic Form	Moore, Elizabeth	N/A	1	Thank you for taking my comments: I do not support an increase of launches at Vandenberg AFB. My reasons are below. Environmental Issues: I believe Space Force must increase the study & monitoring of environmental impacts to public health, marine life, bird populations, and terrestrial ecosystems within the California Floristic Province, a global biodiversity hotspot. Current data collection efforts are insufficient to assess the long-term consequences of launches. Noise Issues: Here in Ojai, almost 100 miles	BI-04, N-11, NP-01

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				away from VAFB I have experienced loud noises, vibrations, and rattling windows due to sonic booms. This noise regularly disrupts my sleep. Sonic booms can startle & potentially harm wildlife, particularly marine mammals like seals and sea lions that breed on nearby islands, and other coastal species. The vibrations and pressure waves generated by sonic booms can disrupt their behaviors, including foraging, breeding, and predator avoidance. There is not enough information or research to fully understand the extent and impact of sonic booms from rocket launches. Jurisdictional Issues: Because the vast majority of SpaceX launches from VSFB are for commercial purposes, SpaceX launches should be subject to separate permitting processes. I am concerned about classifying private activities as federal activities. Thank You.	
Mailed	Moran, Linda	N/A	1	I am concerned that the draft EIS does not include comprehensive multi/year studies. We need to know what the long term effects will be.	NP-01
Electronic Form	Morcroft, Liam	The American Waterway Operators	1	See attached file(s)	See responses provided to P. Schrapen of American Waterway Operators substantive comments below
Electronic Form	Morris, Linda	N/A	1	Each time the sound barrier is broken during a noisy launch at Vandenberg or a reentry over our coastal waters, I am jolted from my chair. My peace of mind is shattered by a thud that could be an earthquake, gunshot, nearby traffic accident, or a body from space striking my house (but is only SpaceX.) That was my thought sequence on April 5, 2025 and on many other occasions. I am only one of MANY in California asking this: And now these launches are to double? True, I could seek out launch schedules to	N-07, N-08

Source	Last, First Name	Organization/ Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				forecast these occurrences, but which of them is likely to disturb? Must I follow the news to see when to expect outrageous disruption? The Concorde was not successful, limited as it was to over-ocean flights and it was retired in 2003, in part because of Sonic booms. What gives Elon Musk's SpaceX the right to our tranquility?	
Electronic Form	Morthole, Carolyn	N/A	1	I support the "NO ACTION ALTERNATIVE". The impact of noise and my house shaking is causing both physical and emotional distress to me and my cancer challenged husband. The cracks in my home have become worse as the number of launches increase. The stress on our communities animals is severe. It takes a lot of time for them to calm down afterwards. Although the number of launches in the middle of the night have decreased, those that continue to happen wake me up and it is difficult to get back to sleep. The lack of sleep has an impact on my entire day. Regardless of what we are told, the majority of the launches are commercial and not military. Commercial enterprises shouldn't be able to prosper at the expense of private citizens. I support the "NO ACTION ALTERNATIVE".	N-01, N-02, N-08, PN-01
Electronic Form	Mowell, Vanessa	N/A	1	To Whom it May Concern, I am writing this in response to the Draft Environmental Impact Statement (EIS) for the proposed Falcon Launch Program at Vandenberg Space Force Base. The proposed increase in rocket launches raises serious concerns for the environment and well-being of our planet and community. My key concerns include: 1. Noise pollution disrupting neighborhoods, schools and wildlife. My family and animals are repeatedly stressed from the sonic booms. 2. Our homes are showing signs of stress from these sonic booms. 3. Air and water quality risks from toxic emissions and launch debris. 4. Emergency response	AQ-02, BI-04, DE-06, HM-01, N-02, N-03, N-08, N-09, S-02

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				challenges in the event of accidents or fires. 5. Impacts on marine ecosystems and endangered species. 6. Hazardous waste, space debris, and long-term environmental health. I urge federal officials to consider the "No Additional Launches" alternative for our health and well-being for all of us and our ecosystems. Sincerely, Vanessa	
Electronic Form	N/A	Muns, Paul	1	Dear DAF, The United States is dependent on the Ports of Long Beach and Los Angeles for a large portion of its necessary exchange of products, especially including Hawaii's shipping dependence. This activity creates a major amount of pollution added to that already produced by the oil refineries nearby in Wilmington. This pollution has been suffered for decades by all of those within miles of these necessary resources. Until this administration took over, reasonable and logical remedies were attempting to be applied to stop the pollution. Now federal funding is being withdrawn for these. The owners of Space X moved its headquarters to Starbase, Texas, to prevent having to pay California taxes. Meanwhile it still has options to launch for multiple other sites. As of 2023, SpaceX operates launch facilities: Cape Canaveral Space Launch Complex 40 (SLC-40), Kennedy Space Center Launch Complex 39A (LC-39A), and Brownsville South Texas Launch Site (Starbase). WHY add to the noise and pollution to an already impacted region when there are other facilities available? Vandenberg is located between San Luis Obispo and Santa Barbara, two major populations with colleges—and you want to risk launches that explode and fly to pieces miles from launch or try landing giant metal structures as big as buildings nearby? The noise from launches can be heard in Long Beach, think what that means to those in the closer cities mentioned above. Consider the	PN-02

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				number and rate of launches, some of which are used as joy rides for billionaires for a self-perpetuating revenue stream (without consideration of any consequences). Sincerely, Paul Muns Resident of Long Beach, California	
Electronic Form	Murdy, Rebecca	N/A	1	To Whom it May Concern, The sound from the sonic booms wakes up me and my family at night, shakes our house, and is incompatible with living in our community. There is plenty of evidence to support the physiologic harm of loud noise to human health including hearing loss, sleep disruption, stress, cardiovascular disease, and cognitive impairment. That is why the EPA (Environmental Protection Agency) has set Maximum Permissible Sound Level Readings for motorcycles at 80 decibels and also why supersonic jets were banned in 1973, after the US Navy received 40,000 complaints about the negative impact of the loud sonic booms. Given this, I have the following feedback and requests for your consideration. 1. Use the appropriate measurement standard for Sonic Booms, shifting from an FAA/OSHA average to an EPA standard of Maximum Permissible Sound Level Reading. It makes no sense that Vandenberg is measured according to FAA/OSHA standards, which were intended for average noise thresholds over extended periods of time in communities facing sustained air traffic noise. If a sound as loud as a gunshot wakes you up in the middle of the night in a startled panic, it is nonsensical to average or spread out that impact over the subsequent 24 hours. 2. Implement a Best Management Practice that all launches should follow a Dog Leg trajectory, sending the sonic boom carpet over the ocean before launching into orbit, rather than directly over communities. It may lead to smaller	N-01, N-02, N-08, N-10, N-11, T-01; The EPA's Maximum Permissible Sound Levels are not specifically applicable to rocket launches or impulsive noise events, and were primarily developed for continuous community noise sources such as highways and aircraft operations.

Source	Last, First Name	Organization/ Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				payloads and cost more money, but this will reduce the physiologic and emotional impact of the noise on human communities. 3. Initiate prospective community-based research on the human impact of sonic booms for individuals living within the boom carpet. This could include distribution of ANSI type 1 sound meters to individual homes or a collaborative study with Kent Gee from BYU who is already studying acoustic impact of SpaceX launches in other communities. Thank you, Rebecca	
Electronic Form	Norton, Doug	N/A	1	Hello! Thanks for providing an accessible way to comment. The Draft Environmental Impact Statement, S.3.1.4 Marine Biological Resources, includes " Through decades of monitoring and collaboration with NMFS, there are generally no substantial behavioral disruptions or anything more than temporary affects to the number of pinnipeds hauled out on VSFB and the Northern Channel Islands. " Whichever procedures are used to conclude "no behavioral disruptions" and "temporary affects" should be applied to the Carpinteria Seal Rookery. During my time volunteering for Carpinteria Seal Watch, I have seen nursing seals flushed to the ocean in response to sonic booms. I believe another volunteer has provided videos of this behavior. Causing a flush to the ocean is especially important while seals are mating, nursing, molting; typically from December through May. There is a documented decline in seal population in Carpinteria from the past 30-ish years. Sonic booms are one of the suspects for this change, depriving seals time to rest from hunting, to bond with newly born pups, etc. Basing the real danger to Carpinteria seals (or seals in other locations) by counting seals on the Channel Islands is very flimsy science. I support No Change until	BI-01

Source	Last, First Name	Organization/ Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				effective studies until wildlife affected by the sonic booms is professionally proven to completely with MMPA and NMFS standards. Thanks.	
Electronic Form	Norton, Rebecca	N/A	1	Hello, my name is Rebecca Norton. Im a resident of Carpinteria and an active member of two volunteer organizations Carpinteria Seal Watch and Save Our Seals "which monitor, educate, and advocate for the protection of our local harbor seal colony. Like the Lorax speaks for the trees, I speak for the seals. Since January 2025, our volunteers have documented multiple disturbances to the Carpinteria Bluffs harbor seal rookery, triggered by sonic booms following Falcon 9 rocket launches from Vandenberg Space Force Base (VSFB). Five of these disturbances were captured on video between January and May, and I have shared this documentation with VSFB, the California Coastal Commission, and NOAA. Please see attached document that contains links to these videos and the associated archives of past launches. As defined by NOAA Fisheries, a disturbance in harbor seal behavior is any human or environmental action that causes a noticeable change in natural behaviors particularly resting (hauling out), nursing, or mating. Harbor seals are especially vulnerable during sensitive periods like the pupping season (February-April) and molting season (August-September). Low-frequency vibrations from launches can travel through both land and water, triggering startle responses, anxiety, and energetic stress. These disturbances can lead to: -- Separation of mothers and pups --Smothering or drowning of pups --Disrupted nursing --Suppressed immune function --Pup mortality Over time, repeated disturbances increase the risk of colony abandonment and declines in reproductive success. Volunteers with Carpinteria Seal Watch have tracked	BI-01

Source	Last, First Name	Organization/ Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				a steady decrease in colony numbers in recent years, based on consistent data collected each year between January 1 and May 31. The evidence is clear: Sonic booms from launches are disturbing the harbor seals at Carpinteria Bluffs. Yet, these impacts are not being adequately monitored or mitigated. The Letter of Authorization (LOA) issued by NOAA Fisheries to the Department of the Air Force (DAF) in October 2019, which permits Falcon 9 launches, lacks sufficient monitoring and mitigation provisions. Though the DAF appears to be complying with the terms of the LOA, the requirements themselves are inadequate, especially in terms of assessing impacts on harbor seal populations outside VSFB. There is currently no monitoring at the Carpinteria Bluffs or Channel Islands rookery sites only at VSFB. This raises critical questions: How can we assess the true impact of launches on marine mammals if monitoring occurs at only one site? Who will monitor remote or underfunded sites like the Channel Islands given recent federal budget cuts? Why has Chevron continued to delay granting permission for monitoring at the Carpinteria rookery, and can regulatory agencies pressure Chevron to allow it? These are serious gaps that should have been addressed before NOAA Fisheries issued the Incidental Harassment Authorization (IHA) in 2019, which permits Level B harassment of marine mammals. At the very least, they must be addressed before any additional launches are approved. Thank you for your attention to this matter.	
Oral Comment Santa Barbara	Norton, Rebecca	N/A	2	I'm a resident of Carpinteria and a volunteer with Carpinteria Seal Watch and Save Our Seals, which are two organizations that monitor and advocate for our local harbor seal colony at the Carpinteria Bluffs.	BI-01

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				Carpinteria Seal Watch volunteers have observed a steady decline in seal numbers over several years based on consistent annual data collected by the volunteers from January through May. Despite this evidence, no formal monitoring is being conducted by the DIF at the Carpinteria Channel Island rookeries, only at VSFB. This raises important questions. Number one, how can we measure impacts if monitoring happens at just one site, at Lompoc? Who will monitor remote areas like the Channel Islands amid the current federal budget cuts?	
Oral Comment Santa Barbara	Norton, Rebecca	N/A	3	The letter of authorization issued by NOAA Fisheries in October 2019 permits level B harassment of marina mammals, but it lacks strong requirements for oxide monitoring and mitigation. While the Department of the Air Force does appear to be in compliance with LOA, the terms are insufficient and remain insufficient. These issues should have been addressed before the LOA and IHA were approved, and they must be addressed before any further launches are permitted.	BI-01
Electronic Form	Not Provided, Laura	N/A	1	I am concerned about the current level of launches and I am even more concerned about an increased number of launches. I do not believe that adequate environmental review of this has been conducted and there is not clarity on the impacts on both humans and wildlife and the natural environment. My dog is severely impacted by these launches and has a panic attack every time there is a launch. Approval for more launches should not be granted until there can be a negative declaration of substantial impact on humans and the environment. Moreover, Santa Barbara County and its residents should reap some financial benefit for having to tolerate the disruption caused	N-08, SE-03

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				by these launches, or at least the ones not associated with the federal government but private companies. We should to have to endure negative consequences so that wealthy companies and individuals can become even wealthier without receiving considerable community benefits. The County should receive payment for every launch. However, the main point is that the current level of launches should not increase until the health impacts and environment impacts are thoroughly studies and if there are negative impacts then additional launches by private companies should not be allowed unless they can be mitigated in some reasonable way.	
Electronic Form	Offerman, Steven	N/A	1	The sonic booms shake my house, crack my walls, and disturb my life. I am traumatized by them already, and a substantial increase would be very traumatic to me. Any sonic booms must be kept 100 miles from any city limits. Federal land and our atmosphere should not be used for highly toxic polluting launches for anything other than essential public-serving payloads. No recreational space launches should be allowed. Launches should be minimized, first by preventing existing satellites from falling to earth.	N-02, N-08, N-09
Electronic Form	Okada, Nancy	N/A	1	See pdf. Thank you.	See responses to N. Oakada substantive comments below
Electronic Attachment	Okada, Nancy	N/A	2	Although the federal government states it wants to increase commercial use of VSFB, a government owned and operated facility, specific details regarding the responsibility of each party, including financial agreements and public transparency of commercial operations, need to be stated explicitly in a detailed reference document. That document must include all financial agreements and exchanges between the federal government and commercial contractors, as well as maintenance and security costs borne by the	The roles of the DAF, FAA, and United States Coast Guard (USCG) are clearly described in Section 1.1 of the EIS. SpaceX is the launch service provider. Disclosing financial agreements and exchanges between the federal government and commercial contractors is outside the scope of NEPA.

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				US Government. An annual audit must be done of all commercial and public-related operations and launches from the facility to ensure the public has access to appropriate transparency regarding its investment in the US Space Industry.	
Electronic Attachment	Okada, Nancy	N/A	3	Special accommodations being made for a single contractor is not in the spirit described as “promoting a robust and competitive national space industry”. Other space contractors should have been sought out and included in this proposal, but they were not....This Proposed Action must be developed to meet the requirements of all space contractors interested in providing launch services. Attention must be paid to other US companies who also need facilities. ...In summary, the American people need to have confidence that the US Government will be fair and evaluate all space-related companies. These operations need to be documented, in a transparent fashion, cataloging all commercial and public-related launches that are conducted at VSFB.	U-02
Written Comment Lompoc	Olson, Tom & Grace	N/A	1	We are interested in the public advisory in the differences between sonic booms in the ascending and descending 1st stage as it affects the geographic boundaries of the human population, i.e., when to expect a sonic boom in Lompoc vs Ventura/Santa Barbara.	N-07
Written Comment Lompoc	Olson, Tom & Grace	N/A	2	Given the proposed increased launches, will there be increased frequency of monitoring of marine mammals and birds. Will there be a change of threshold of observed disturbances of species and in turn affect the frequency of future launches.	BI-01, BI-04
Mailed	Olter, Marcia	N/A	1	There must be a comprehensive study of the impact current launches, particularly on endangered species, public health, and tourism.	NP-01
Electronic	Orr et al.,	Audubon	1	Comments electronically submitted in pdf file	See responses to Audubon California, Ventura

Source	Last, First Name	Organization/ Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
Form	Dan	California, Ventura Audubon Society, Santat Barbara Audubon Society		attachment.	Audubon Society, Santat Barbara Audubon Society substantive comments below
Electronic Attachment	Orr et al., Dan	Audubon California, Ventura Audubon Society, Santat Barbara Audubon Society	2	Launch Cadence Transparency. The Draft EIS should include: • The annual and monthly launch requirements necessary to fulfill U.S. Government needs. • A full disclosure of all commercial (non-Government) launches under contract by SpaceX, including Starlink operations. • A commitment by the U.S. Space Force and SpaceX to provide quarterly updates on launch cadence to ensure transparency and support informed planning.	N-07; Thank you for your participation in the NEPA process. To sign up for VSFB launch alerts, visit https://public.govdelivery.com/accounts/USDODSFVANDENBERG/signup/41755 . As described in Chapter 2 of the EIS, the Proposed Action would authorize up to 100 launches of Falcon 9 and Falcon Heavy at both SLCs, combined, per year with Falcon Heavy launches only accounting for up to five times per year from SLC-6. These missions would encompass U.S. Government missions, civil space missions, and commercial payloads such as Starlink. The number of annual launches—and their monthly distribution—is highly variable and dependent on mission readiness, national security needs, orbital windows, and global launch demand. With respect to disclosing U.S. Government launch requirements, many missions—particularly those involving national defense—are classified or subject to operational security constraints and cannot be publicly disclosed in advance. Similarly, commercial launch contracts held by SpaceX, including Starlink, are proprietary business agreements that are not subject to public reporting under NEPA. Regarding the request for quarterly public updates on launch cadence, while the DAF and SpaceX do not publish quarterly

Source	Last, First Name	Organization/ Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
					launch summaries, information about upcoming and completed launches is made available to the public through multiple channels, including: • U.S. Space Force press releases and mission briefings (when available) • SpaceX launch announcements and webcasts • FAA licensing and Notices to Airmen • USCG Launch Area Advisories (LAAs) These mechanisms are designed to balance public awareness with national security, proprietary, and safety considerations.
Electronic Attachment	Orr et al., Dan	Audubon California, Ventura Audubon Society, Santat Barbara Audubon Society	3	Clarification of Launch Objectives. The EIS must clearly distinguish between: • Government-mandated launches (e.g., DOD, NASA, NOAA), and • Commercial endeavors, particularly Starlink, are not a government requirement. This distinction is essential to properly evaluate cumulative impacts and avoid mischaracterizing commercial launches as mission critical.	PN-01
Electronic Attachment	Orr et al., Dan	Audubon California, Ventura Audubon Society, Santat Barbara Audubon Society	4	Coastal Development Permit (CDP): As a private entity, SpaceX should be required to obtain a CDP, ensuring review under the California Coastal Act and appropriate mitigation for environmental impacts.	CO-02
Electronic Attachment	Orr et al., Dan	Audubon California, Ventura Audubon Society, Santat Barbara Audubon Society	5	Mitigation for Sensitive Nesting Sites: The EIS must account for disturbance to nesting habitat from launch activity, including sonic booms, and require mitigation. This should include financial contributions to support monitoring, predator management, and protection during the nesting season.	BI-05

Source	Last, First Name	Organization/ Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
Electronic Attachment	Orr et al., Dan	Audubon California, Ventura Audubon Society, Santat Barbara Audubon Society	6	Support for off-base Site Managers: Nesting sites south of Vandenberg are already under pressure from trespassing, dogs, off-road vehicles, and trash. Site managers are underfunded and lack the capacity to monitor during launch events. The EIS should require mitigation funding from SpaceX to reduce harm from additional disturbances.	BI-04
Electronic Attachment	Orr et al., Dan	Audubon California, Ventura Audubon Society, Santat Barbara Audubon Society	7	Merely promising to develop in light management plan is not enough, and we request any such plan be finalized and vetted by conservationists prior to the installation of any additional lighting.	Under General Measure-2 of the Final USFWS BO (Appendix B of the EIS), the DAF is required to develop a lighting management plan for SLC-6 which will be provided to the USFWS. The SLC-4 lighting management plan is currently being revised. Both management plans will follow BMPs to minimize light pollution and be provided to the USFWS.
Electronic Attachment	Orr et al., Dan	Audubon California, Ventura Audubon Society, Santat Barbara Audubon Society	8	Vandenberg Space Force Base sits within the Western Snowy Plover recovery unit (RU) 5. Based on the 2024 Pacific Coast Distinct Population Segment of Western Snowy Plover 5-year review, RU5 continues to hold the highest number of Western Snowy Plovers out of the 6 regional units ³ . However, since the 2019 Review, breeding adults counted during the breeding window have declined. The 2024 Review describes threats that Western Snowy Plovers are faced with which include increased rocket launches from spacecraft. The Review states, "During the terrestrial sonic boom events plovers exhibit stress responses such as hunkering down over the nest or abandoning the nest, which may have resulted in damage to eggs and embryos." Increased nest abandonment was documented in 2023 and trends showed abandonment was higher for sites closer to rocket launches. Increased launches at VSFB, carrying one of the largest Western Snowy Plover colonies along the	As discussed in Section 5.1.9.2 of Appendix B of the EIS, in 2022, 2023, and 2024, there were no significant changes in incubation rates, overall plover abundance, or nest attendance before and after the launches and boost-back events. Rates of nest abandonment were lower in 2024 compared to 2023 when a high abandonment rate was documented for the Surf South beach section closest to SLC-4, which was likely attributed to many high surf and wind events during 2023. Additionally, both hatch rates and abandonment rates were similar among north and south VSFB beaches in 2024. It is unknown whether the damaged eggs were related to launch impacts, other human-related impacts, or a natural event that we were unable to detect. One hypothesis for why an egg would be damaged in the absence of natural damaging events is that the hunker down or flushing behaviors can lead to damage.

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				U.S. West Coast, could have disproportionately negative impacts to the entire range and must be approached with caution. While these impacts and number of launches will be new to California, populations of Piping Plovers in Texas have shown what the potential impacts are when we increase launches. Based on data from Boca Chica, Texas, Piping Plover population occupancy decreased by 54% ² . From the 2024 Review, the RU5 Western Snowy Plover population sits at 676 birds, which is significantly less than the recovery goal of 1200 breeding adults. A drop in population will move us further away from our goal to recover this threatened species.	However, none of the 33 launch noise events monitored in 2023 showed any snowy plover flushing off nests and only 4 snowy plovers were observed to flush during 77 responses to noise events video recorded in 2024, making this explanation unlikely. Although VSFB does not yet have data on how often eggs are damaged under normal (i.e., non-launch) circumstances, it is common that one or more eggs from a successful nest do not hatch. Overall, all the monitoring that has been performed has shown there are no changes in bird abundance, nest attendance, or hatching rates, before and after launches.
Electronic Form	Patchen, Gianna	Sierra Club / Surfrider Foundation	1	Please find the attached comments on behalf of the Surfrider Foundation (Surfrider) and the Sierra Club, including its Santa Barbara-Ventura, Santa Lucia and California Chapters.	See responses to D. Ritzman of the Sierra Club / Surfrider Foundation substantive comments below.
Mailed	Penny, DellaPelle	N/A	1	I am concerned that the draft EIS does not include comprehensive multi-year studies of the impacts of preexisting launches, particularly on endangered species, tourism and recreation, greenhouse gas emissions, and public health and wellbeing.	NP-01
Electronic Form	Posakony, Ann Elizabeth	N/A	1	I am absolutely opposed to the proposal to increase the launches at Vandenberg. I am deeply concerned about the effects of these launches on our air quality, the increase in noise pollution & its long-term effects on people & wildlife (which is unknown), & the almost-certain potential of ocean contamination. I live in an older manufactured home & the constant rattling of my windows, the concussive effects upon the structure of my home, & the terror of my animals are unacceptable. In addition, I'm concerned about something that is never discussed: the addition of more "space junk" to space, with no plans by the	N-02; The purpose of this NEPA review is to evaluate the potential environmental impacts of authorizing up to 100 Falcon launches annually from VSFB rather than an assessment of the orbital and post-launch lifecycle of second stages, interstages, and payload components, which are regulated and reviewed under separate statutory authorities. The Proposed Action analyzes a maximum annual launch cadence, not a specific manifest. The actual number, size, and type of satellites vary by mission and customer, and are subject to change based on national security

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				organizations and companies that perform these launches to retrieve old satellites & to ameliorate the crowding in space. As usual, large organizations & companies are allowed to ride rough-shod over people, animals, & the environment with no accountability & no plans to fix the long-term damage. We the people end up paying the long-term price for the damage from the proposed increased in launches from Vandenberg. I say, "No!"	priorities, commercial contracts, and other factors outside the authorization of the DAF. The EIS focuses on the environmental impacts associated with launch operations, rather than variable, speculative effects of on-orbit payload behavior or atmospheric reentry events, which depend on specific mission profiles and are not uniform across all launches.
Written	Price, Donna Hare	N/A	1	I am concerned that the draft EIS does not include comprehensive multi-year studies of the impacts of preexisting launches.	NP-01
Electronic Form	Purcell, Leslie	N/A	1	Please see attached.	See responses to L. Purcell substantive comments below
Electronic Attachment	Purcell, Leslie	N/A	2	As a resident of Ventura County, I am particularly concerned that most of this County is in serious nonattainment for the eight-hour O3 NAAQS, including areas where the Proposed Action would take place. We do not need more significant air pollutants here, and the DEIS should take these increases as significant, and propose mitigations if the increased launches were to occur. In addition, Los Angeles County, where portions of the proposed action would take place, is in extreme nonattainment for the eight-hour O3 NAAQS, maintenance for CO, nonattainment for Pb, nonattainment for PM2.5, and maintenance for PM10. Similarly, the DEIS should take these increases in LA County as very significant, and propose mitigations if the increased launches were to occur.	AQ-02
Electronic Attachment	Purcell, Leslie	N/A	3	Contrary to the assertion in the DEIS, relating to the CINMS Final EIS (1980), there is not a "preexisting" basis for the number of launches now proposed. The DEIS then refers to the CINMS Final EIS, describing	BI-03

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				“pre-existing activities” (NMFS 2007). Review of the Final Management Plan/Final Environmental Impact Statement for the Channel Islands National Marine Sanctuary, dated November 2008, under 3.5.9 Department of Defense Activities, page 176, shows that a very low number of launches was reviewed. At page 180, the CINMS Final EIS (2008) notes that “(e)leven spacelift operations occurred between 1997, 1998 and 1999.” The proposed large order of magnitude increase in launch activities at Vandenberg cannot be viewed as pre-existing activity in light of the references to the minimal number of launches in the CINMS Final Environmental Statements. Thus, the DEIS should find no “pre-existing basis” for DoD activities within the CINMS protected areas. ...A similar argument can be made in reference to the Chumash National Marine Sanctuary (CHNMS) in terms of the assessment of pre-existing vs. the proposed number of 100 launches. The increased number is at least of a doubling of launches from 2024, which went from 36 to 50 in that year, and now to a proposed 100, a large increase that therefore should not be exempt from serious environmental review as to potential effects.	
Electronic Attachment	Purcell, Leslie	N/A	4	The launches by SpaceX are for private commercial purposes in large part, as well as for US security/defense. What are the percentages of commercial vs. public/US government payloads on the proposed launches? This brings up the question of private commercial vs. public and government interests, as well as liability for the proposed activities of SpaceX on Vandenberg SFB.	PN-01
Electronic Attachment	Purcell, Leslie	N/A	5	Blue whales, an endangered species, generally migrate from June to September along the Southern California coast. Thus, the EIS should consider the	BI-02, BI-07

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				pattern of these species of whale migrations, and in the proposal to increase SpaceX launches, conditions should address the timing of launches in relation to, and consideration of, the whales' migratory patterns, including blue. There are many other whale and marine species that would be affected by the resulting debris in the ocean, if the proposed doubling of SpaceX launches is approved, as well as the noise above and below the water. The DEIS should give to more consideration to the endangered blue whale, the largest animal living on the Earth.	
Electronic Attachment	Purcell, Leslie	N/A	6	Whales, including dolphins, communicate with sound, and the possible interference by noise pollution from launches and sonic booms could have a detrimental effect on their movements, feeding, mating and breeding, etc.	BI-02
Electronic Attachment	Purcell, Leslie	N/A	7	There is documentation of detrimental effects to the harbor seal rookery, particularly during pupping season, at the Carpinteria bluffs from current SpaceX launches. Timing of launches should take into account the seals' pupping season, and avoid such impacts or propose significant mitigations.	BI-01
Electronic Attachment	Purcell, Leslie	N/A	8	The Southern sea otter is discussed in the DEIS, and though effects are admitted to occur from SpaceX launches, more observation and data analysis should be done to protect this species, listed as threatened under the ESA, certainly before the proposed doubling of SpaceX launches occurs. The increase in 2024 from 36 to 50 launches has not yet been fully evaluated.	BI-06
Electronic Attachment	Purcell, Leslie	N/A	9	Increased energy use for these proposed launches is a concern and should be addressed as an overall contributor to climate change. Construction, demolition, grading, trucking and transportation, are	AQ-02

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				among climate impacts that may be shorter term and specific. The proposed 100 launches and related test firings use fuels for energy, create heat, GHGs, and pollution, and should be cumulatively addressed as ongoing sources of climate change. The proposed increase in launches would add ongoing transportation of materials, as well as transportation of personnel, increasing energy use and resulting in pollutants that should be quantified and, if this proposal goes forward, there should be mitigation.	
Electronic Attachment	Purcell, Leslie	N/A	10	The amount of water used in launches for cooling is also a major concern, both for the large amounts used and where the water supply will come from. Local groundwater and the associated creek, as well as the State water project, are given as sources. These sources may be uncertain in the future, and may be aggravated by climate change and drought. Further, the energy to acquire and transport the water for these launches must be accounted for, as well as the energy to cool the heated water after the proposed launches and firings. These amounts of energy and water should have been identified and quantified in the DEIS. This data and the relationship to cumulative climate change impacts should also be addressed in the EIS.	WR-03
Electronic Attachment	Purcell, Leslie	N/A	11	The DEIS fails to consider and address concurrent plans by the US Navy for significant additional training and testing for a period of 7 years offshore in areas that are within, or adjacent to, the region of influence (ROI) for SpaceX launches from Vandenberg. The issue of the Navy increasing its military testing and training offshore, above and below the ocean surface, with manned and unmanned vessels, explosives, etc. will have effects not mentioned in this DEIS, including some onshore	CE-01; The U.S. Navy's Hawaii-California Training and Testing project has been added to the list of foreseeable actions (Table 3.2-3 of the Final EIS) included in the cumulative analyses in the Final EIS.

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				effects to air quality. The suite of environmental concerns that have been raised in comments on the SpaceX DEIS must be considered in light of the potential environmental effects posed by this increase in Navy activities, for example, air and water pollution, energy use and climate effects, effect on cetaceans and other marine life and habitats. Cumulative impacts of both these proposed increased actions, by the Navy and VSFB, must be addressed in order to make a proper evaluation, per NEPA.	
Oral Comment Ventura	Purcell, Leslie	N/A	12	I'm wondering about cumulative effects of what Vandenberg and all these extra space launches would do in conjunction with the Navy's proposed activities. So there's a huge amount of activity that the Navy is proposing and I'm wondering how that's going to coincide and be affected by the Vandenberg launches and marine mammals, the air quality, the water quality, all the effects to habitat that this cumulatively will involve.	CE-01
Electronic Form	Reagan, Janis	N/A	1	I am tired of the LOUD, EARTH-SHAKING Booms! ESPECIALLY THE ONES IN THE NIGHT/EARLY MORNING!!! Please limit the total number of blasts to once or twice a week, and NONE during the hours that most households are sleeping. Thank you for reading this. I hope that something positive comes from the comments.	N-01
Electronic Form	Reimer, Anders	N/A	1	It is my concern that the proposed expanded launches would have significant negative impacts to private property, wildlife wellbeing, water resource use, and general annoyance of residents in Santa Barbara county, Ventura county and surrounding areas. I strongly support the alternative "take no action" option to not authorize any launches. Thank you.	BI-04, N-03, N-09, WR-03
Oral	Reimers,	N/A	1	I didn't see in there was any discussion of one of	S-01, S-02

Source	Last, First Name	Organization/ Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
Comment Lompoc	Sheryl			these missiles re-landing on the ground and ·exploding and setting the entire area on fire.·	
Electronic Attachment	Ritzman, Dan	Sierra Club / Surfrider Foundation	1	Need for More In-Person Public Hearings. The DEIS process did not include public hearings in the City of Santa Maria or any locations in San Luis Obispo County. During the DEIS January 2025 scoping comment period, Sierra Club requested that San Luis Obispo County be included in the DEIS process, however this did not occur, despite the ecological and public health impacts having potential to reach these communities.	NP-03
Electronic Attachment	Ritzman, Dan	Sierra Club / Surfrider Foundation	2	This issue of long-term studies has not been addressed in the most recent DEIS. The Sierra Club and Surfrider continue to urge that a specific focus of the final EIS be to ensure, prior to any further increase in the cadence of launches, that there is sufficient time to collect the data necessary to establish a baseline for the current impacts from recent exponentially increased cadence of SpaceX launches and to include a full discussion of potential mitigation measures for the impacts thereof. The DEIS lacks findings based on long-term, comprehensive studies and analysis of the cumulative impacts from debris, emissions, noise and vibrations (including sonic booms), and other activities on wildlife, human health and the stability of human-made infrastructure, particularly with cumulative impacts of the proposed increased cadence of Falcon 9 and Falcon Heavy launches. The Sierra Club's comments on the NOP urged that "the scope of the EIS should address this admission that there has been insufficient data to assess and properly mitigate the impacts from increasing the launch cadence from 6 to 36 per year, or from 36 to 50 per year." This problem has not been addressed in the DEIS and is now	NP-01

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				proposed to be compounded by a doubling of the last increase in launch cadence to 100 per year.	
Electronic Attachment	Ritzman, Dan	Sierra Club / Surfrider Foundation	3	The DAF conducted informal Section 7 consultation with National Marine Fisheries Service (NMFS), which concurred potential impacts may affect, but are not likely to adversely affect ESA-listed species." Notably, this NMFS concurrence does not encompass southern sea otters, as the DEIS acknowledges the conclusion at DEIS Table 3.5-13 - "Southern Sea Otter: May affect, likely to adversely affect." And again, neither DAF, NMFS, nor USFWS has sufficient data to make such an assurance regarding the disruption by noise and visual disturbance associated with Falcon launches and landings up to 100 times per year, or to conclude that adverse effects on reproductive success, mortality rate, or ability to sustain minimum population levels would result in no significant impacts – particularly with this proposed 100% increase in launches per year. Although reference is made to decades of monitoring by NMFS which showed "no substantial behavioral disruptions," the data is lacking to back up this statement.	BI-05
Electronic Attachment	Ritzman, Dan	Sierra Club / Surfrider Foundation	4	At S3.1.2, no reason is given why sonic booms are estimated only at night, since launches do occur during the day. "Conservatively estimating that all operations occurred at night, the maximum CDNL was estimated at 58.0dBC."	The DAF took a conservative approach to estimating the impact of noise on the local community by evaluating the action as if all operations would occur at night. This is because noise impacts at night are treated as more influential when calculating day-night levels since nighttime noise events are "penalized" 10 dB before being incorporated into community noise level calculations. Thus the community noise level calculations are conservatively high (i.e., the estimated impact on community noise levels are estimated to be greater than if noise events occurred during both the day and night).

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Electronic Attachment	Ritzman, Dan	Sierra Club / Surfrider Foundation	5	The DEIS appears to be in conflict with itself in its analysis of the noise impacts on wildlife from launches, landings, static fire events and demolitions at SLC-6. The EIS should resolve the discrepancy between these two statements: "Wildlife responses to noise can be behavioral or physiological, ranging from mild, such as an increase in heart rate, to more damaging effects on metabolism and hormone balance. Because responses to noise are species specific, exact predictions of the effects on each species are unreliable without data pertaining to the behavioral responsiveness and physiological sensitivity to noise of those species or similar species." (3-63) And: "Individuals that are at SLC-4 or SLC-6 during launch, landing, or static fire events may experience temporary or permanent shifts in hearing thresholds (the range of noise frequencies that species can perceive), depending on the species sensitivity to noise, length of exposure, and the intensity of the noise." (3-64) The DEIS should not equate permanent hearing loss as an impact on a par with an increase in heart rate, metabolism or hormone balance.	BI-04
Electronic Attachment	Ritzman, Dan	Sierra Club / Surfrider Foundation	6	The radius of the unweighted maximum sound level of 130db of the Falcon Heavy rocket engines at takeoff and landing, as mapped at Figure 3.4-6, encompasses coastal habitat and coastal waters off Pt. Arguello. A few seconds of exposure to 130 dB can cause hearing damage or hearing loss in humans. The potential for a similar impact on wildlife is not alleviated by the statement of the DEIS at 3-25, "Falcon Heavy orbital launches at SLC-6 noise events last a few minutes at most, with the highest noise	BI-04

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				levels occurring for less than a minute."	
Electronic Attachment	Ritzman, Dan	Sierra Club / Surfrider Foundation	7	The DEIS concludes at 3-78 that "Extensive launch monitoring of sea otters on VSFB has shown that rocket disturbance is not a primary driver of sea otter behavior or using the habitat along Sudden Flats and has not had any apparent long-term consequences on populations, potentially indicating that this population has acclimated to launch activities." This contrasts with the observation that "if resting otters are disrupted frequently, there may be energetic consequences that could affect fitness and survival of individuals." The doubling of the launch cadence from VSFB will result in frequent disruption. The "extensive launch monitoring of sea otters" has not been conducted at this level of disturbance. Southern sea otters are protected under the Endangered Species Act, Marine Mammal Protection Act and California state law (per the USFWS) and are listed as threatened under the ESA, therefore more consideration must be given to potentially detrimental effects on sea otters and their habitat by the proposed increased launches. In support of the claim that the noise of launches and landings "would be expected to result in minor behavioral response," the EIS cites observations of the startle/dive response of otters off VFSB and the assurance that otters are observed to "resettle" within 30 minutes. (3-77) As such monitoring was not conducted over 100 launches over a 12-month period, and is not sufficient to detect hearing loss, this conclusion is speculative.	BI-06
Electronic Attachment	Ritzman, Dan	Sierra Club / Surfrider Foundation	8	In response to the statement that "Because responses to noise are species specific, exact predictions of the effects on each species are unreliable without data pertaining to the behavioral	BI-01

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				responsiveness and physiological sensitivity to noise of those species or similar species," we note that Harbor seals in Carpinteria are reportedly affected dramatically and detrimentally by launches, which is of particular concern in pupping season. Is there consideration of protection for seals during this sensitive season as part of the proposed increase in the number of launches?	
Electronic Attachment	Ritzman, Dan	Sierra Club / Surfrider Foundation	9	In its discussion of the two new landing pads proposed adjacent to SLC-6, the DEIS states that construction activity at SL-6 includes demolition of an existing structure with dynamite, which "would result in a short impulsive sound, similar to those experienced during first stage landing events at SLC-4. Therefore, C&D activities at SLC-6 would not have a significant impact on the acoustic environment." (S-3) The DEIS does not explain why there would be no significant impact on wildlife in the immediate vicinity of a short impulse sound equivalent to a first stage landing – 140 db – in light of the statement on 3-64 that wildlife "that are at SLC-4 or SLC-6 during launch, landing, or static fire events may experience temporary or permanent shifts in hearing thresholds." Per the DEIS at 3-65, "when any demolition, contouring, or construction occurs at SLC-6, the active construction areas would be surrounded by exclusion fence." Is the DEIS claiming that a construction fence, which presumably will not be present during launches and landings, would be sufficient to exclude wildlife from the area such that potential permanent shifts in hearing thresholds from the demolition-equivalent sounds of launches and landings would be avoided? The impacts from construction, particularly explosive demolition, are understated and need further analysis of impacts.	BI-04

Source	Last, First Name	Organization/ Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
Electronic Attachment	Ritzman, Dan	Sierra Club / Surfrider Foundation	10	Despite acknowledging that marine debris will increase under the Proposed Action, the DEIS fails to meaningfully analyze the cumulative ecological burden of this increase over time—particularly within sensitive marine habitats or for vulnerable species found along California’s coast.	DE-02
Electronic Attachment	Ritzman, Dan	Sierra Club / Surfrider Foundation	11	These human and economic dimensions of marine debris further underscore the inadequacy of the DEIS’s treatment of this issue. The DEIS Fails To Take A Hard Look At The Project’s Substantial Increase In Marine Debris And The Impacts This Will Cause.	DE-02
Electronic Attachment	Ritzman, Dan	Sierra Club / Surfrider Foundation	12	The DEIS fails to conduct an updated, project-specific analysis of the significant marine debris impacts associated with doubling the launch rate at VSFB. The DEIS instead incorporates by reference a 2023 Supplemental Environmental Assessment (2023 SEA) that concluded that 36 launches would not have a significant environmental effect because SpaceX would “attempt to record potential debris where and when practicable” and would “offset” marine debris impacts by participating in the “SLD 30 Adopt-A-Beach Program and conduct quarterly cleanups at Surf Beach.” 2023 SEA at 4-49. DAF’s mere reference to sections of the 2023 SpaceX Supplemental Environmental Assessment, without a new assessment of the potential harms and necessary mitigation, constitutes a failure to take a “hard look” at the Project’s marine debris impacts, as NEPA requires	DE-02, DE-03
Electronic Attachment	Ritzman, Dan	Sierra Club / Surfrider Foundation	13	The 2023 SEA (attached as Exhibit A) provided a cursory analysis of the marine debris impacts of 36 Falcon 9 launches. This analysis is substantially different and insufficient to substitute for the impacts of 100 Falcon 9 and Falcon Heavy launches per year.	DE-02

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				The scale of proposed operations has a significant impact—especially when dealing with marine debris that, by the SEA’s estimate, could result in up to 17,700 pounds of marine debris.	
Electronic Attachment	Ritzman, Dan	Sierra Club / Surfrider Foundation	14	The DEIS ultimately relies on the outdated and inadequate analysis in the 2023 SEA. Specifically, Section 3.4.2.1.1 of the 2024 EA, which the DEIS incorporates by reference, concludes that the potential effects of physical disturbance and impacts by fallen objects, ship strike, entanglement, and ingestion of expended materials on ESA-listed fish would be insignificant. EA at 3-40. However, that conclusion is directly based on Section 4.4.1 of the 2023 SEA.7 The 2023 SEA minimizes risk by asserting that the probability of entanglement or ingestion is “discountable” because most ESA-listed species exist in low densities in the landing zone. SEA at 4-33 to -36. These conclusions are repeated verbatim across species categories—including fish, sea turtles, and cetaceans—without species specific data, meaningful distinctions, or considerations of updated population information. SEA at 4-33 to -36. By adopting the 2024 EA’s conclusions, which themselves rest on the outdated 2023 SEA, the DEIS fails to conduct an updated assessment of the potential cumulative impacts when launch activity doubles.	The DAF initiated Section 7 consultation with the NMFS in 2022 for the potential effects of space launching and landing activities at VSFB on ESA-listed marine species. The DAF’s proposed action included up to 110 launches annually and up to 36 first stage landings. In 2023, NMFS issued a LOC to the DAF that the action may affect, but was not likely to adversely affect specified ESA-listed fish, sea turtles, pinnipeds, and cetaceans occurring within the action area. In 2024, the DAF reinitiated this consultation to increase first stage and booster recoveries to 100 times per year, and expanding the first stage/booster and fairing recovery area in the Pacific Ocean. NMFS issued a LOC in 2024, concurring that the proposed action may affect, but was not likely to adversely affect the specified ESA-listed marine species. These 2023 SEA cites the 2023 LOC and the 2024 EA cites the 2024 LOC. The EIS also cites coverage for ESA-listed marine species under the NMFS 2024 LOC, which covers up to 110 launches per year and up to 100 first stage landings per year. Therefore, the conclusions reached in Section 3.6.2.1 of the EIS are appropriate.
Electronic Attachment	Ritzman, Dan	Sierra Club / Surfrider Foundation	15	The DAF provided no information about the actual amount of marine debris the SpaceX launches caused, how often it was “practicable” for SpaceX to “attempt to recover” marine debris, how much marine debris was recovered, how many beach cleanups SpaceX held, how many people attended those cleanups and how much trash was collected, and how much SpaceX	DE-03

Source	Last, First Name	Organization/ Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				contributed to the California Lost Fishing Gear Recovery Project. Indeed, a 2024 report from the California coastal commission raises serious concerns about the adequacy, transparency, and relevance of SpaceX's marine debris mitigation plan. The mitigation plan, dated 2016, was originally developed to address impacts from failed first-stage landings, not the full suite of launch-related debris such as weather balloons, radiosondes, parafoils, and fairings. It relies on a mitigation ratio of just 0.3 pounds removed for every pound unrecovered, despite admitting that the underlying U.S. Army Corps of Engineers ratio checklist was designed for freshwater impacts, not marine debris in offshore environments. The plan also lacks any adjustment for inflation, meaning that mitigation payments are likely inadequate in today's dollars. ¹⁰ Further, the Coastal Commission found that the DAF provided no information on the total amount of debris SpaceX has deposited in the ocean under the 36-launch program. Without that data, there is no way to evaluate the effectiveness or sufficiency of the proposed mitigation.	
Electronic Attachment	Ritzman, Dan	Sierra Club / Surfrider Foundation	16	Under NEPA, the DAF must take a hard look at the environmental consequences of the project. Relying on a prior, limited analysis created for a smaller launch cadence fails this standard. The environmental impacts of 17,700 pounds of annual marine debris—which is non-biodegradable—cannot simply be dismissed through outdated assumptions.	DE-02

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Electronic Attachment	Ritzman, Dan	Sierra Club / Surfrider Foundation	17	Among these, the release of five weather balloons per launch is especially troubling. DEIS at 2-3. Each balloon is equipped with a radiosonde powered by a 9-volt battery. ¹³ The DAF has failed to provide critical information about the specific components within the radiosondes—components which may include circuit boards containing heavy metals such as lead or mercury, and 9-volt batteries that may contain lithium, nickel, or zinc. This lack of disclosure and analysis regarding the chemical composition and fate of this debris—especially when launched at scale—undermines the DEIS’s conclusion that impacts will be insignificant.	DE-04
Electronic Attachment	Ritzman, Dan	Sierra Club / Surfrider Foundation	18	...the DEIS provides no quantified recovery rates and cites no independent verification of SpaceX’s retrieval efforts. For instance, the DEIS notes that “[m]ission objectives may occasionally require expending the first stage booster in the recovery area in the Pacific Ocean,” allowing it to “sink to the bottom of the ocean.” DEIS at 2-6. But it fails to specify which mission objectives justify this abandonment or how often it will occur—once per year or twenty times? As launch frequency doubles under the Project, even a small percentage of unrecovered materials will accumulate, compounding the marine debris problem over time. Thus, without specific, verifiable data, the DEIS’s claims of limited impact lack credibility.	DE-01, DE-05
Electronic Attachment	Ritzman, Dan	Sierra Club / Surfrider Foundation	19	The DEIS rests on speculative and outdated assumptions about debris recovery and environmental risk, primarily by incorporating and relying on analysis from the 2023 SEA. The 2023 SEA rests on a series of unverified and overly optimistic assumptions regarding debris and environmental risk.	DE-01, DE-02, DE-05, S-01, S-03

Source	Last, First Name	Organization/ Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				It presumes that first stage boosters will break up upon atmospheric re-entry, and that any residual fuel would dissipate harmlessly. It further contends that parachutes, parafoils, radiosondes, and other debris are “inert,” will sink quickly, and will pose negligible risk to ESA-listed marine species. SEA at 4-33 to -37, 4-48 to -49. Yet none of these claims are supported by independently verified recovery data, nor do they account for accumulating impacts over time or the consequences of off-nominal events such as explosions or failed recoveries. These assumptions have been repeatedly contradicted by recent real-world incidents. According to news reports cited below, SpaceX launches have resulted in recognizable debris washing ashore, floating in coastal waters, and falling dangerously close to populated areas. For example: • In Poland, debris from a SpaceX Falcon 9 rocket "made an uncontrolled re-entry into the atmosphere," resulting in a 1.5 meter by one meter (five feet by three feet) chunk landing near the western city of Poznan.¹⁵ The Polish Space Agency later verified that the rocket was part of a Space X Starlink Group launch from Vandenberg Air Force Base. • In Mexico, scientists have reported wreckage from SpaceX’s failed Starship launches is killing wildlife, including dolphins, sea turtles and fish. Mexican President Claudia Sheinbaum has stated that her government is investigating the “security and environmental” effects of SpaceX’s operations, confirming that “there is indeed contamination.” • One of SpaceX’s recent Starship test flights ended in failure, releasing debris into the Indian Ocean due to	

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				a propellant leak. • Most recently, in June 2025, debris believed to be from a SpaceX Starship launch washed ashore in Matamoros, Mexico.20 Conservation groups documented “millions of fragments,” including metal tanks and small components marked with the SpaceX logo. This debris arrived during sea turtle nesting season, raising alarm over the risk of ingestion and entanglement by hatchlings. These incidents underscore the inadequacy of the DEIS’s assumption that recovery can be reliably conducted or that unrecovered debris will sink to the ocean floor. Without verifiable recovery data, enforceable protocols, and contingency plans for debris that escapes recovery efforts, the cumulative impacts on marine and coastal environments are unlikely to be sufficiently mitigated. The failure to update the analysis violates NEPA’s requirements to take a hard-look at environmental consequences. The DAF cannot rely on arbitrary assumptions and outdated information when direct evidence of harm exists.	
Electronic Attachment	Ritzman, Dan	Sierra Club / Surfrider Foundation	20	The DEIS dismisses entanglement and ingestion risks to marine species as negligible, stating they are “not likely [to] be detectable at the population level.” DEIS at 3-80. This standard is unreasonably high and dismisses localized and individual-level harm. For example: • Endangered marine mammals or seabirds entangled in parafoils or parachutes suffer consequences irrespective of whether the overall population is affected. • Marine debris is often mistaken for food by wildlife such as sea turtles, seabirds, and marine mammals.	BI-07

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				Ingestion of marine debris leads to loss of nutrition, internal injury, intestinal blockage, starvation, and death in wildlife. Entanglement affects many different types of animals: 44 species of sea birds, 13 species of cetaceans, 11 species of pinnipeds, 31 species/taxa of invertebrates, 6 species of sea turtles, and a few fish species have been reported entangled in marine debris in the United States. These types of harm must be taken seriously and not brushed aside merely because they are “unlikely to cause population-level effects.”	
Electronic Attachment	Ritzman, Dan	Sierra Club / Surfrider Foundation	21	The DEIS states that Falcon Heavy launches will typically expend the center core booster, which will sink to the ocean floor. DEIS at 2–6. While the impact area may be large, these boosters are sizable and non-biodegradable, and they will increasingly litter benthic ecosystems. This is particularly troubling because: - The DEIS does not evaluate the harm associated with dumping the Falcon Heavy center core into the ocean. - When marine debris accumulates in ocean basins, beaches, estuaries, and other submerged benthic habitats, it can cause reduced light levels in underlying waters, low oxygen levels, and other physical changes or degradation of these habitats. - Habitat degradation due to marine debris has far-reaching impacts on ocean biodiversity since many critical areas, such as coral reefs, mangroves, salt marshes, seagrass beds, and macroalgae serve as breeding grounds or nurseries for nearly all marine species. - The debris may settle in sensitive marine habitats. - Larger-scale effects of marine debris pollution are multifaceted and remain to be fully understood,	DE-03

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				including cumulative impacts to ecosystem goods and services. • Iron debris from unrecovered boosters can cause an overgrowth of cyanobacteria, leading to the formation of algal blooms.²⁷ Cyanobacteria can displace other species and grow to dominate the microbial population in a bloom. Despite these well-documented risks, the DEIS proposes no mitigation measures to address the long-term buildup of debris in marine ecosystems.	
Electronic Attachment	Ritzman, Dan	Sierra Club / Surfrider Foundation	22	The DEIS concludes that increased debris will “not result in significant cumulative effects on marine mammals in the ROI or beyond.” DEIS at 3–80. This conclusion is presented without supporting longitudinal data, despite the acknowledged increase in debris and its potential impacts. Surfrider and the Sierra Club urge the Department of the Air Force and the Federal Aviation Administration to reconsider the Proposed Action in light of its cumulative impact on marine debris and marine ecosystems. At minimum, the DEIS should be revised to: • Quantify expected unrecovered debris over a 5-, 10-, and 20-year period under increased launch cadence. • Require independent monitoring and reporting on marine debris recovery rates. • Explore alternatives or mitigation measures to reduce debris load, including guaranteed recovery protocols.	DE-01, DE-03, DE-05
Electronic Attachment	Ritzman, Dan	Sierra Club / Surfrider Foundation	23	The Ocean Dumping Act, formerly known as the Marine Protection, Research, and Sanctuaries Act, prohibits dumping into the ocean material that would unreasonably degrade or endanger human health or the marine environment. The Ocean Dumping Act requires those who would dump waste into the ocean	The Ocean Dumping Act (33 USC 1401 et seq.) does not apply to the Proposed Action because that law applies to actions taken “for the purpose of” dumping material in the ocean. No part of the Proposed Action is being carried out for the purpose of dumping any material into the ocean:

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				to first receive a permit from the Environmental Protection Agency (EPA) to do so. Ocean Dumping Act regulations state that “no permit will be issued when the dumping would result in a violation of applicable water quality standards.” 40 C.F.R. §227.1(d). The EA fails to demonstrate that dumping space junk in the ocean would not violate water quality standards and that SpaceX could receive a permit for such dumping. Further, EPA will deny an ocean dumping permit where (1) there is no need for the dumping and alternative means of disposal are available; (2) where there are unacceptable adverse effects on esthetic, recreational or economic values, or (3) where there are unacceptable adverse effects on other uses of the ocean. 40 C.F.R. §227.2. Here, there is no need for SpaceX to dump its space junk in the ocean. SpaceX could and should recover the materials it launches into the atmosphere, instead of planning to merely use the ocean as its dumping ground. Allowing SpaceX to dump its space junk in the ocean will have unacceptable adverse effects on esthetic, recreational, and tourism values. Therefore, SpaceX’s plan to dump its space junk in the ocean does not qualify for an Ocean Dumping Permit and, absent a permit, seemingly would not comply with legal requirements imposed by the Ocean Dumping Act.	any unrecovered debris that may end up in the ocean would have gotten there incidental to a Falcon 9 or Falcon Heavy launch.
Electronic Attachment	Ritzman, Dan	Sierra Club / Surfrider Foundation	24	The DEIS inadequately addresses the environmental risks associated with expended Falcon Heavy center core boosters, particularly those that may survive atmospheric re-entry and impact the ocean’s surface with residual propellants. DEIS at 2–6. The DEIS acknowledges that, in rare anomalous situations “when an intentionally expended booster does not break up upon atmospheric reentry,” a residual amount of propellants (RP-1 and LOX) would remain	S-01

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				and may cause an “explosive event” upon impact. DEIS at 2–6. However, it dismisses this risk entirely from analysis, characterizing it as “off-nominal,” “low probability,” and “worst-case.” DEIS at 2–6.	
Electronic Attachment	Ritzman, Dan	Sierra Club / Surfrider Foundation	25	The DEIS fails to take a hard look at the environmental consequences of failed recoveries, explosions, or the dispersion of marine debris from anomalies. The DEIS justifies these omissions by labeling the events as “off-nominal” or of “low probability.” However, under established NEPA case law, “a scenario’s low probability of occurrence does not automatically render it a speculative worst case scenario insulated from further NEPA analysis.” Further, courts have held that NEPA is violated when a catastrophic event is eliminated from consideration based solely on its low probability of occurrence. Other courts have noted that a finding of no significant impact is permissible “only if a grave harm’s probability is so low as to be remote and speculative, or if the combination of probability and harm is sufficiently minimal.” Yet, the DEIS does not sufficiently demonstrate that the probability of an anomaly is so low as to be remote and speculative. Nor is the combination of probability and harm minimal—this is evident from the occurrence in Matamoros, Mexico. The Sierra Club’s NOP comments noted that “SpaceX’s rocket launches have been halted several times in other locations by the FAA due to safety concerns.” And urged that “the EIS should specifically consider the environmental and public health impacts of these operations, including worst case accidents, and require suitable mitigations in the case of launchpad or launch explosions, especially as Vandenberg considers including heavier rockets on site that have not been used in this	S-01, S-02

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				location before.” Since the issuance of the NOP, multiple instances of “rapid unscheduled disassembly” of SpaceX rockets have occurred in January, March, May and June of this year, causing the FAA to divert flights and Orlando International Airport to ground flights. In view of these events, the assertion that “the probability of an off-nominal event is very low” appears to be in need of revision. The requirements of NEPA are not met by the statement that “the effects of an off-nominal event are directly related to the size and type of launch vehicle, as well as the trajectory of the vehicle and location of the event. As a result, effects to health and safety are difficult to anticipate considering the different launch providers, associated vehicles, and launch locations” (3-123). The EIS needs to assess the impacts of such an event involving this specific launch vehicle and launch provider, from this specific location. In doing so, the EIS should include the catastrophic failure of a Long March 3B rocket on Feb. 15,1996, as part of an assessment of the potential effects of a 550-ton rocket with a near full complement of rocket-grade kerosene and liquid oxygen impacting and detonating in the surrounding area. If such analysis limited its evaluation to impacts based on “the trajectory of the vehicle,” it would fail to capture all potential impacts as the LM 3B rocket veered off its trajectory immediately after launch. Nor would the ability of operators to terminate thrust or destroy vehicles that follow non-nominal trajectories mitigate the impacts resulting from the destruction of the vehicle. The consequences of an explosive launch failure could also include injury or death to marine life, contamination of nesting grounds, and the degradation of sensitive marine and	

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				coastal habitats. As stated, these are demonstrated risks that must be assessed under NEPA. Thus, the DAF's failure to analyze the full range of environmental impacts from increased launch cadences—especially under “low probability” or off-nominal scenarios—violates NEPA.	
Electronic Attachment	Ritzman, Dan	Sierra Club / Surfrider Foundation	26	The DEIS provides no quantitative estimate of the likelihood of such an event, nor does it identify any mitigation measures (such as additional vehicle safeguards or emergency containment plans) to address this risk. Without such analysis, the DEIS cannot reasonably conclude that the impact is insignificant merely because the scenario is considered “off-nominal” and of “low probability.	S-02
Electronic Attachment	Ritzman, Dan	Sierra Club / Surfrider Foundation	27	While a single event may be improbable, the proposed doubling of launch frequency means that the cumulative likelihood of off-nominal outcomes increases over time. The DEIS fails to account for how this elevated risk interacts with the rising number of launches, especially given the Falcon Heavy's reliance on expendable center cores.	Expending Falcon Heavy's center core does not inherently increase environmental or public risk, as the mission profile and descent trajectory are fully controlled and assessed during pre-launch planning. The cumulative effects of increased operations were considered in the EIS, and no significant impacts were identified. Modeling the environmental impacts of extremely low-probability events (such as catastrophic failures) is not required under NEPA unless they are reasonably foreseeable. Given the demonstrated reliability of the Falcon launch vehicle, launch anomalies are considered unlikely and too speculative to meaningfully analyze in detail under NEPA.
Electronic Attachment	Ritzman, Dan	Sierra Club / Surfrider Foundation	28	The Proposed Action will negatively impact public access to public trust resources such as beaches and coastal waters for activities including but not limited to recreation, cultural observances, and environmental observation and data collection. These	P-01; Ocean Beach County Park and Surf Beach would be closed a maximum of 12 times per year. Section 3.10.2.1 has been revised to correct the administrative error to be consistent with 12 times per year, not 17.

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				impacts, however, are not properly analyzed or mitigated in the DEIS. The DEIS acknowledges that “impacts on Jalama Beach County Park would result from occasional, temporary evacuation of the public during launch/landing events.” DEIS at 5-6. It further proposes to cap beach closures at 12 times per year for Jalama Beach, and 17 times per year for both Surf Beach and the County of Santa Barbara Ocean Beach—amounting up to 46 days of beach closures annually. DEIS at 3-100. While the DEIS attempts to minimize the significance of these closures by emphasizing their “temporary nature” and the existence of a formal evacuation agreement, it fails to take the required hard look at the direct, indirect, and cumulative impacts these closures impose on the public. DEIS at 3-101. The number of closure days underrepresents the effective loss of access. Public users have to plan around posted closures and are unlikely to attempt a beach visit on a scheduled closure day. If a launch is cancelled the day of a scheduled closure day, the lost recreational opportunity for community members cannot simply be reclaimed, especially for those who scheduled time off work or traveled long distances. The DEIS fails to identify or evaluate any mitigation measures to offset the impacts of beach closures. Merely providing advanced notice is not mitigation. The burden is improperly shifted to the public to navigate uncertain and fluctuating access conditions. The DAF has an obligation under NEPA to evaluate and disclose these impacts and consider feasible alternatives or mitigation strategies, such as limiting closures to off-peak hours or seasons.	

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Electronic Attachment	Ritzman, Dan	Sierra Club / Surfrider Foundation	29	The project would substantially increase SpaceX's water usage at VSFB, with annual consumption rising to approximately 21.1 million gallons (65.6 ac-ft). While the DEIS downplays this impact as "negligible," it fails to assess the broader ecological and regional implications of this increase, especially in the context of California's ongoing drought cycles and strained water infrastructure. DEIS at 3-89. The DEIS fails to adequately assess the environmental impacts of the project's water usage increase, and instead relies on analysis from the 2023 SEA, which evaluated a significantly smaller demand—19.5 ac-ft per year—opposed to the proposed project's 65.6 ac-ft per year. Despite this increase, the DEIS adopts the SEA's conclusion that water usage would be "negligible" and would not result in "measurable impacts." DEIS at 3-89; SEA at 4-43. Moreover, the SEA includes a crucial fact that the DEIS omits altogether: "due to ongoing drought conditions and significant reductions in State water allocations, VSFB will remain on well water from the San Antonio Creek Basin for the foreseeable future." SEA at 3-26. The DEIS not only fails to mention this fact, it also fails to analyze the cumulative impacts of increasing extraction from the San Antonio Creek Basin if the State Water Project continues to have significant reductions, or puts reductions in place again in the future. The DEIS also fails to critically evaluate the potential cumulative impacts on State Water Project (SWP) sources, from which VSFB draws its primary supply. These waters are heavily allocated and under persistent threat from climate change, snowpack decline in the Sierra Nevada, and increased demand from urban and agricultural users.³³ The DEIS's assumption that a 2.3% increase is insignificant fails to account for how	WR-02, WR-03

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				marginal increases in use can become significant at scale—especially as the number of launch cadences continues to increase.	
Electronic Attachment	Ritzman, Dan	Sierra Club / Surfrider Foundation	30	On page 3-79, the DEIS asserts that the “Proposed Action would not result in any adverse impacts on existing marine reserves.” This assertion is contradicted by the references cited. Further, the DEIS claims that Channel Islands National Marine Sanctuary (CINMS) prohibitions “do not apply to military activities carried out by the [Department of Defense] (DOD),” referring back to Section 3.5.9 of the CINMS Final EIS. The DEIS then goes on to state that “spacelift operations originating from VSFB” are “pre-existing activities” that find exemption from CINMS prohibitions. None of these assertions are supported by the references cited in the DEIS. The CINMS Final EIS (1980), at page E-89, refers to “the development and operation of the Space Shuttle Vehicle System.” The CINMS Final EIS contemplates only “twenty operation flights” which “extend over an eight year period.” This disclosure of only 2.5 flights per year has become the anchor upon which the present EIS has asserted the basis for “pre-existing activities.” The proposed 100 launches per year do not have a “pre-existing” basis in the CINMS Final EIS (1980), contrary to the assertion in the DEIS. The DEIS refers then to the CINMS Final EIS, without clarifying which document is being referenced, as describing “‘pre-existing activities’ (NMFS 2007).” Given this time reference, the Final Management Plan/Final Environmental Impact Statement for the Channel Islands National Marine Sanctuary, dated November 2008, is apparently the document referred to. Review of that document under 3.5.9 Department of Defense Activities, page 176, shows that, again, a	BI-03

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				very low number of launches was reviewed. At page 180, the CINMS Final EIS (2008) notes that “(e)leven spacelift operations occurred between 1997, 1998 and 1999.” The DEIS asserts that noise levels “produced during launch activities as SLC-4 and SLC-6 would not change substantially from those previously analyzed in Section 3.4.2.1.7 of the 2024 EA.” The November 2024 Final Environmental Assessment, Appendix A, is entitled Biological Assessment for Falcon 9 Cadence Increase and SLC-6 Modifications at Vandenberg Space Force Base, California, dated June 2024. The Assessment lists many, many impacts to biological resources. The DEIS asserts an exemption to CINMS prohibitions based upon the claim that the large increase in launches per year is somehow a pre-existing activity under the CINMS Final EIS, whereas review of 1980 CINMS FEIS and the 2008 CINMS FEIS show contemplation and review of only 2.5 flights per year (1980) or 3.6 flights per year (2008). The large order of magnitude increase in activities cannot be viewed as pre-existing activity in light of the CINMS Final Environmental Impact Statements. The DEIS makes reference to purported exemption due to this project being for U.S. security and defense. It must be clarified if this is the case, and what circumstances such a project would fall under FAA civilian jurisdiction. In other locations in the DEIS it says that NMFS was consulted and that there are effects: “The DAF conducted informal Section 7 consultation with NMFS, which concurred potential impacts may affect, but not likely to adversely affect ESA-listed...species.” Environmental Consequences 3.6.2.1.1.(fish);3.6.2.1.2;(sea turtles);3.6.2.1.3 cetaceans). More study needs to be done as to effects on ESA-listed species of this proposed increase	

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				in launch activity. Sonic booms created by the Falcon 9 would reach above 5.0 psf at CINMS on rare occasions. Section 3.5.9.1 of the CINMS Final EIS describes spacelift operations originating from VSFB and potential sonic booms from these activities as “pre-existing activities” (NMFS 2007). As stated in the 2025 Vandenberg Falcon Launch Program DEIS Section 3.6.1.4, the Chumash Heritage National Marine Sanctuary (CHNMS) included an exemption for existing DOD Activities, including launch and landing activity originating from VSFB. An exemption for existing DOD activities should not necessarily mean an exemption for such a significant increase in activity, i.e. doubling the launch frequency, as well as adding a larger, heavier rocket. Commercial launches should also be considered, as the facility proposed will be under private control of SpaceX.	
Electronic Attachment	Ritzman, Dan	Sierra Club / Surfrider Foundation	31	The absence of air dispersion modeling or receptor-based cumulative impact analysis fails to capture this inter-basin transport, particularly for secondary pollutants like ozone or fine particulate matter (PM _{2.5}), which form or accumulate downwind. Additionally PM has the highest potential for public health harm. A scientifically robust analysis should incorporate regional air modeling to assess transport and cumulative deposition of criteria pollutants beyond the project’s immediate emissions envelope	The Final EIS includes a project-level air quality analysis consistent with NEPA and Clean Air Act requirements, showing that estimates of emissions from the Proposed Action are below DAF insignificance thresholds. Regional air dispersion modeling for secondary pollutants such as ozone or Particulate Matter Less Than 2.5 microns (PM _{2.5}) is conducted at the state or regional level during SIP development. Unlike continuous emission sources, the Proposed Action involves short-duration, intermittent emissions, with most combustion occurring above altitudes where pollutants rapidly disperse. Given the scale and frequency of the Proposed Action, regional air modeling for inter-basin transport is not commensurate with the action and outside the scope of this analysis. The general conformity process ensures that cumulative regional impacts,

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					including those related to PM _{2.5} and ozone, are addressed through broader regulatory planning efforts.
Electronic Attachment	Ritzman, Dan	Sierra Club / Surfrider Foundation	32	The GCD references projected emissions from launch and support operations but does not provide a comprehensive accounting of cumulative impacts over time, especially in light of the growing commercial use of space launch infrastructure. • The frequency of launches is expected to increase substantially beyond historical levels due to expanded commercial operations, yet the GCD does not appear to model a range of plausible scenarios or long-term emissions forecasts. • The "incremental" approach used in this GCD is not adequate for capturing the cumulative air quality burden associated with ongoing and future launch activities, which are not one-time events but part of a sustained operation. Without a projected cumulative emissions profile over a 5, 10, or 20-year planning horizon, the GCD risks underestimating regional air quality degradation.	The Draft GCD evaluated the total projected emissions associated with the Proposed Action as defined in the EIS, which includes up to 100 annual Falcon launches and associated support activities. Cumulative impacts are addressed within the EIS in accordance with NEPA requirements, including consideration of other past, present, and reasonably foreseeable future actions. While the Draft GCD did not include long-term forecasting beyond the scope of the Proposed Action, it ensures compliance with the Clean Air Act by demonstrating that total annual emissions will remain within applicable SIP thresholds. Any future increases in launch frequency or substantial changes in operations would require additional environmental review, as appropriate. It would be speculative to project cumulative emissions from other unrelated or uncertain future launch operations, or to forecast future background air quality conditions that depend on a wide range of regional, regulatory, and technological variables. The EIS conservatively assumes a steady state of emissions over time to avoid underestimation of potential impacts.
Electronic Attachment	Ritzman, Dan	Sierra Club / Surfrider Foundation	33	While the GCD confirms conformity with the State Implementation Plan (SIP) emission budgets, it does not discuss the costs, logistics, or enforcement mechanisms associated with future air quality mitigation. • For instance, there is a lack of mitigation strategies, if any, that will be implemented to minimize emissions during high-frequency launch periods.	The revised air quality analysis in the Final EIS shows that estimated emissions are below DAF insignificance thresholds. As a result, offsetting mitigation is not required.

Source	Last, First Name	Organization/ Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				• Additionally, the emissions offset relies solely on set-asides from the Air Quality Management District (AQMD) but there are no contingency measures if those budgets are exhausted. • The admin costs for public agencies or private operators to maintain conformity over time is not considered and can take away from other essential air mitigation measures. This lack of detail may lead to non-transparent environmental cost-shifting—where long-term pollution mitigation is deferred to public entities or future regulatory updates without current planning accountability.	
Electronic Attachment	Ritzman, Dan	Sierra Club / Surfrider Foundation	34	The draft document notes that operations may emit hazardous air pollutants (HAPs), but offers little analysis of: • Specific HAP species. • Potential exposure pathways. • At-risk communities, including environmental justice populations in downwind areas of Los Angeles and Ventura Counties. A meaningful air quality impact assessment should evaluate toxicity-weighted health risks, including cancer risk and chronic exposure, particularly for communities already overburdened by poor air quality.	AQ-04, AQ-06; Additional language has been added to the EIS Air Quality Technical Report (Appendix F, Section 2.2.1.2) to address hazardous air pollutants (HAPs) from the project.
Electronic Attachment	Ritzman, Dan	Sierra Club / Surfrider Foundation	35	To move towards sufficient assessment and mitigation of air quality impacts, we recommend the following supplemental environmental analyses: • Conduct a regional-scale air dispersion modeling analysis to assess cross-basin pollutant transport. • Quantify cumulative emissions and impacts under multiple commercial launch scenarios. • Address the cost structure and accountability of	Conducting a regional-scale air dispersion modeling analysis to assess cross-basin pollutant transport, quantifying cumulative emissions and impacts under multiple commercial launch scenarios, addressing the cost structure and accountability of emission mitigation, and preparing a supplemental EIS to address broader, long-term air quality concerns more thoroughly

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				emission mitigation. • Include toxicological risk screening for HAPs in affected communities. • Consider preparing a supplemental Environmental Impact Statement (EIS) under NEPA to address these broader, long-term air quality concerns more thoroughly.	are not commensurate for the Proposed Action. Additional language has been added to the EIS Air Quality Technical Report (Appendix F) to address HAPs from the project.
Electronic Attachment	Ritzman, Dan	Sierra Club / Surfrider Foundation	36	These amounts of energy and water should have been identified and quantified in the DEIS. This data and the relationship to cumulative climate change impacts should also be addressed in the EIS.	The amount of proposed energy use was identified in Section 3.11.2.1 of the EIS (15,000,000 kilowatt-hours [kW-hr] at SLC-4 and 8,000,000 kW-hr at SLC-6). The primary source of VSFB's electricity, Pacific Gas and Electric Company Diablo Canyon nuclear power plant. Nuclear power itself does not directly contribute to climate change during operation because it doesn't produce greenhouse gas emissions. Overall, nuclear power is considered a low-carbon energy source. The amount of proposed water use was identified in Section 2.1.2.6 of the EIS. At maximum cadence, the Proposed Action would use up to 65.6 acre-feet of water per year. This would represent an increase of approximately 2.3 percent of the total annual water usage on VSFB. Under current regulations, climate change impacts are not required to be analyzed in NEPA documents.
Electronic Attachment	Ritzman, Dan	Sierra Club / Surfrider Foundation	37	DEIS section 3.7.2.1.3 identifies "the seep south of N Road" as an on-site wetland. The location of this established wetland requires mitigation, and although public comment was solicited and alternatives considered, no mention of planned mitigation for impacts to this acknowledged wetland is given in the DEIS. The importance of wetlands cannot be overlooked. They serve a variety of functions, including a valuable link for transit in	WR-05

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				habitat corridors—particularly corridors that are fragmented.	
Electronic Attachment	Ritzman, Dan	Sierra Club / Surfrider Foundation	38	In summary, the fact that nine ESA-listed species are located in the Action Area highlights the importance of providing the government-mandated mitigation required for this wetland.	WR-05
Electronic Attachment	Ritzman, Dan	Sierra Club / Surfrider Foundation	39	In the DEIS Section 2.1.7 page SLC-6, it states “Approximately 143,000 ft2 of commodity storage would be required. This includes storage tanks for LOX, RP-1, water, nitrogen, helium, and other launch commodities and may be a combination of new tanks and repurposing existing tanks at SLC-6.” (LOX= Liquid Oxygen, RP-1 = Kerosene). In the interest of public safety, more detail is needed advising the storage and transport of these hazardous materials, the type of emergency warning systems that will be in place for potential accidents regarding these hazardous materials. Ensuring public safety during the transport of hazardous materials is paramount. Specific details are needed as to the frequency of these hazardous material deliveries, transporting by rail or truck and if GHG emissions will be taken into account. The planned installation of a nitrogen gas line at the site also requires public safety and environmental oversight, particularly regarding protecting the nitrogen gas line from accidents.	The DAF and SpaceX comply with all pertinent federal, state, and local laws and regulations, and applicable DAF and SLD 30 plans would govern all actions associated with implementing the Proposed Action and would minimize the potential for significant impacts. SpaceX implements an Emergency Response Plan per the SLD 30 Installation Management Plan. This Plan ensures that adequate and appropriate guidance, policies, and protocols regarding hazardous material incidents and associated emergency response are available to and followed by all installation personnel and commercial entities. Launch commodities such as RP-1 and liquid oxygen are routinely used at VSFB for operations and are managed and stored under existing safety protocols, which include secondary containment and established response procedures for accidental releases or emergencies. Emergency response planning includes the installation of fire detection and suppression systems, remote monitoring, and emergency shutoff valves. Specific design and siting of new tanks at SLC-6 would consider safety criteria to mitigate risk. As discussed in Section 3.15.1.3 of the EIS, the transportation of hazardous materials to and on VSFB would adhere to DOT regulations for interstate and intrastate shipment of hazardous

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					materials (Title 49 CFR Parts 100–199). The DAF and SpaceX adhere to all federal and state regulations and requirements for the transport of hazardous materials, and under the Proposed Action commodity deliveries would continue to use existing, permitted transportation routes and protocols. DOT-certified commercial transporters would convey hazardous material used in or resulting from the Proposed Action. The estimated number of deliveries of commodities was included in the air quality analysis, presented in Section 3.3.2.1 and Appendix F of the EIS. The proposed nitrogen gas line would be installed consistent with industry safety standards and engineering design would include measures to prevent damage from operational hazards. The DAF remains committed to ensuring public safety and environmental protection throughout launch operations and supporting infrastructure development at VSFB.
Electronic Attachment	Ritzman, Dan	Sierra Club / Surfrider Foundation	40	A thorough evaluation of all aspects of this project must be done with an eye to the future so as to protect all the surrounding environments which will be impacted as the Falcon Launch Project and Vandenberg Space Force Base complex grows beyond its boundaries. It is important to understand the impact of this rocket launch project goes beyond the boundaries proposed in this document. It extends into the ocean and far into both coastal and inland urban areas in ways that need to be anticipated and evaluated	The ROI was described in Section 3 of the EIS under each resource category. As applicable to each resource, the ROIs included VSFB, all areas potentially affected by noise (see Section 3.4.1.2 of the EIS), and a broad area of the Pacific Ocean where recovery activities and vessel transportation would occur. The EIS analyzes all areas potentially affected by the Proposed Action, including locations beyond the boundaries of VSFB.
Electronic Attachment	Ritzman, Dan	Sierra Club / Surfrider Foundation	41	To meaningfully assess the impacts of the proposed increase, a proper study of the impacts of the prior intermediate increase must be performed first. As stated in the Sierra Club’s January 2025 comments for	BI-05, S-01

Source	Last, First Name	Organization/ Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				the DEIS Scoping Period, "The EIS should specifically consider the environmental and public health impacts of these operations, including worst case accidents, and require suitable mitigations in the case of launchpad or launch explosions, especially as Vandenberg considers including heavier and more intense rockets on site that have not been used in this location before." Until sufficient studies of the preexisting launches' impacts have been done, many of the conclusions in the DEIS and mentioned mitigation measures lack the foundational data to ensure they are accurate.	
Electronic Attachment	Ritzman, Dan	Sierra Club / Surfrider Foundation	42	The DEIS lacks comprehensive data, complete studies, and sufficient analysis of ecological and local communities impacts from the preexisting and proposed increase in launches. It therefore likely lacks sufficient mitigation measures to address these issues. The Environmental Impact Statement should fully study and address the impacts of the preexisting 50 launches/year before expanding the program to 100 launches/year. In order to meaningfully assess the impacts of this proposed increase, proper long-term comprehensive study and analysis of the recent intermediate increase must be performed first—which has not been done.	PA-02
Electronic Form	Roberts, Nicole	N/A	1	As a homeowner in Ventura County the sonic boom impact is averse to our community. It is damaging our homes, startlingly loud and disruptive. Will homeowners get a stipend for damages caused by the SpaceX launches? Thank you , Nicole Roberts	N-02
Electronic Form	Robinson, Rima	N/A	1	Please submit my commit to take the NO ACTION ALTERNATIVE I have many concerns about this project. And I am against it for the following reasons.: I am deeply concerned for the environment and it	DE-06, N-01, N-02, N-03, N-09, U-02

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				seems as though all assessments in this ESI were streamlined to okay the project, saying that there will be minimal affects to everything across the board. What about cumulatively? The build up of debris in space, debris falling into our atmosphere, the launching pollution? I don't want there to be ANY damage to structures, nor debris in space, the ocean, or, land and relive that that damages will be significant, especially the accumulative impacts. Sound and it's vibration is a huge concern. I live in a canyon in the foothills of the east side of Santa Barbara. When the first time I heard the reentry of Falcon 9, late at night, all of my closed interior doors (including the bedroom door), was shaking so hard it woke me up and I immediately thought that someone was breaking into my house. This was the first time I have ever felt truly afraid in my house. After discerning no one was there, I made phone calls and found out about the reentry. But even knowing this, the second time it happened it still had the same impact on me before I remembered it could be the reentry. I still woke up in intense fear that someone was breaking in. I do NOT want to feel this way several times more times a year. I not want to have to get used to this. I'm not the only one. My neighbor said that the sonic vibration opened his front door, and he was afraid someone had broken in. Another couple living a mile and a half away said that the front door of their house opened. I believe whoever conducted the environmental impacts did not look into the personal impacts of the vibrations countywide. I didn't know there was a "complaint" page until today while searching for this EIS report, so I will write something there as well. Another thing that does not make me feel safe is the fact that the	

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				house is being shaken and that this will increase by many more and reentries per year. I read the whole impact report and I read the section suggesting that the damages done to houses caused by Falcon 9 and Falcon Heavy reentries will be solely because the houses are old, or in poor repair, such as plaster. This was almost an insult. My house is only 10 years old. If my house can be that shaken in the way it was, what about all of the thousands of old historic wooden or adobe houses and buildings in SB county? What about cumulative damage to these homes and buildings being shaken several times a year? Is the language in the EIS suggesting that all these thousands of structures be upgraded to withstand these "minimal effects"? This will be nearly impossible. If my structurally sound 10 year old house is shaking on the inside as much as it has, I KNOW there will be loosening of the plaster, joints, etc. caused by it eventually. Do I send Vandenberg a bill for repairs when things go bad? I also believe the vibration and sound will impact birds, animals, and sea life greatly. I object to this increase of launches because they will have negative impacts to the environment, structures, privacy, and national security. All for the sake of someone who wants to take advantage of the commercial opportunity to be had. Thank you for reading this comment.	
Oral Comment Virtual	Roger, Guy	N/A	1	We should vote on this	NP-04
Electronic Form	Rumble, Patricia	N/A	1	The noise levels of sonic booms are disturbing the children of the community as they occur at all hours. The risk of debris fallout from a failed launch has not been properly assessed for the safety of the community.	S-02, T-02

Source	Last, First Name	Organization/ Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
Oral Comment Santa Barbara	Salazar, Jenny	N/A	1	On your proposed action, it says that you are doing currently 50 Falcon 9 launches a year, and you'll go to 100 a year of the Falcon 9 and the Falcon Heavy. And I'm not 100 percent clear, is it 100 for the Falcon 9 and 100 for the Falcon Heavy or 100 total those two together? When I read that, I can go either way, so I don't know if I'm looking at 100 total or 200 total.	The introduction of Section 2.1 of the EIS states: "The overall launch cadence for Falcon 9 and Falcon Heavy at both SLCs, combined, would be up to 100 launches per year." Under the Proposed Action, there would be up to 100 launches per year total, which may include up to five Falcon Heavy launches per year.
Oral Comment Santa Barbara	Salazar, Jenny	N/A	2	The second question is -- or clarification is the percentage of launches that this is discussing or the percentage that's for government use for our purposes versus how many of the launches are for a person's personal profit for a private business.	PN-01
Oral Comment Santa Barbara	Salazar, Jenny	N/A	3	And if you're going to up the numbers of launches, there will be a catastrophe. One of them won't -- at least one won't make it, and it's going to be over land. Who's it going to hit? Worse than that almost is the fuel and the fire dangers in California. If that happened, the fires, I wouldn't even want to think about the kind of fire danger and the huge expense that the state would face alone since FEMA is being removed.	S-02, T-02
Oral Comment Santa Barbara	Salazar, Rick	N/A	1	I've seen them fly with -- they appear to fly over land, or at least over Hope Ranch. Once they got up the altitude, I guess they have to fly over the -- over the United States, and especially over California, and with all wildfire risks, if there was an unplanned termination or explosion like happened over Florida and Poland, I guess, and I forget where else, that those embers and the ashes and stuff not only would shut down airspace, but they would probably set most of California on fire if all those little things went floating down all over because of the prevailing winds over the state.	S-01, S-02, T-02

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
Oral Comment Santa Barbara	Salazar, Rick	N/A	2	I'm interested in why the estimates of the noise standards, CNEL and CNDALs are -- don't involve any actual measurements, just estimates. You've had enough launches, you should be able to get some actual estimates of the noises.	N-06
Electronic Form	Savage, Quatrella	Jubilee Scholars LLC	1	Jubilee Scholars would like to contribute to public comments for EISX00757USF1728547807. Our company simply recommends that before launches, a wildlife survey be conducted within the boundaries of the Vegetation Maintenance Area to also ensure that no nesting sites or burrowing wildlife are present within the area. Those that are present within the boundary area will need to be captured and relocated to a safer distance.	The DAF will ensure that a pre-survey of construction areas is performed if the construction or demolition occur within nesting season and that adequate buffers are set to ensure that there are no impacts to species protected under the Migratory Bird Treaty Act. The Final EIS has been revised to include this mitigation in Section 3.5.2.5.
Oral Comment Ventura	Schmitt, Tevin	Wishtoyo Chumash Foundation	1	SpaceX is notorious for underestimating and undercounting evacuations of public beaches. In 2023, Vandenberg officials committed to fewer than 12 closures of Jalama Beach that year. However, by July, 2023, the Beach had been closed 15 times, with another 20 launches still planned for the rest of the year. In Boca Chica, SpaceX claimed that only 500 hours of beach closures would be necessary for general operations, but in 2020 the Fish and Wildlife Service calculated that there had been over 1000 hours of closures in just 3 months. The Department of the Air Force MUST be transparent about these closures and infringement upon public beach access.	P-01
Oral Comment Ventura	Schmitt, Tevin	Wishtoyo Chumash Foundation	2	The draft EIS completely lacks transparency on the project's impacts to water resources, increased vehicle traffic on federally listed species, sensitive habitats, launch debris, deluge water, and beach closures. The EIS falls short in its analysis of water use impacts on the communities that live on Vandenberg SFB. Vandenberg SFB was deemed vulnerable to water scarcity by the government accountability office in	WR-01, WR-02, WR-03 Impacts to water resources, increased vehicle traffic on federally listed species, sensitive habitats, launch debris, deluge water, and beach closures are listed in (see EIS Sections 3.5, 3.6, 3.7, 3.10, and 3.14) of the EIS. SpaceX is not proposing to use any TCEs or perchlorates.

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				2019, but the EIS suggests that rocket launches that use up to 1.5 million gallons per launch will not impact these communities that primarily rely on state water, which is a notoriously unreliable source. Further, the legacy of missile and rocket testing at the SLC-4 launch area has resulted in the mass build up of TCE and perchlorate in the underlying groundwater aquifer. The Central Coast Regional Water Quality Control Board has determined that it will take at least 80 years for that water to be fully remediated. How is it a good idea to increase the rocket launch cadence at such a site?	
Oral Comment Ventura	Schmitt, Tevin	Wishtoyo Chumash Foundation	3	The EIS includes no analysis on impacts associated with launch debris from the Falcon Heavy Rocket on nesting birds, all of which require similar beach nesting habitats as those found in Boca Chica.	BI-04, S-03 There would be no impacts associated with “launch debris” from Falcon Heavy. Falcon Heavy is a much smaller rocket than Starship, which is launched in Boca Chica, and would not result in any impacts during launch on nesting habitats.
Electronic Attachment	Schrappen, Peter	American Waterways Operators	1	AWO recommends that SpaceX continue to work with the USCG to ensure that Ship Hazard Areas issued in NOTMARs are properly marked and include any areas where potential hazards to navigation related to SpaceX launch or landing/reentry activity could impact maritime operations.	As described in Sections 2.1.2, 3.12.2, and 3.14.1 of the EIS, SLD 30 and the USCG would continue to review each SpaceX mission trajectory to develop risk plots which are used to define hazard operation areas. USCG would continue to issue NOTMARs to communicate hazard operation areas [LAAs] and Regulated Access Areas to maritime operators before each mission.
Electronic Attachment	Schrappen, Peter	American Waterways Operators	2	If the establishment of a Limited Access Area (LAA) is deemed necessary during launch or landings, we urge the project team and USCG to engage with local commercial vessel operators and allow for a public comment period of at least 45 days to ensure LAAs do not place unnecessarily onerous restrictions on vessel operations. Creating a permanent safety zone that can periodically be enforced, as proposed for Space	As described in the EIS, LAAs are dynamic, short-term notifications issued to protect public safety and ensure maritime exclusion during launch events. These advisories are based on mission-specific risk calculations and flight trajectories that are not finalized until shortly before launch. The Proposed Action does not include a change to the existing LAA process, nor does it propose the

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				X's Boca Chica launch site, gives vessel operators a more predictable impact on their operations and allows them to proactively plan transits to avoid temporarily restricted areas. The notice of enforcement of an LAA like a permanent safety zone should be given at least three days prior to the enforcement period.	creation of a permanent or fixed LAA zone. The existing approach—typically issuing LAAs approximately three days in advance—is expected to continue, subject to coordination with USCG and mission planning requirements. This approach has historically resulted in limited, temporary advisories that minimize disruption to maritime operations while ensuring public safety. The DAF agrees that a permanent or overly broad LAA could unnecessarily impact maritime access. For that reason, and consistent with current practice, LAAs will continue to be tailored to the minimum area necessary, issued as late as feasible while still complying with safety, risk, and notification requirements. A 45-day public notice would not be practicable for operational LAAs, which are exempt from such lead times due to national security, mission confidentiality, and safety protocol constraints. SLD 30 will continue to coordinate with the USCG, stakeholders, and local users to ensure that LAAs are narrowly scoped, effectively communicated, and protective of both safety and access.
Oral Comment Santa Barbara	Sedar, Jean	N/A	1	o mainly on your EIS, I just question how the marine research has been done since there's actually increased launches that, as I understand, really weren't permitted or planned on already, and now we're getting the word that we're going to go even higher than that. So it seems to me that it's already doubled from what was originally planned. And so along with notifying people, I think that even going as basic as a mail out that people could say what they have gotten in Santa Barbara County as the noise response.	BI-10, N-07
Oral	Sedar, Jean	N/A	2	And so I'm just wondering, how was the testing done	N-04

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
Comment Santa Barbara				about noise if the heavies haven't been used for years and now we're talking about heavies?	
Oral Comment Santa Barbara	Sedar, Jean	N/A	3	So I'm wondering what the increased noise for the heavies is going to be. I haven't seen anything on that.	N-04
Written Comment Lompoc	Sharp, Lauren	N/A	1	How are environmental and health impacts being studied? These increased launch frequencies are an anomaly. What other communities are being studied to see long-term environmental and health impacts on residents? How many other communities are being subject to constant launches? Will we be at increased risk for cancers and long-term health conditions? None of the materials shown at public hearings can answer these concerns. Materials are vague at best.	N-07, N-08, N-11
Written Comment Lompoc	Sharp, Lauren	N/A	2	The presentation calls damage to property "unlikely" and that property damage reports may be made to SpaceX. And yet, we have friends in the community who have suffered property damage and broken windows that they have suffered directly after a launch and they worked for years to receive any information from Vandenberg staff on how to be reimbursed for damages. They paid thousands to make repairs on their own and only after ongoing repeated phone calls and emails were finally reimbursed over a year and a half after incident. These increased launch schedules will put our communities' many older homes and businesses at risk for constant property damage.	N-02, N-09
Written Comment Lompoc	Sharp, Lauren	N/A	3	Where can we submit a reimbursement for our dog's regular anxiety medication that we now pay hundreds for each year?	N-02
Oral	Sheen,	N/A	1	So you guys provided a document for us to read, but I	N-08

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
Comment Lompoc	Ericka			didn't find anything on the impact that this is having on humans' stress and anxiety	
Oral Comment Lompoc	Sheen, Ericka	N/A	2	I would like to know the impact that this is causing on the environment. This is not only affecting us, but the environment, and I would like to know how expensive that impact is. I would like to know how this will be impacting -- all the debris, all the environment, the radiation, and what it's going to be, the trouble-making.	DE-01, DE-03
Electronic Form	Siemsen, Stephen	N/A	1	Is there anything that can be done to limit the number of launches by Space-Ex from Vandenberg Space Force Base? Why is this private corporation allowed to use a military facility at will? The frequency of the launches is becoming more than just an annoyance! I believe Space-EX has already exceeded the number of agreed upon launches. The noise is disrupting the quality of life in the surrounding communities and endangering the health and welfare of both wild and domestic animals, like breeding seals and seabirds. A recent launch rattled our windows so much that it startled our perched macaw, sending it into a panic that resulted in a minor wing injury. Would we send the veterinary bill to Musk, Space-Ex, or the U.S. Space Force? The most effective noise mitigation would be to limit the number of launches, and you don't need a multi-million dollar study to come to that conclusion. Elon Musk and Space-Ex profit from EACH and EVERY launch from public property, yet the public has to endure the noisy launches without compensation and take the brunt of our health and welfare. Meanwhile, the sky is becoming ever more littered with Elon's orbiting space junk.	As discussed in Section 1.1 of the EIS, the DAF is the lead agency and the FAA and USCG are cooperating agencies. As stated in the EIS, the DAF is the lead agency for the Proposed Action and is responsible for the scope and content of the EIS. The FAA's regulatory responsibilities concerning commercial space operations generally are mainly derived from the Commercial Space Launch Act of 1984, as amended and codified at 51 USC Sections 50901–50923, which authorizes the Secretary of Transportation to oversee, license, and regulate commercial launch and reentry activities, and the operation of launch and reentry sites within the U.S. or as carried out by U.S. citizens. Section 50905 directs the Secretary of Transportation to exercise this responsibility consistent with public health and safety, safety of property, and the national security and foreign policy interests of the U.S. In addition, Section 50903 requires the Secretary of Transportation to encourage, facilitate, and promote commercial space launches and reentries by the private sector. As codified at 49 CFR Section 1.83(b), the Secretary of Transportation has delegated authority to carry out these functions to the FAA Administrator. The

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					USCG is a cooperating agency because of its role in maritime safety and regulatory authority over waters subject to jurisdiction of the U.S., pursuant to the Ports and Waterways Safety Act, 46 USC Section 700. The USCG also advises SLD 30 on all launch and reentry site evaluation risk assessments with a focus on vessel navigation safety. As stated in Section 1.3 of the EIS, the Proposed Action fulfills (in part) 10 USC Section 2276(a), "Commercial space launch cooperation," authorizing the Secretary of Defense to: maximize the use of the capacity of the space transportation infrastructure of the DOD by the private sector in the U.S.; maximize the effectiveness and efficiency of the space transportation infrastructure of the DOD; reduce the cost of services provided by the DOD related to space transportation infrastructure and launch support facilities and space recovery support facilities; encourage commercial space activities by enabling investment by covered entities in the space transportation infrastructure of the DOD; and foster cooperation between DOD and covered entities. Implementation of the Proposed Action would support the DAF's statutory obligation to ensure capabilities to launch and insert necessary national security payloads into space (10 USC Section 2273).
Electronic Form	Silva, Tracy	N/A	1	I find it very disturbing that residence of Lompoc were pretty much told to suck it up we do not care about damage to your homes or property. Shame on you. My home also had damage due to these every other week launches. So sad that the Money for Your purpose from Ole Elon out weighs everything else. As I said. Shame on U	N-02, N-09

Source	Last, First Name	Organization/ Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
Electronic Form	Simpson, Shannon	Monterey Audubon Society	1	To whom it may concern: Monterey Audubon Society has learned of the plan to increase the number of launches from about 30 per year to about 100 per year. As you can imagine this will be devastating for the wildlife in the area but particularly the harbor seal colony located there. I have personally seen videos of their response when launches happen, and see the beaches cleared. This absolutely must not happen, and if it does, there should be wildlife monitors consulted and the timing should not coincide with pupping season. Launches are also polluting the environment. Coastal areas are so incredibly sensitive and to do these launches in these environmentally sensitive locations. Please consider the environment, as we only have one. Sincerely, Shannon Simpson, MA/MSNPA Monterey Audubon Society	BI-01
Electronic Form	Sitterley, Kaye	N/A	1	I oppose doubling the launch cadence due to environmental, strategic, and economic concerns. First, the environmental impact of expanded launch activities on and around Vandenberg Space Force Base (VSFB) is insufficiently addressed. Heavy-lift launches emit significant quantities of particulate matter and greenhouse gases, and their increased frequency may disrupt delicate ecosystems, including protected coastal habitats and marine species. The cumulative effects of intensified launch activity, including increased traffic, noise pollution, and hazardous material usage, warrant a more robust and transparent environmental review. Second, the proposal advances a model of military-commercial collaboration that risks prioritizing commercial interests over public accountability and democratic oversight. The privatization of national infrastructure, under the guise of increasing efficiency and	AQ-02, PN-04

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				innovation, may instead reduce transparency, shift risk to taxpayers, and consolidate access to critical space assets among a few large private entities. The statutory mandate under 10 U.S.C. Section 2276(a) must be balanced against the need for equitable and public-centered governance of space. In summary, I call for a pause on this proposal until a more comprehensive, environmentally sound, and publicly accountable plan is presented, one that reflects the full spectrum of national interest, not only defense and industry priorities.	
Electronic Form	Solo, Geoff	N/A	1	My home is about 10 miles away from the launch pad at Vandenburg. The launches shake my home like an earthquake. The whole place shakes, you can see the windows shake, the eaves of the roof and rain gutters are all shaking during the lift offs. The foundation is shaking. I'm seeing cracks on the stucco around the outside walls, more cracks around the concrete driveway and on my patio tiles. I want to know what will Vandenburg do about the damages to homes that these launches are causing?	N-02
Electronic Form	Spear, Linda	N/A	1	The launches violently shake our house, rattle our windows and give the impression the roof is going to pop off. Having the equivalent of a sizeable earthquake once a week is ridiculous. There's no way this isn't negativity impacting the structure of our house.	N-02, N-09
Oral Comment Ventura	Stillman, Allison	N/A	1	In the last year I have -- from the sonic booms that have gone off in Ojai, I now have a crack in the ceiling in every single room of my home. I've called Vandenberg three times, I've submitted emails, I've submitted photos, I've submitted the listing from before that showed no cracks. So there's no question of where those cracks came from.	N-02, N-09
Oral	Stillman,	N/A	2	In addition to that, my heart -- I feel like I'm going to	N-02, N-03

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
Comment Ventura	Allison			have a heart attack. It's so frightening. I've had pictures fall off the walls of my home. My animals completely freak out at the sonic booms. And I had to laugh when I read this, "With the increased launch cadence, the increased instances of ascent noise and sonic booms may increase human annoyance. "And that's what you think my issues are that my house is cracking and I'm having near heart attacks is a human annoyance?"	
Oral Comment Ventura	Stillman, Allison	N/A	3	And then I read here, "The below resources were dismissed from further analysis in the EIS." The protection of children from environmental health risks and safety risks. Wait a minute. You're not going to protect our children? You don't think they're worth protecting?	Executive Order 13045, titled Protection of Children from Environmental Health Risks and Safety Risks, was issued by President William Clinton in 1997. As described in Table 3.1.1 of the EIS, because no component of the Proposed Action would result in a disproportionate risk to the health and safety of children this was eliminated from further analysis.
Mailed	Tan, Fred	Santa Barbara County Fire Department	1	SBCFD has historically been notified of launches and notifications to SBCFD should continue. Additionally, SBCFD will seek cost recovery for any incidents requiring SBCFD response for suppression, mitigation, rescue investigation or other emergency response efforts. As a CAL FIRE Contract County, any incident on State Responsibility Areas will be investigated and reported to CAL FIRE and other appropriate governmental agencies. In addition to any private claims, CAL FIRE and governmental stakeholders would also seek cost recovery for response and compensation to repair damage within their respective jurisdictions.	The DAF appreciates the Santa Barbara County Fire Department's comments and continued coordination and support for VSFB operations. The DAF would continue these practices under the Proposed Action.
Electronic Attachment	Tang, Victoria	California Department of Fish and Wildlife	1	Lake and Streambed Alteration Agreement. The Project proposes to perform Project activities and modifications through the Red Roof Canyon drainage and unnamed drainage. CDFW has regulatory authority over activities in streams that will divert or	Federal agencies are required to conduct a 3-parameter delineation. Wetland analysis is included in Section 3.7.2.1.1 (Surface Water). A Lake and Streambed Alteration Agreement is not required because the action occurs on DoD land.

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				obstruct the natural flow, or change the bed, channel, or bank (which may include associated riparian resources) of any river, stream, or lake or use material from a river, stream, or lake. For any such activities, the Project proponent (i.e., SpaceX) must provide written notification to CDFW pursuant to section 1600 et seq. of the Fish and Game Code. Based on this notification and other information, CDFW determines whether a LSA Agreement with the Project proponent is required prior to conducting the proposed activities. CDFW's issuance of a LSA Agreement for a project that is subject to CEQA will require CEQA compliance actions by CDFW as a Responsible Agency. A notification package for a LSA Agreement may be obtained by accessing CDFW's Lake and Streambed Alteration Program website.	
Electronic Attachment	Tang, Victoria	California Department of Fish and Wildlife	2	CDFW recommends the EIS incorporate a measure that requires a rare plant survey be conducted prior to any ground-disturbing activities to ensure that no impacts to undetected rare plants occur. CDFW also recommends a qualified botanist conduct a rare plant survey, adhering to CDFW's Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities (CDFW 2018) during the appropriate blooming season. If rare plants are observed within the Project area, the qualified botanist should implement an adequate buffer around the individual plant or population to prevent any potential adverse impacts. If avoidance is not achievable, the EIS should offset the loss of rare plants through compensatory mitigation at a minimum of 2:1 ratio. Translocation of these species is not advisable, as there is insufficient data to support that such translocations would be successful.	A plant survey was conducted within areas of planned ground disturbance. Disturbance will be minimized to the maximum extent practicable. VSFB has a basewide program to enhance natural communities, including rare plant, to offset impacts due to project activities.

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Oral Comment Ventura	Temkin, Mark	N/A	2	The other part that I would like to mention is that we like to go camping up at Jalama Beach and there's been many times for us and for plenty of our friends that live around here that also go up to Jalama Beach, that in the middle of their trip they've been told, sorry, you guys got to vacate now, there's going to be a launch. I can't tell you how many people I've heard that's, like, in the dark about how to look it up and figure out because they -- there really hasn't been a lot of good information about how often actually in Jalama Beach State Park has been closed now due to these launches. And to double that capacity, you might as well close the park. Seriously. Because nobody can plan around that schedule with it.	P-01; The EIS analyzes impacts to Jalama Beach in Section 3.10.2.1 of the EIS. As stated in Section 3.10.2.1, evacuations would not be issued for more than 12 launches each year.
Electronic Form	Thomas, Linda	N/A	1	If my generation was accused of thinning the ozone layer by spraying Right Guard under our armpits then what is Elon Musk doing by directly injecting the stratosphere with rocket propellants full of kerosene? The focus of this study being the environmental impacts of increased rocket launches on the ground has not taken into effect the impacts of the damage being done to our pristine atmosphere. Not only are the launches harming the stratosphere but the reentry of burned up satellites are doing harm as well. Without the ozone layer the Sun will quickly become our enemy making life on earth as we know it deadly. This program needs to be reined in with protocols that measure the impacts to the atmosphere as were conducted in 1987 with the Montreal Protocols that eliminated the use of chlorofluorocarbons that were thinning the ozone layer. Going forward, the sustainability of increasing launches on ozone recovery and the stratosphere should be the priority with more study on the	AQ-01, AQ-02

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				impacts.	
Electronic Form	Thompson, Patricia	N/A	1	Our community is an agricultural hub that will be impacted by the partial waste of fuel combustion and debris. Air Quality is already at a dangerous level without adding chlorine gas and soot with additional launches. We have come so far to decrease the ozone level, additional launches will destroy our advances. What will the black carbon do in our stratosphere? Increase temps? Disrupt atmospheric circulation. All the chemicals and debris that falls into the ocean, not good. We are shitting where we eat! Not to mention space junk overload! Thanks	AQ-01, AQ-02
Electronic Form	Tillisch, Sandra	N/A	1	1. I am concerned about the noise and vibration impacts. Doubling the launches will have an even greater impact. 2. I am concerned about the number of satellites being sent into space and their impact on astrophysicists and astronomers to continue their vital work. 3. I am concerned about the possible effect on the stratosphere, including an impact on climate change.	AQ-01, DE-06, N-03, U-02
Electronic Form	Tobin, Clare	County of Santa Barbara	1	The County of Santa Barbara appreciates the opportunity to comment through the Responsible Agency Review process. Please see attached for our comments.	See responses to Santa Barbara County Parks Division and Santa Barbara County Fire Department substantive comments below
Electronic Form	Torfeh, David	N/A	1	SpaceX Draft EIS Comment Dear staff, The exact locations of the proposed native vegetation replacement efforts remain insufficiently detailed. The report states that these efforts will occur within the same watershed, specifically around creeks and riparian habitats classified as environmentally sensitive habitat areas (ESHAs). Without detailed mapping or a comprehensive restoration plan, it is unclear how effectively these enhancements will mitigate the impacts of vegetation removal and protect these sensitive habitats. The presence of the	The Proposed Action would not have significant impacts to sensitive vegetation resources; therefore, the DAF has not proposed any offset measures because they would not be commensurate with the impacts. Gaviota tarplant is addressed in Section 1.2 of the Biological Assessment (Appendix B of the EIS). Although suitable habitat for Gaviota tarplant exists where construction would occur, the area was surveyed by a qualified biologist and only the common unlisted grassland tarplant (<i>Deinandra increscens</i>

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				federally endangered Gaviota tarplant (<i>Deinandra increscens</i> ssp. <i>villosa</i>), found in several locations west and northwest of Lompoc, does not appear to be documented or addressed or mitigated for in the provided project document. It could well occur on the project site. Another concerning issue is the release of heated water used in the cooling procedures. It is well known that even a slight increase in water temperature can adversely impact riparian/wetland native plants and other aquatic organisms. David Torfeh	ssp. <i>increscens</i>) was present. The area was surveyed outside of the peak blooming period, but plants were still extant and identifiable. Based on plant morphology and the characteristics of the flowers still present, none of the tarplant stands matched the accepted phenotype of Gaviota tarplant. Additionally, a genetic study was conducted in 2006 to clarify taxonomic status of Gaviota tarplant. Based on this study, Gaviota tarplant was limited geographically to the type locality in Gaviota, California (Point Conception, Sudden Peak (outside of the VSFB boundary), and Lion's Head on north VSFB (Baldwin 2009). Therefore, the tarplant originally identified as Gaviota tarplant at SLC-6 and much of south VSFB was determined not to be the unlisted grassland tarplant based on this study and subsequent morphological analysis.
Electronic Form	Tse, Shirley	N/A	1	As a resident in Vandenberg Village, I am glad to read Air Quality would still be within standard with the increased launch, however, the sound pollution does affect our household negatively. We are concerned with the increased frequency of launch sound and vibration, sonic booms, as well as the time at which these launches will happen. Please consider the quality of life in our community when you make changes! Thank you!	N-01, N-03
Electronic Form	VanAntwerp, Alexandra	N/A	1	Public Comment on the Draft EIS Falcon Launch Program at VSFB As a longtime resident of Carpinteria, I'm asking you to reconsider the plan to double rocket launches from Vandenberg. The constant shuddering and sonic booms already disrupt our quiet coastal life and this proposal would make it worse. More concerning is the harm to wildlife. Repeated loud impacts "up to 100 times a year" may	BI-04, BI-10

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				not kill marine mammals outright, but they cause stress and behavioral changes that can ripple through ecosystems. Just because this has been tolerated in the past doesn't mean it's sustainable, especially at this scale. I urge you to adopt the No Action Alternative. Let's hit pause until we better understand the long-term impacts on coastal communities, sensitive marine species, and the land we all share. Thank you. Alexandra VanAntwerp Carpinteria CA	
Oral Comment Ventura	VanDam, Nicole	N/A	1	There is no way for SpaceX or the military to mitigate the effects of a sonic boom if they're not really studying who's feeling it, where they're feeling it, when they're feeling it, what the environmental conditions were. And so I think out of respect for all these citizens who have come here and been very open about their concerns and fears that there should really be field studies about what's going on.	N-07, N-11
Oral Comment Ventura	VanDam, Nicole	N/A	2	I'm also concerned about the Heavy version. Because apparently from what you guys said, that hasn't been launched yet. So if it hasn't been launched yet, how much worse are those sonic booms going to be? And these are the types of things that I think need to be discussed and studied.	N-04; Falcon Heavy has not been launched from VSFB, but to date there have been 11 launches of Falcon Heavy from Kennedy Space Center in Florida, all successful.
Electronic Form	Voss, Chris	Commercial Fishermen of Santa Barbara	1	The commercial fishing community is directly and significantly impacted by the increase in launch frequency from Vandenberg Space Force. The frequency of the closures due to launches effectively closes large areas of historically productive fishing grounds to trawl, longline, trap, troll, gillnet and dive fisheries. We have been in contact with both Calif Coastal Commission and Space Force about our concerns and potential mitigation of this impact. We are aware of the debris offset program that should have more funding as a result of the increase in	Currently the debris offset funds are dispersed per the VSFB Commercial and Recreational Fishing Plan; however, the Commercial Fishermen of Santa Barbara can request to be included in the Plan and it will be considered by the DAF. Communications on launches are issued via Notice to Mariners (NOTMARs) through the USCG and per 33 CFR 334.1130, these are distributed to Harbor Masters in Morro Bay, Port San Luis, Santa Barbara, Ventura, Channel Islands, and Port Hueneme Harbors, and any established harbor of

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				launches. It is our expectation that the Commercial Fishermen of Santa Barbara be awarded some of these funds to support our established and ongoing marine debris removal program. Communicating the launch schedule to our community also requires time and effort that should be mitigated. Thank you for considering our concerns.	refuge between Santa Barbara and Morro Bay.
Electronic Form	Walker, Scott	N/A	1	Simply put, I would like there to be less launches not more. Less than the baseline we have now. Also, I would like launches to only occur during pre-scheduled and publicly announced windows AND most importantly for launches to occur no earlier than 8 AM and no later than 8 PM. These early morning and late night launches are total bullshit.	N-01, N-07
Oral Comment Lompoc	Walsh, Barbara	N/A	2	Plus, we have to wonder about the pipes -- the underground pipes, gas lines, water lines. You know, we are responsible as homeowners for the damage from the street into our home, unless we have additional insurance.	N-02
Oral Comment Lompoc	Walsh, Barbara	N/A	3	And I'm wondering about an end date. I think I saw something somewhere about 2030. That would mean five -- five more years of this, plus who knows how many more they're going to want? Are they going to want three a week?	PA-01
Oral Comment Lompoc	Walsh, Mary	N/A	1	You can tell the sound of the missiles going up by the shaking in your house. And you calm down, all the dogs in the neighborhood calm down, and all of a sudden, bam, you are hit with the sonic boom. This is absolutely and definitively a detriment to the quality of our lives in Lompoc, and I imagine the whole Central Coast.	N-03
Electronic Attachment	Ward, Dave	County of Ventura Resource Management	1	The County's General Plan Land Use and Community Character Element has a goal related to military compatibility. Within the county, the Naval Base Ventura County operates three facilities that	CE-01

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
		Agency		encompass a diverse set of specialties. The County collaborates with the Department of Air Force to protect military missions, the health of local economies and industries, and the quality of life for county residents. The following General Plan Policy may apply to the Proposed Action: General Plan Policy 21.4 - Enhance Communications: The County shall work to enhance communication and coordination with Naval Base Ventura County (NBVC) and other jurisdictions in the county to enhance public knowledge and access to information regarding military operations and compatibility challenges while adhering to operational security requirements. While this County policy pertains to the local Naval Base, the Proposed Action requires coordination with Naval Base Ventura County regarding the effects of combined military operations and compatibility challenges in Ventura County.	
Electronic Attachment	Ward, Dave	County of Ventura Resource Management Agency	2	The draft EIS does not analyze the same noise metrics that are included in County General Plan policies. County General Plan noise policies intend to limit impacts from equivalent continuous sound and ambient noise levels from new uses, but not sonic booms. The draft EIS analyzes pounds per square foot (psf) to interpret the potential effects of sonic booms on hearing impairment and vibrations on structures. The draft EIS states that "damage to structures is unlikely below 2 psf [p. S-3 of draft EIS]," which is supported by the Noise Assessment in Appendix II with "2 psf is taken to be the low threshold level for window (glass) breakage [p. 55 of draft EIS."	N-10
Electronic Attachment	Ward, Dave	County of Ventura	3	A map modeling the potential overall impact of Falcon Heavy similar to Figure 2 (attached) is not	N-04

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
		Resource Management Agency		included in the draft EIS. The draft EIS states that the anticipated launch frequency would not exceed 15 missile and 110 rocket launches per year (p. 3-45, draft EIS) and Falcon Heavy would launch a maximum of five times a year. Similar to Figure 2, please include modeling the sonic boom trajectory of the Falcon Heavy for five runs (proposed maximum number of rocket launches) and include a similar summary table identifying the percentage of overlapping sonic boom levels to determine the extent of impacts from the Falcon Heavy rocket to areas of the unincorporated County.	
Electronic Attachment	Ward, Dave	County of Ventura Resource Management Agency	4	The non-auditory behavioral effects of noise on humans are associated primarily with the subjective effects of annoyance, nuisance, and dissatisfaction, which lead to interference with activities such as communications, sleep, and learning. The non-auditory physiological health effects of noise on humans have been the subject of considerable research attempting to discover correlations between exposure to elevated noise levels and health problems, such as hypertension and cardiovascular disease. In addition, noise may interfere with or interrupt sleep, relaxation, recreation, and communication. To reduce adverse health impacts, it is recommended that all launches occur outside of 10:00 PM and 7:00 AM, to the maximum extent feasible.	N-01, N-08
Electronic Attachment	Ward, Dave	County of Ventura Resource Management Agency	5	The Proposed Action should include long term noise monitoring study measures to determine whether the [Ventura] County's protected sensitive natural resources are impacted by more frequent and louder sonic boom occurrences, that targets various wildlife taxa within the region that may also include pollinators/invertebrates, birds, reptiles, mammals,	BI-05

Source	Last, First Name	Organization/ Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				etc.	
Electronic Attachment	Ward, Dave	County of Ventura Resource Management Agency	6	In addition, draft EIS Sec. 3.5.1.6 does not include several special status species that occur within Ventura County. For example, Steelhead - southern California DPS (<i>Oncorhynchus mykiss</i>), California red-legged frog (<i>Rana draytonii</i>), Two-striped garter snake (<i>Thamnophis hammondi</i>), and several others. We recommend that a full list of special status species that have the potential to be impacted by the Proposed Action are included within the analysis of Special Status Wildlife Species. Sources of this information are available from the California Department of Fish and Wildlife's California Natural Diversity Database and iNaturalist. Habitats that support these species are also designated Environmentally Sensitive Habitat Areas (ESHA) within the County's coastal zone.	The EIS considered potential impacts to special status species occurring in Ventura County, including the steelhead (see Table 3.5-8 and Table 3.6-1), CRLF (see Table 3.5-9), and two-striped garter snake (see Table 3.5-10). The DAF performed Section 7 consultation for potential impacts to steelhead with NMFS in 2023 and 2024. In 2023, NMFS issued a LOC to the DAF that the action may affect, but was not likely to adversely affect specified ESA-listed fish species. In 2024, the DAF reinitiated this consultation to increase first stage and booster recoveries to 100 times per year, and expanding the first stage/booster and fairing recovery area in the Pacific Ocean. NMFS issued a LOC in 2024, concurring that the proposed action may affect, but was not likely to adversely affect the specified ESA-listed fish species. The EIS analyzes potential impacts to CRLF in Section 3.5.2.1.3 and in the BA (Appendix B of the EIS) in support of Section 7 consultation with the USFWS. Two-striped garter snake are not a federally listed species; however, an analysis of potential impacts to wildlife species, inclusive of this species, is provided in Section 3.5.2.1.2 of the EIS.
Electronic Attachment	Ward, Dave	County of Ventura Resource Management Agency	7	The following Ventura County General Plan biological policies may be relevant to the Proposed Action: General Plan Policy COS-7. 13 - Partnerships for Protection of Natural and Biological Resources: The County shall continue to work in partnership with agencies, organizations, and entities responsible for the protection, management, and enhancement of the county's biological resources.	DAF has considered the consistency of the Proposed Action with applicable regional plans and policies, including Ventura County's General Plan, to the extent that off-base impacts may affect areas within Ventura County. The analysis presented in this EIS indicates that while there may be minor regional contributions to air quality and noise, the Proposed Action is generally consistent with the goals and policies of the

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					Ventura County General Plan. No direct conflicts were identified. Sonic booms and launch noise are infrequent and localized; noise modeling indicates negligible impact in Ventura County. Mitigation and communication procedures are consistent with public safety goals.
Electronic Attachment	Ward, Dave	County of Ventura Resource Management Agency	8	The County's Local Coastal Program, Coastal Area Plan, is included in the General Plan and has a chapter for ESHA (Sec. 8178-2) with the following policy that may be relevant for the final EIS: Policy 6.19 Development shall be sited and designed to support biodiversity and to protect and enhance wildlife and plant habitat connectivity corridors as follows: a. Avoid the fragmentation of core habitat areas; b. Avoid the creation of corridor chokepoints and enhance habitat within existing corridor chokepoints; c. Minimize indirect impacts (e.g., lighting, noise, human-wildlife interactions) that alter wildlife behavior; and d. Avoid the placement of new structures or other barriers that disrupt species movements through habitat connectivity corridors.	The DAF found no inconsistencies with Ventura County's Local Coastal Program Policy 6.19 and remains committed to ensuring that the Proposed Action supports long-term biodiversity and ecological resilience, consistent with the intent of the County's policy.
Electronic Attachment	Ward, Dave	County of Ventura Resource Management Agency	9	Recommendations: Residential a. Model noise impacts (psf) for Falcon Heavy launches and summarize the results in a table like Table 1 in the draft EIS.	N-04
Electronic Attachment	Ward, Dave	County of Ventura Resource Management Agency	10	Recommendations: Residential b. Limit hours when the launches are scheduled to between 7:00 AM and 10:00 PM	N-01
Electronic Attachment	Ward, Dave	County of Ventura	11	Recommendations: Residential c. Analyze if atmospheric conditions when the launches may occur	The DAF performs sonic boom modeling for each Falcon launch which includes multiple historic

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		Resource Management Agency		would dampen the expected noise generation. Certain atmospheric conditions may dampen the sonic boom and reduce the noise impacts from the launches.	meteorological profiles that estimate the potential variability in both the sonic boom footprint on the surface of the earth and sonic boom levels. The DAF is also open to continued collaboration with academic institutions and regulatory agencies to improve the precision of modeling predictions. For example, SLD 30 began collaborating with Brigham Young University and California State University at Bakersfield in June 2024 to collect acoustic measurements in Santa Barbara, Ventura, and Northern Los Angeles counties during launches from VSFB. However, potentially constraining launch dates and times to certain meteorological conditions which can be difficult to predict would not allow the DAF to meet the purpose and need of the Proposed Action, as described in Sections 1.2 and 1.3 of the EIS. Sonic booms are brief and occur under controlled conditions during scheduled, publicly announced launches. Launch schedules posted in advance on official VSFB and SpaceX websites. The DAF regrets any distress caused by these events and encourages community members to stay informed through official launch notices. While the DAF cannot eliminate the noise, it remains committed to minimizing disruption where feasible and to ensuring public awareness and safety throughout all launch activities. To sign up for VSFB launch alerts, visit https://public.govdelivery.com/accounts/USDODS FVANDENBERG/signup/41755 .
Electronic Attachment	Ward, Dave	County of Ventura	12	Recommendations: Biological Resources a. Incorporate measures to collaborate with the	BI-04

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
		Resource Management Agency		shorebird and migratory bird monitoring programs being conducted by Naval Base Ventura County (NBVC) at Point Mugu, USFWS, California State University - Channel Islands, California Department of Fish and Wildlife (CDFW and Ventura Audubon Society at the following locations: Santa Clara River Estuary (herons, ducks, and other migrant birds); Hollywood, Ormond, and NBVC Point Mugu Beaches to measure sonic boom impacts on California least tern, Western snowy plover, and other migratory bird populations.	
Electronic Attachment	Ward, Dave	County of Ventura Resource Management Agency	13	Recommendations: Biological Resources b. Include in draft EIS Sec. 3.5.1.6 a complete list of protected species that occur in Ventura County within the noise impact area and within the coastal zone areas that are considered ESHA.	A complete list of special status species potentially occurring within the ROI, including Ventura County, was provided in the EIS in Tables 3.5-7 through 3.5-10.
Electronic Form	Wasow, Althea	The Satellite Coast Research Project	1	We are residents of Santa Barbara county, employees at UC Santa Barbara, and leaders of an ongoing research project called The Satellite Coast, which focuses on the social, economic, and environmental impacts of commercial satellite launching from VSFB. In June 2025 we attended the public hearings on the Draft EIS in Ventura, Santa Barbara, and Lompoc, as well as the virtual one. We deeply value the many voices we heard at the hearings and noted the strong pattern of public opposition to the proposed action to increase rocket launches and landings and redevelop infrastructure to support expanded Falcon 9 and Falcon Heavy operations. Many people of this region recommended the No Action Alternative that would deny SpaceXs proposal to launch a Falcon 9 or Falcon Heavy rocket from SLC-4 or SLC-6 every 3 days. We write here, however, to register concerns about the 45-day public review and comment period process itself. During the in-person and virtual public	CR-01, NP-02, NP-03

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				hearings, commenters and listeners were informed that these meetings were not the only public comment method, everyone who wants has an opportunity to comment. In addition to making a verbal comment or submitting a written statement at one of the hearings, the public was invited to review the Draft EIS and send comments by mailing a letter to ManTech International Corporation in Solana Beach CA or by submitting a comment through the EIS website. After attending all public hearings on the Draft EIS, pursuant to the National Environmental Policy Act (NEPA) commitment to public involvement, we urge the Department of the Air Force to support the No Action Alternative. DAF must hear from and include communities in the Draft EIS process who live, work, and engage in spiritual practices closest to SLC-4, SLC-6, and other VSFB sites of proposed action. These communities must be able to submit comments and offer their input to DAF for review prior to the preparation of the Final EIS. These communities include: people incarcerated at the federal prison, Lompoc Federal Correctional Complex, next to the southern boundary of VSFB; correctional officers, administrative personnel, medical and program staff who work at the prison, and correctional officers who live in housing across from it; agricultural workers doing crop production and field labor in the numerous farms adjacent to VSFB; labor organizations and unions that represent workers on and/or near VSFB; and, members of multiple Chumash and Indigenous Tribes, who are not only the ancestral owners of this land, but for whom these lands have profound significance today. 8 to 12 miles from rocket launching and landing at SLC-4 and SLC-6, 3,058 people are currently imprisoned at 2	

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				main low-security institutions at FCC Lompoc. The Draft EIS was available for viewing and download on the EIS website and hard copies were available for review at 8 libraries (including in Ventura, Lompoc, Ojai, Santa Barbara, Santa Maria, Oxnard, and on VSFB). While people who are incarcerated (and have the means) have access to mail service and could send a letter commenting on the Draft EIS, in effect, they are structurally excluded. The Draft EIS public review and comment process did not make hard copies available to Lompoc FCC prison libraries or information repositories. As a result, it is significantly less likely that people incarcerated or working at FCC Lompoc would have the opportunity to review the Draft EIS and provide comments on the Proposed Action and environmental analysis. To ensure fuller public participation in future EIS public review and comment processes related to VSFB, further outreach is necessary. All EIS documents and public hearing announcements should be shared with a broader array of residents and organizations, with particular effort to include communities living and working immediately adjacent to VSFB. As stated at the public hearings and on the EIS website, public involvement's crucial to the NEPA and National Historic Preservation Act process. In order to fulfill the goals of these important Acts, we implore DAF and cooperating agencies, to expand the notion of public in the EIS review process to include people who are incarcerated and farmworkers" due to their proximity, these communities are among those most impacted by rocket launches and landings at VSFB. It is crucial to take steps so that they are part of the public that is invited to review and provide comments. We close our comment with the	

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				suggestion that a community benefits agreement between Lompoc and the VSFB be deliberated and taken seriously. A community benefits agreement (such as Staples Center/L.A. Live CBA or the LAX CBA) could begin to address concerns about noise pollution, vibrations and material damages to housing, including long-term property depreciation, infrastructure funding, public education, environmental protections, and the future of the community. Sincerely, Lisa Parks and Althea Wasow	
Electronic Form	Wayson, William	N/A	1	I feel that the EIS' analysis of the impact from sonic booms is inadequate and unrelated to the proposed action. The analysis is probably based on studies of the effects of infrequent daytime sonic booms of local audibility mostly far from densely populated areas, the booms produced by small jets flying at supersonic speeds. The proposed action would produce a steady cadence of sonic booms every few days, at any hour of the day or night, that would be audible over hundreds, if not thousands of square miles that would include heavily populated areas. The array of effects of such sonic pollution are not addressed in the EIS.	N-11, PA-03
Electronic Form	Welcher, Andy	N/A	1	The Draft EIS as currently written has major flaws and should be rejected. The Draft EIS needs to be re-done in a more comprehensive fashion. Several major concerns include: 1) The Draft EIS takes a positive perspective on every potential impact without showing that the writers' assumptions are correct. There must be ongoing monitoring of ALL potential impacts as the launch cadence increases in order to rapidly detect and mitigate negative effects. Ongoing updates need to be provided to the public. 2) There is no mention of the impact of failed launches including explosions and crashes. Rockets malfunction and	N-02, S-01

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				SpaceX rockets malfunction explosively. With increased launches, failure is simply a matter of when not if. The Draft EIS fails to mention this likelihood, doesn't assess the likely negative impacts, or describe how a malfunction should immediately change the cadence of future launches until proper mitigation is in place. 3) Allowing SpaceX to adjudicate potential damages is the proverbial fox guarding the chicken coop. They will have no interest in pursuing such claims in a fair or timely manner. Damages MUST be assessed by an independent board with citizen participation and evaluation of the judgement process.	
Oral Comment Virtual	White, Dorene	N/A	1	One is the total lack of any consideration of the effect on the stratosphere. When my studies, the kerosene fuel leaves a black soot which can impact climate change.	AQ-01
Oral Comment Virtual	White, Dorene	N/A	2	I also have great concern about the whales and marine life. Apparently some of the sound will not penetrate the water, but during migration season when there's a lot of whales, I don't know how they can determine that no whale will be on the surface.	BI-02
Electronic Form	Whitman, Heidi	N/A	1	To Whom It May Concern, thank you for the opportunity to comment. I'm writing to express my opposition to a new launch facility and more launches from Vandenberg as discussed in the Draft Environmental Impact Statement (EIS) for the Falcon Launch Program at Vandenberg Space Force Base. While I recognize the importance of space exploration and national defense, I'm deeply concerned about the risks posed by increased rocket launches, including: 1. Noise pollution and sonic booms that damage homes, schools, wildlife, and community well-being as is stated in the EIS. 2. Air and water pollution from rocket emissions and launch	AQ-02, BI-04, HM-01, N-02, N-07, N-11, WR-04

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				debris, threatening health and ecosystems. 3. Plastic pollution from launches such as weather balloons that pollute our environment and endanger wildlife. 4. Hazardous waste and space debris that endanger public safety and future access to space. 5. Harm to wildlife and marine ecosystems, particularly the Channel Islands, as well as impacts on agriculture and tourism. I respectfully urge the agency to select the no additional launches alternative to avoid these serious impacts. If launches are allowed, I request stronger protections, including: 1. Real-time noise, air, and water monitoring 2. Public notification systems before launches 3. Emergency response plans with local coordination 4. Transparent waste management and reporting 5. Safeguards for wildlife and habitat protection, and 6. Compensation for damage to my home. We must prioritize public health, environmental protection, private property and community safety in this process. I live in Ojai, CA, and this directly affects our community. I have seen the effects on our homes, pets, and well-being. Each time there's a sonic boom, it feels like a 5.0 earthquake, and I've noticed huge cracks in the plaster ceilings in my historic home. It's affecting our quality of life now, and I'm concerned about the future if this program moves forward. Thank you for considering my comments. Sincerely, Heidi Whitman	
Mailed	William, Fot	N/A	1	I am concerned that the Draft EIS does not include multi-year studies assessing impacts of species.	NP-01
Electronic Form	Wilson, James	N/A	1	I wish to comment on Appendix 2, Part G: Sound. The conclusions include: The potential for structural damage assessment indicates that damage claims can be expected at 1 in 1,000 residences located within the maximum unweighted 111 dB noise contour for certain launch events; the 111 dB contour extends to	N-02, N-06, N-09

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				the west side of Lompoc for Falcon 9 launches from SLC-4 and this noise contour extends to the east side of Lompoc for Falcon Heavy launches from SLC-6. For booster landing events at both sites, SLC-4 and SLC-6, boom levels are unlikely to cause structural damage. These conclusions are based on models, without any mention of uncertainties. If the models predict damage claims for 1 in 1000 residences for a single launch event, that implies damage claims for 1 in 10 residences for 100 launches per year. Given that there is a possibility of structural damage in Lompoc I feel that it is essential the models be supplemented with in-situ measurements from e.g. SPL meters, atmospheric overpressure gauges and accelerometers attached to structures around Lompoc. These data will validate the model results and provide an unambiguous determination of risk to many residents greatest investment: their homes. Absent these hard data I feel strongly it is premature to increase the number and intensity of launches from Vandenberg SFB.	
Electronic Form	Wilson, John	N/A	1	The best alternative to increased launches at the Falcon Launch Program is to take no action at all and disallow Falcon 9 and Falcon Heavy launches from any space launch complex in Santa Barbara or Ventura counties. This opinion is based on just one factor: NOISE. Based on my experience of sonic booms in the recent past, I have no doubt that more and larger booms would have a shocking impact and cumulatively a detrimental one for residents in Ojai. Past booms, which always come unexpectedly, have sounded and felt like an oak tree falling suddenly on my roof. The whole house moves against its anchor bolts, windows rattle, and I am stunned for a long time. That has to be true for Ojai residents in general.	N-03, N-07

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				unless they are on vacation somewhere or anesthetized. No study claiming to have employed the "best science" to date can contradict experiential fact. I hope never to experience sonic booms by Falcon Heavies. Notwithstanding detrimental impacts on air quality and marine life, the harmful effects on human health (both physical and mental) are enough for me to say NO to more and louder Falcon launches, and YES to fewer and quieter launches or none at all.	
Electronic Form	Woodbridge, Bill	N/A	1	I and 10's of thousands of residents in the Lompoc and Santa Barbara areas are in favor of the "NO ACTION" alternative. This project is nothing more than a boondoggle for Elon Musk and SpaceX profits. Putting the Air Force in charge of the E.I.S. is a lot like putting a fox in charge of building the chicken coop, or like putting Elon Musk in Charge of the Federal Agencies (we have seen what that has destroyed). The existing and future damage (multiplied by this 100% increase in launches and heavier launches) is and will be devastating to our air quality, peaceful living, water quality, sealife, and wildlife. This E.I.S. conveniently does not address the mental, physical and neurological declining health of the community residents who are moving out of Lompoc due to the constant stress caused by frequent loud sonic booms and smoke. Is that omission just reflecting a poor, incomplete job on the E.I.S., or was it an intentional exclusion of derogatory information??? The real estate values in the area have dropped and will fall off of a cliff if this increased activity is approved. Who is going to pay all of the residents for their lost assets? Not the government, not Elon Musk, and not the Air Force. So this is a form of Emminent Domain without any compensation!!!! Wildlife has left the area. The eggs of any remaining birds will be cracked	N-02, N-08, SE-03, T-02

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				by the sonic booms. I suggest that the Air Force move the additional and heavier launches to SpaceX City in Texas where there are nowhere near as many residents and sensitive environments. This project is a travesty waiting to happen. There will be rockets exploding over land (major disasters), and fuel/toxins released into the ocean and on land/our beaches from launches and rocket pieces falling into the ocean. PLEASE DO NOT GO FORWARD WITH THIS PLAN!!	
Oral Comment Santa Barbara	Woodbridge, Bill	N/A	2	This project disregards or whitewashes the effects that these additional launches, much less the existing ones, will have on sea life, on seabirds, on nesting birds. If it can crack windows and stucco and crown moldings clear down in San Roque, it will certainly crack the eggs of any bird that's stupid enough to still nest anywhere close to this area.	BI-04; As discussed in Section 5.1.9.2 of Appendix B of the EIS, the sonic booms produced during first stage landing are of vastly insufficient levels to break avian eggs (Ting et al. 1997). Bowles et al. (1994) found that sonic boom forces up to 30 psf were not sufficient to damage chicken eggs or embryos. While chicken eggs are larger than snowy plover and least tern eggs, Bowles et al. (1994) argued that chicken eggs were more susceptible to damage than smaller eggs because larger eggs will resonate more with the low frequencies produced by a sonic boom. Furthermore, Bowles et al. (1991) found that sonic boom forces up to 200 – 400 psf were not sufficient to damage intact eggs or further damage eggs with pre-existing cracks. Finally, Ting and Bowles (2002) predicted that a sonic boom would need to create a minimum force of 250 psf before damage to an egg would occur. (see Appendix B for cited literature).
Oral Comment Santa Barbara	Woodbridge, Bill	N/A	3	It will put toxic fumes in the air, destroy our atmosphere. It will put toxic particles and things on the ground and in the ocean water with the cylinders landing in the water or being destroyed and landing in the water.	AQ-02; After separation, the vast majority of Falcon first stage boosters land on droneships at sea or back at the launch site and are then reused for future launch missions.

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
Oral Comment Santa Barbara	Woodbridge, Bill	N/A	4	I would suggest that the Air Force have SpaceX launch its additional rockets from its facility in Texas in SpaceX City. Why can't they do that? There are no -- there are not as many residents anywhere near close by that facility as there are in Lompoc.	PN-03
Electronic Form	Woodman, Lorraine	N/A	1	Section 3.4.2.1.2, Page 3-25 says "Launch events are the loudest single events of all the proposed Falcon flight and test operations." The EIS is in error, as Falcon 9 booster landings have created sonic booms heard very loudly in Santa Barbara and much louder than any launch event. Section 3.4.2.1.2, Page 3-25 (and repeated several more times in Section 3.4.2) says "However, noise-induced stress can activate the body's sympathetic nervous system, leading to elevated blood pressure and heart rate (Sobotova et al. 2013). Noise at night, even at relatively low levels, can disrupt sleep cycles, reduce sleep quality, and lead to long-term health consequences such as fatigue and cognitive impairments (Basner 2005). Additionally, noise exposure can contribute to stress, anxiety, depression, and reduced overall well-being and interfere with concentration, productivity, and relaxation, exacerbating psychological distress (Stansfeld & Matheson 2003). The frequency of these events would not be expected to cause chronic health problems. The DEIS provides no evidence to support this conclusion. In addition, acute health effects also are important. If someone experiences the above-mentioned symptoms from a launch event, this should be considered a significant impact. The EIS is inadequate, as it does not include these symptoms as NEPA significance criteria for the evaluation of potential health effects from the proposed launches. I was awakened from a deep sleep in Santa Barbara from a Falcon 9 booster landing sonic boom and that	N-01, N-08

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				was a startling experience and not one I want to repeat. For the DEIS to claim that such an impact is not significant is preposterous and inadequate. Page 3-47, Section 3.4.2.5 says “implementing the following EPM would avoid or minimize potential adverse effects to noise during the Proposed Action. In order to minimize any potential disturbance to human populations as a result of sonic boom, SLD 30 provides notification prior to each launch mission through social media and an opt-in launch alert text and email system, which includes a message indicating areas of potential sonic boom impact.” The current launches get delayed so often that the notification process has become less effective and suffers from the cry wolf syndrome. The overwhelming majority of people in the region do not and will not subscribe to these notifications so this EPM will do little to mitigate public noise impacts. Moreover, how does this EPM in any way protect either the environment or the impacts of noise on the public? Providing a notification that a launch is going to occur would not prevent someone from being awakened or otherwise reduce the disturbance experienced by the launch. At a minimum, the DAF should implement the following mitigation to lessen proposed noise impacts during the most critical noise-sensitive evening hours “implement a curfew on proposed operations so that launches do not occur between the hours of 10 PM and 7 AM local time. The San Diego International Airport implements a similar measure to minimize public noise impacts from their commercial air operations. If a place as busy as the San Diego International Airport can implement such a measure, then so can the proposed action at VSFB regardless of the minor inconvenience	

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				it might impose on such operations.	
Electronic Form	Yananton, Leah	N/A	1	I am adding further written comments here in this 3rd part due to the 5,000 character limit on your website. The EIS must be expanded to include the cumulative and global effect that SpaceX rocket launches have on the acceleration of melting polar ice caps in the Antarctic and Arctic, and also study the impact on the ice melting in the glaciers of Alaska, South America, Greenland, Switzerland, and the Himalayas. I urge the Space Force to declare the No Action Alternative: The DAF would not authorize any Falcon 9 or Falcon Heavy launches or landing operations at, or modifications to, SLC-6, nor would the DAF authorize additional Falcon 9 launches from SLC-4. The FAA would not license Falcon operations at SLC-6 or an increase in Falcon 9 launches at SLC-4. The Space Force and DoD must rescind policies and strategies that degrade our natural resources and environments and rescind policies and strategies that would cause women and children and men to suffer and instead invest military budgets in programs and services that promote human well-being, which is where real security lies. The current trajectory of accelerating human suffering and mass death in extinction-level war games and consequences must be abandoned. Thank you for your attention and concern for the well-being of humanity and Earth resources for this generation and future generations to come.	AQ-05
Electronic Form	Yananton, Leah	N/A	2	In addition to my spoken public comment, I am adding further written comments here in 2 parts due to the 5,000 character limit on your website. Part One: I support the No Action Alternative” there should be no redevelopment or expansion of SCL-6/Space Launch Complex 6, and no increase in the number of	AQ-01, CE-01; In regard to the request to consider if the Proposed Action would cause an arms race, political implications are not considered within the framework of NEPA.

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				SpaceX rockets Falcon 9 and/or Falcon Heavy launches. The current 50+ launches a year are already too many and the Environmental Impact Statement needs to catch up with the damage that is already being incurred on our habitat. Why aren't the current launches being examined and measured for their ongoing and cumulative environmental impacts? I respect our military and I love our country. As the DoD is here to protect and serve this great country of America, the current determinations by the DAF are quantitatively insufficient in data and analysis. Currently SpaceX does not provide any clean-up program nor any program to heal the ecosystems and living creatures that have been impacted and harmed by launches, reentries, anomalies, or explosions. SpaceX is a company that has received billions and billions of dollars from the U.S. Government, NASA, and In-Q-Tel as is common knowledge, so why has SpaceX failed to give back to America's resources with programs to heal and repair the damage it profits from incurring? The EIS needs to be expanded to include the projection of long-term and cumulative effects on the troposphere, stratosphere, ozone layer, mesosphere, thermosphere, and on the exosphere. The EIS needs to be expanded to thoroughly examine the impact on our climate. The EIS needs to be expanded to include the projection of long-term changes and degradation that the SpaceX launches will cause to living habitats and all resources as a consequence to its emissions, debris, and penetration of our atmosphere layers, with scrutiny of its impact on biosphere integrity, on genetics and functional systems, ocean acidification, and on atmospheric aerosol loading and particulate pollution, with attention to preventing irreversible	

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				change and harm. Why would the U.S. Space Force rush past these very vital and important data sets in the name of security, to be actually putting our National Security in jeopardy? The strategy of putting numerous satellites into orbit for security, whether for deterrence or in concept to make it harder for an enemy to shoot them down, or for surveillance, needs to be scrutinized for cause and effect and long-term consequences analyzed in this EIS. The EIS must also include how this strategy of increasing launches and increasing satellites will cause an arms race” which is a socioeconomic impact as well as hurdling us towards a nuclear war and explain in the EIS, why would a nuclear war and escalation of one is even being considered when it would not be survivable for the entire planet? The CEO of SpaceX has publicly expressed that he doesnt think dropping a nuclear bomb is a big deal. The Environmental Impact Statement must include a mandatory cumulative assessment from all Space Force actions & operations, as well other military and energy departments within the Department of Defense, such as the Navy, Marines, Air Force, Army, and National Nuclear Security Administration, and their cumulative long-term effects on ecosystems and livable habitats for all biological life, with scrutiny and focus on the impacts on human females, fertility both males and females, and on the health of children during the exponential increase of waste-streams from all functions of the military, including from the fossil fuel extraction for all departments of DoD operations, mineral mining, machine manufacturing, all the way to testing to deployment. All of the energy emissions are quantifiable and the impact on natural and biological resources must be measured in this EIS.	

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				This must include data from all DoD departments and as an example, the Marines & Navys permitted takes of mammal life and marine life, to also include the department of the NNSA and its nuclear radioactive waste and clean-up plan or reason why there isn't concern to clean up radioactive waste sites on bases, power plants, and in places that are in precarious states of danger such as the Runit Dome on the Marshall Islands, the integrity of which is being threatened by rising sea levels, as well as the radioactive nuclear waste stored at Fort Hueneme, and nuclear power plants that were built on fault lines. The EIS should include quantitative study of the link between launches into space, satellite orbit, moon landings, and space travel and the impacts on Earth's geological activity such as earthquakes.	
Oral Comment Ventura	Yananton, Leah	N/A	3	The EIS needs to be expanded to include likelihood of accidents. So the environmental impact of anticipated accidents needs to be taken into effect.	S-01, S-02
Oral Comment Ventura	Yananton, Leah	N/A	4	And the projection of long-term effects on our climate and climate change should be included in the EIS, including biosphere integrity on genetics and functional systems, on ocean acidification, and atmospheric aerosol loading with attention to preventing irreversible change in harm and the cumulative environmental impact of global launches with atmospheric aerosol loading and particle pollution and to quantify the boundaries of planetary boundaries and effect on planetary boundaries. Not just from launches, but also reentries and also from satellite disintegration.	AQ-01, AQ-05; The purpose of this NEPA review is to evaluate the potential environmental impacts of authorizing up to 100 Falcon launches annually from VSBF, rather than to assess downstream impacts of orbital operations, which are regulated and reviewed under separate statutory authorities. The Proposed Action authorizes a maximum annual launch cadence, not a specific manifest. The actual number, size, and type of satellites vary by mission and customer, and are subject to change based on national security priorities, commercial contracts, and other factors outside the authorization of the DAF. Providing an estimated satellite count would therefore not reflect a reliable or meaningful basis for environmental analysis. The EIS focuses on the

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
					environmental impacts associated with launch operations, rather than variable, speculative effects of on-orbit payload behavior or atmospheric reentry events, which depend on specific mission profiles and are not uniform across all launches. Additionally, in May 2025, the U.S. Supreme Court issued a ruling in <i>Seven County Infrastructure Coalition v. Eagle County</i> , clarifying the scope of federal agencies' obligations under NEPA. The Court held that NEPA requires agencies to analyze environmental effects that are proximately caused by the agency's action and within the agency's jurisdiction or control. Agencies are not required to assess speculative or attenuated effects from actions that occur outside the scope of the agency's authority. In alignment with this precedent, revision to the NEPA analysis is not warranted. The DAF and its launch partners comply with federal requirements, including those administered by the FAA, related to orbital debris mitigation and end-of-life planning for spacecraft. While the EIS does not address on-orbit operations, launches from VSFB are subject to licensing requirements that include orbital debris minimization measures. The DAF appreciates the public's engagement in the NEPA process.
Oral Comment Ventura	Yananton, Leah	N/A	5	The EIS must include a mandatory cumulative assessment from other departments under the Department of Defense and their environmental impacts and its long-term effects on livable habitats for all biological life. And that must include all departments from the Navy and its takes on mammal life to the NMSA and nuclear radioactive waste such as the nuclear waste at Port Hueneme nearby.	CE-01

Source	Last, First Name	Organization/ Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
Oral Comment Ventura	Yananton, Leah	N/A	6	The EIS should include quantitative studies of the link between space launches and its effects on geological activity such as earthquakes.	N-12
Oral Comment Ventura	Yananton, Leah	N/A	7	It should also look at the issue of space junk.· Already 30,000 objects bigger than a softball are hurling in low-earth orbit ten times faster than bullets.	The purpose of this NEPA review is to evaluate the potential environmental impacts of authorizing up to 100 Falcon launches annually from VSFB, rather than to assess downstream impacts of orbital operations, which are regulated and reviewed under separate statutory authorities.
Electronic Form	Yuzer, Sahap	N/A	1	To whom it may concern, I am writing to express my strong concern about potential damage to nearby houses and structures from rocket launches and landings at Vandenberg Space Force Base (VSFB). The Environmental Impact Statement (EIS) reports that shock waves from rocket launches, landings, and associated sonic booms can affect nearby structures, particularly when overpressures reach 2 psf or greater. At these levels, the probability of damage to windows, brittle materials, and weak structures "especially those already in poor condition" increases. The EIS further highlights that 4 psf overpressures, while less frequently occurring, pose a greater risk of damage to nearby properties, particularly those constructed with less robust materials. I am strongly opposed to the proposal to make SpaceX the sole point of contact for damage complaints and resolution. The Department of Air Force and its regulators should not entirely transfer responsibility to a commercial operator when the federal government is directly authorizing and benefiting from these operations. Furthermore, many members of the community may find it confusing or unfair to pursue a private company for damage that results from operations under federal oversight and approval. Therefore, I respectfully request that the	N-02, N-09; Consistent with the Secretary of Defense's strategic vision, the DOD is strengthening partnerships with commercial entities and integrating commercial space capabilities. While Title 51, Chapter 509 of the USC mandates that licensees secure liability insurance equal to the potential maximum probable loss, the DAF does not direct the implementation of licensees' specific insurance and claims processes.

Source	Last, First Name	Organization/Affiliation	Individual Comment #	Comment	Response Code (see Table E-6) and/or Unique Response
				Department of Air Force and its regulators, alongside SpaceX, be designated as responsible parties for addressing damage complaints and making affected homeowners whole. There should be a clear, impartial, and accessible process for investigating complaints, assessing damage, and providing appropriate repairs or compensation. Additionally, I urge the Department of Air Force to establish a neutral oversight body or escalation point," separate from Space to handle disputes and appeals if affected residents are not adequately compensated through the initial process. This approach will help assure the community that their complaints will be treated fairly and impartially, and it underscores the federal governments role in protecting the well-being of nearby communities. Additionally, I want to express strong opposition to adding more launches and landings that will further disturb the residents of Lompoc and nearby communities. The current launch schedule already subjects us to significant noise, vibrations, and disruptions, affecting our daily lives and peace of mind. Increasing the number of operations to up to 100 per year will only exacerbate these impacts and undermine the ability of Lompoc families to enjoy their homes in peace and safety. The Department of Air Force should reconsider whether adding more launches is reasonable or appropriate for a community already experiencing substantial effects from the existing launch activity. Thank you.	

Table E-8. Non-Substantive Commenter List

Source	Last, First Name	Organization/Affiliation
Electronic Form	AbouSamra, Moustapha	Not Applicable (N/A)
Electronic Form	Abou-Samra, Jamil	N/A
Electronic Form	Adams, Erica	N/A
Electronic Form	Adams, Tucker	N/A
Electronic Form	Allred, Tracy	N/A
Electronic Form	Archer, Luke	N/A
Electronic Form	Bader, Bart	N/A
Electronic Form	Baker, Emmie	N/A
Electronic Form	Bea, Chri	N/A
Electronic Form	Beaman, Budd	N/A
Electronic Form	Behnke, Karen	N/A
Electronic Form	Bertoy, Diane	N/A
Electronic Form	Birely, Sarah	N/A
Electronic Form	Blanton, Carol	N/A
Electronic Form	Blumenthal, Kate	N/A
Electronic Form	Bolelli, Daniele	N/A
Electronic Form	Bonnet, Michele	N/A
Electronic Form	Boswell, Joshua	REACH
Electronic Form	Brintzenhofe, Ashley	N/A
Oral Comment Virtual	Brady, Theresa	N/A
Electronic Form	Brisco, Lola	N/A
Mailed	Brook, Lisbet	N/A
Electronic Form	Brooks, Sierra	N/A
Electronic Form	Brophy, Heather	N/A
Electronic Form	Brown, Janet	N/A
Oral Comment Virtual	Buckingham, Rich	N/A
Electronic Form	Business, Nunya	N/A
Electronic Form	Byers, Russ	N/A
Electronic Form	C, S	N/A
Electronic Form	Carter, Laurie	N/A
Electronic Form	Chafe, Maya	N/A
Electronic Form	Chambers, Dana	N/A
Oral Comment Virtual	Chris	N/A
Electronic Form	Cohen, Rosanna	N/A
Electronic Form	Corry, Rachel	N/A
Electronic Form	Davis, Holly	N/A

Source	Last, First Name	Organization/Affiliation
Electronic Form	DeAngelo, Gina	N/A
Electronic Form	Deluna, Brenda	N/A
Electronic Form	England, David	N/A
Electronic Form	Falcon, Leanna	N/A
Electronic Form	Faraci, Ellis	N/A
Electronic Form	Fior, Joseph	N/A
Electronic Form	FitzGerald, Caity	N/A
Electronic Form	Fradkin, Gary	N/A
Electronic Form	Gagnon, Bruce	Global Network Against Weapons & Nuclear Power in Space
Electronic Form	Garcia, Carmelita	N/A
Electronic Form	Gianfala, Gina	N/A
Electronic Form	Gray, Evelyn	N/A
Electronic Form	Hahn, A	N/A
Electronic Form	Harding, Leah	N/A
Electronic Form	Herrick, Sherri	N/A
Electronic Form	Ho, Jennifer	N/A
Electronic Form	Hummer, Caroline	N/A
Electronic Form	Isaac, Morgan	N/A
Electronic Form	James, Melissa	REACH
Oral Comment Virtual	Jan	N/A
Electronic Form	Jantzen, Carell	N/A
Electronic Form	Jeffery, Tara	N/A
Electronic Form	Johnson, Brent	N/A
Mailed	Kaylor, Jody	N/A
Electronic Form	Knapp, Wyatt	N/A
Electronic Form	Krueger, Carolyn	N/A
Electronic Form	Kunhardt, Tom	N/A
Electronic Form	Kuraishi, Mayce Al	N/A
Electronic Form	Larson, Jillian	N/A
Electronic Form	Larson, Jody	N/A
Electronic Form	Larson, Scot	N/A
Electronic Form	Lauriello, Judy	N/A
Electronic Form	Lepkowsky, Charles	N/A
Electronic Form	Leyva, Lisbeth	N/A
Oral Comment Virtual	Lindbeck, Miriam	N/A
Electronic Form	Leyva, Sophia	N/A
Electronic Form	Lozano, Vonda	N/A
Electronic Form	Luna, Hayley	N/A

Source	Last, First Name	Organization/Affiliation
Electronic Form	Luna, Zabdiel	N/A
Electronic Form	Mann, Lee	N/A
Electronic Form	Mansfield, Margaret	N/A
Oral Comment Virtual	McHenry, Keith	N/A
Electronic Form	McKenzie, Alan	N/A
Electronic Form	McPherson, Melanie	N/A
Electronic Form	Meyer-Morris, Deborah	N/A
Electronic Form	Minooofar, Payam	N/A
Electronic Form	Moreno, Melanie	N/A
Electronic Form	Munoz, Shanna	N/A
Electronic Form	Nani, Jill	N/A
Electronic Form	Newville, Meagan	N/A
Electronic Form	Nyman, Nancy	N/A
Electronic Form	O'Donnell, Lauren	N/A
Electronic Form	Okamoto, Derek	N/A
Oral Comment Virtual	Oki, Peggy	N/A
Electronic Form	Osorio, Mario	N/A
Electronic Form	Owen Jr, Jack	N/A
Electronic Form	Padfield, John	N/A
Electronic Form	Panchal, Jennifer	N/A
Electronic Form	Paris, Samantha	N/A
Electronic Form	Pederson, Joel	N/A
Electronic Form	Perry, Eileen	N/A
Electronic Form	Perry, Kelsey	N/A
Electronic Form	Pierce, Jeff	N/A
Electronic Form	Pierszalowski, Susan	N/A
Electronic Form	Plaister, Deane	N/A
Electronic Form	Pope, Kalyn	N/A
Electronic Form	Potwora, John	N/A
Electronic Form	Powers, Marlana	N/A
Electronic Form	Prince-Potwora, Roe	N/A
Mailed	R, L	N/A
Electronic Form	Raine, Michelle	N/A
Electronic Form	Richard, Shannon	N/A
Electronic Form	Rodrigues, Karen	N/A
Electronic Form	Roos, Marc	N/A
Electronic Form	Ruhge, Justin	N/A
Electronic Form	Seldin, Lila	N/A

Source	Last, First Name	Organization/Affiliation
Electronic Form	Shreaves, Dana	N/A
Written Comment Lompoc	Smith, Terry	N/A
Mailed	Soske, Julie	N/A
Electronic Form	Spangler, Lore	N/A
Electronic Form	Speth, Debbie	N/A
Electronic Form	Springer, Sarah	N/A
Electronic Form	Stauffer, Judith	N/A
Electronic Form	Stewart, Nora	N/A
Electronic Form	Stoker, Mike	Santa Barbara County Taxpayer Advocacy Center
Electronic Form	Stone, Katherine	N/A
Electronic Form	Subramaniam, Sylvia	N/A
Electronic Form	Swift, David	N/A
Electronic Form	Tabacchi, Fred	N/A
Oral Comment Ventura	Temkin, Mark	N/A
Electronic Form	Tiger, S	N/A
Oral Comment Virtual	Weiss, Elaina	N/A
Electronic Form	Walters, LeAnn	N/A
Oral Comment Lompoc	Wilkinson, Brad	N/A
Electronic Form	Wolk, Susan	N/A
Electronic Form	Yarbrough, Jim	N/A
Electronic Form	Z, Zach	N/A
Electronic Form	Zaboski, Michael	N/A