DRAFT ENVIRONMENTAL IMPACT STATEMENT

SPACEX STARSHIP-SUPER HEAVY LAUNCH VEHICLE AT LAUNCH COMPLEX 39A

at the Kennedy Space Center, Merritt Island, Florida

Volume II, Appendix B.7

August 2025

Federal Aviation Administration

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Appendix B *Regulatory Consultations*

This appendix provides regulatory consultation documentation for Endangered Species Act Section 7 consultation with the United States (U.S.) Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS), Magnuson-Stevenson Fishery Conservation and Management Act consultation with the NMFS, National Historic Preservation Act (NHPA) Section 106 consultation with the Florida State Historic Preservation Officer (SHPO), U.S. Department of Transportation Act Section 4(f) consultation with officials with jurisdiction over affected properties, Coastal Zone Management Act consultation with the Florida Department of Environmental Protection, and Marine Mammal Protection Act Incidental Harassment Authorization with NMFS.

B.7 Marine Mammal Protection Act Incidental Harassment Authorization (NMFS)

On April 22, 2024, SpaceX provided NMFS an application for an Incidental Harassment Authorization (IHA) under the Marine Mammal Protection Act (MMPA) for the taking of marine mammals incidental to Starship-Super Heavy operations at LC-39A, among other locations. On December 17, 2024, NMFS provided a response to the IHA Application via email indicating that the proposed activities are not likely to result in the incidental take of marine mammals under NMFS' jurisdiction. NMFS further concluded that, given the expected lack of incidental take, issuance of an IHA under the MMPA in response to the application is not warranted. The IHA application and NMFS response are included in the EIS appendix.

B.7.1 Incidental Harassment Authorization Application

Incidental Harassment Authorization Application SpaceX Starship-Super Heavy Launch Vehicle and Reentry Operations

22 April 2024

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ACRONYMS AND ABBREVIATIONS

AFTT	Atlantic Fleet Testing and Training
CCSFS	Cape Canaveral Space Force Station
dB	Unweighted decibel(s)
E	East
EIS	Environmental Impact Statement
ESA	Endangered Species Act
EEZ	Exclusive Economic Zone
GOMEZ	Gulf of Mexico
IHA	Incidental Harassment Authorization
km	kilometer(s)
km^2	square kilometer(s)
KSC	Kennedy Space Center
LC	Launch Complex
LOX	Liquid Oxygen
MHI	Main Hawaiian Islands
mi.	mile(s)
MMPA	Marine Mammal Protection Act
MT	Metric tons
NCI	North Channel Islands
NE	Northeast
NM	nautical miles
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NW	Northwest
PIFSC	Pacific Islands Fisheries Science Center
psf	pounds per square foot
RES	Relative Environmental Suitability
RTLS	Return to Launch Complex
SDM	Species Distribution Model
SE	Southeast
SEFSC	Southeast Fisheries Science Center
SLC	Space Launch Complex
SMI	San Miguel Island
SpaceX	Space Exploration Technologies Corporation
SAR	Stock Assessment Report
U.S.	United States
U.S.C.	United States Code
USAF	United States Air Force
USSF	United States Space Force
VSFB	Vandenberg Space Force Base
W	West

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1 Description of Specified Activity

1.1 Introduction

Space Exploration Technologies Corporation (SpaceX) has prepared this application for an Incidental Harassment Authorization (IHA) for the taking, by Level B harassment, of marine mammals' incidental to increased cadence of Starship-Super Heavy launch and reentry operations. SpaceX is proposing to increase the Starship-Super Heavy launches to a total of 145 times per year. The Boca Chica launch site is the only current operationally Starship launch site. LC-39A and Cape Canaveral Launch Sites are completely new launch sites. (See Table 1.1).

Table 1-1: Proposed Launches per year from Each Launch Site

Launch Complex	Launches per year
Starbase, Boca Chica TX	25
LC-39A at Kennedy Space Center, FL	44
Cape Launch Site, Cape Canaveral Space Force Station (CCSFS), FL	76

SpaceX plans to land the reusable Super Heavy (booster) and Starship (ship) back on land at its launch site or on floating platforms in the ocean. As SpaceX continues to develop the capability to perform a return to launch site landing of the booster and/or ship, some vehicles may not be reused and are instead expended in the ocean in the following three conditions depending on the stage of development of the program:

1. In-flight breakup - Breakup during reentry resulting in debris falling into the ocean
2. Explosion at the surface of the water
    - 2A. Hard landing at terminal velocity and break up on impact resulting in an explosive event inside Starship or Super Heavy where the overpressure event propagates into the surface of the water
    - 2B. Soft water landing and tip over and explode on impact within Starship or Super Heavy where the overpressure event propagates into the surface of the water
3. Soft water landing and tip over and sink

Of the above scenarios, SpaceX anticipates no more than 25 In-flight breakups of the vehicle resulting in debris falling into the water and 20 explosive events at the surface of the water for each vehicle from November 2024-November 2025. Super Heavy could be expended in a target area in the Atlantic Ocean or the Gulf of Mexico while Starship could be expended in the Pacific Ocean west of Hawaii, northeast Pacific Ocean, southeast Pacific Ocean or Indian Ocean.

Under the Marine Mammal Protection Act (MMPA), 16 United States (U.S.) Code (U.S.C.) Section 1361 *et seq.*, the Secretary of Commerce shall allow, upon request, the incidental, but not intentional, taking of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographic region. The term "take" means "to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal" (16 U.S.C.

§ 1362[13]). IHAs are for actions that result in harassment (i.e., injury or disturbance) only and are effective for one year.

1.2 Specified Activity

1.2.1 Super Heavy (First Stage) Launched and Landings

SpaceX plans to land the reusable Super Heavy (booster) back on land at its launch site or on floating platforms in the ocean, land at terminal velocity and break up upon impact or soft water land and tip over or explode. A return to launch site (RTLS) or landing on a floating platform would occur after stage separation of the Super Heavy from Starship, the flight plan is for Super Heavy to conduct a boost-back burn prior to descending into the atmosphere. After descent through the atmosphere, Super Heavy would conduct a landing burn as it returns to the launch site or lands on a floating platform. Overpressure events are described in the following paragraph below.

The Action includes up to 20 total overpressure events of the Super Heavy booster (first stage) resulting in an explosion in the Gulf of Mexico Landing Area (Figure 4) off the coast of Boca Chica, Texas and in the Atlantic Ocean off the coast of CCSFS (Figure 5). After stage separation of the booster from the ship, the booster would conduct a boost-back burn prior to descending into the atmosphere. After descent through the atmosphere, some residual propellant (approximately 74 metric tons) would remain in the booster, which would impact the Gulf of Mexico or Atlantic Ocean action area. As described in Section 1.1, an overpressure event would result from the following two conditions: (1) landing at terminal velocity resulting in an explosive event within Super Heavy and break up on impact resulting in an over pressurization event which propagates into the surface of the water or (2) soft water landing and tip over and sink or explode inside Super Heavy and the overpressure event would propagate into the surface of the water.

1.2.2 Starship (Second Stage) Landings

SpaceX plans to land the reusable Starship (ship) back on land at its launch site or on floating platforms in the ocean, land at terminal velocity and break up upon impact or soft water land and tip over or explode. Starship would complete its payload mission and maintain trajectory to the landing locations (RTLS or floating platform). Overpressure events for Starship are described in the following paragraph below.

The Action also includes up to 20 total overpressure events of Starship (second stage) at the surface of the water in the Indian Ocean Landing Area (Figure 3) and/or in three potential landing areas in the Pacific Ocean (Figure 1 and 2) to accommodate new trajectories proposed by SpaceX. Landing events would generally proceed as follows- after ascent engine cutoff, the ship would retain residual propellant in the main tanks and in the header tanks (approximately 101 metric tons). Following an in-space coast phase, Starship would begin its descent. During descent, when the second stage is supersonic, a sonic boom (overpressure of high-energy impulsive sound) would be generated but would be directed entirely at the ocean or uninhabited land masses. Some residual propellant (approximately 31 metric tons in the headers and approximately 70 metric tons in the main tanks) would remain in the ship. As described in Section 1.1, an overpressure event would result from the following two conditions in the landing areas: (1) landing at terminal velocity resulting in an explosive event within Starship and break up upon impact resulting in an over pressurization event which propagates into the surface of the water or (2) soft water landing and tip and explode inside Starship and the over pressurization event which propagates into the surface of the water. The impact would disperse settled remaining propellants and drive structural failure of the vehicle, which would allow the remaining liquid oxygen (LOX) and methane to mix, resulting in an explosive event within Starship and the overpressure event would propagate into the surface of the ocean.

2 Dates, Duration, and Specified Geographic Region

The Proposed Action would begin in November 2024 and end in November 2025. Launch operations would occur day or night, at any time during the year. Up to 145 Starship-Super Heavy launches would be performed at KSC, Florida, CCSFS, Florida, and Boca Chica, Texas. The Starship could be expended in the Northwest Pacific Starship Landing Area (**Figure 1Error! Reference source not found.**, pink area), Northeast Pacific Landing Area (**Figure 1**, green area) Southeast Pacific Starship Landing Area (**Figure 2Error! Reference source not found.**), or Indian Ocean Starship Landing Area (**Figure 3**). For each mission, Super Heavy could be expended in the Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location (**Figure 4**) or the North Atlantic Ocean Super Heavy Landing Area (**Figure 5**), depending on the launch location.

Due to its large size, the North Pacific Starship Landing Area spans a wide range of species' habitats. To better represent species densities and distributions in the analysis, the North Pacific Starship Landing Area was divided into two areas, the Northwestern and Hawaii area and the Northeastern Pacific area (**Figure 1**).

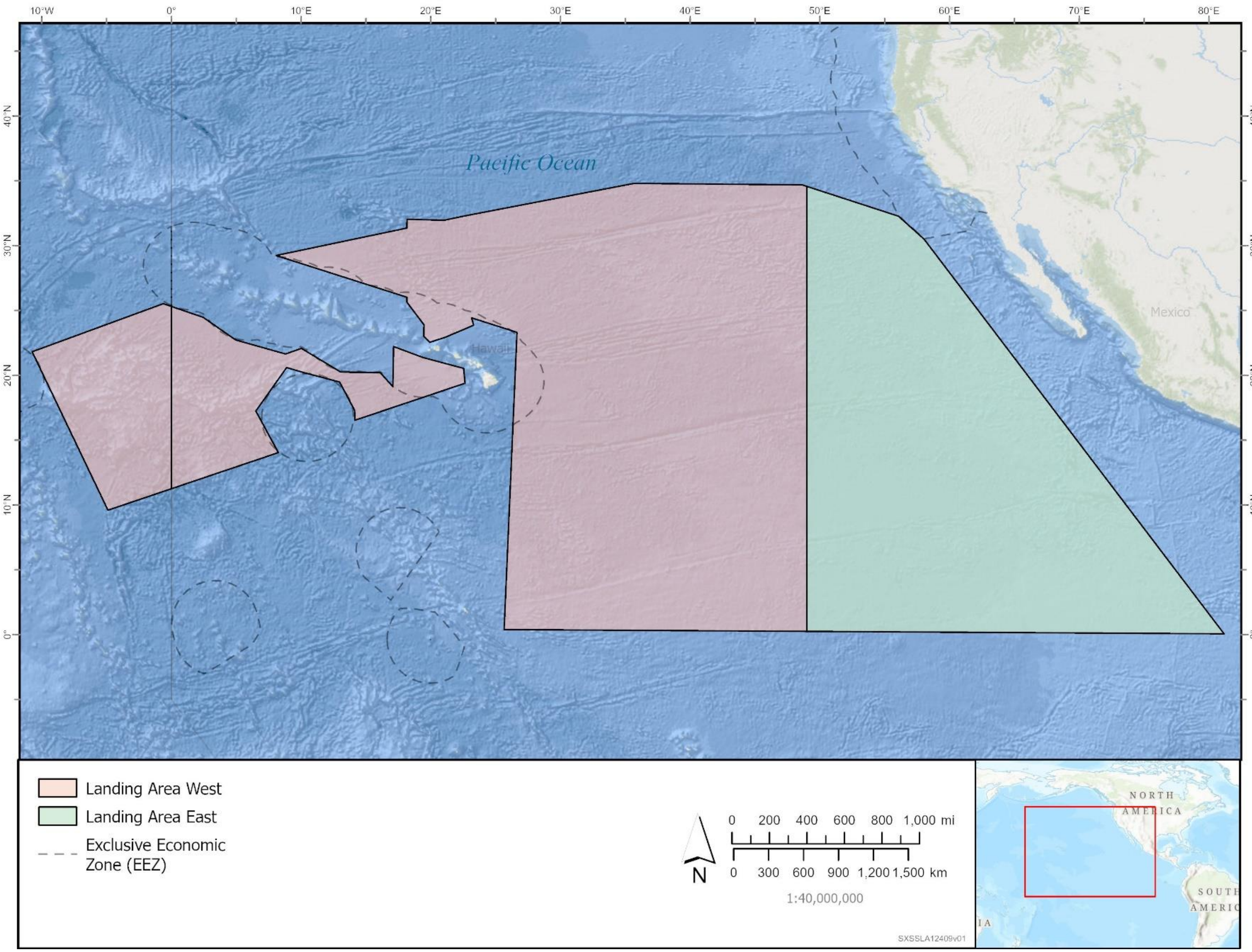

Figure 1. Northwest Pacific (Hawaii) and Northeast Pacific Starship Landing Area

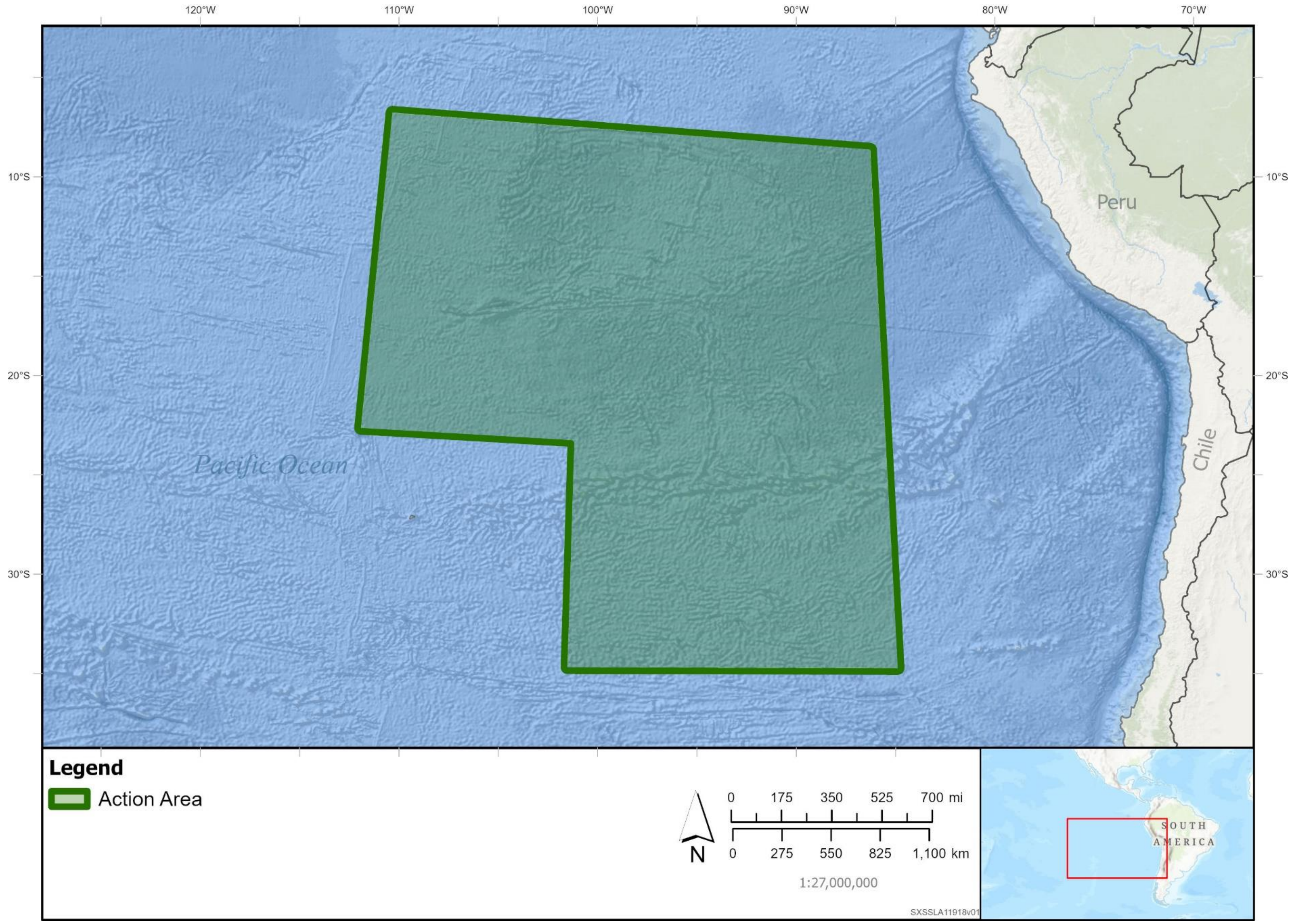

Figure 2. Southeast Pacific Starship Landing Area.

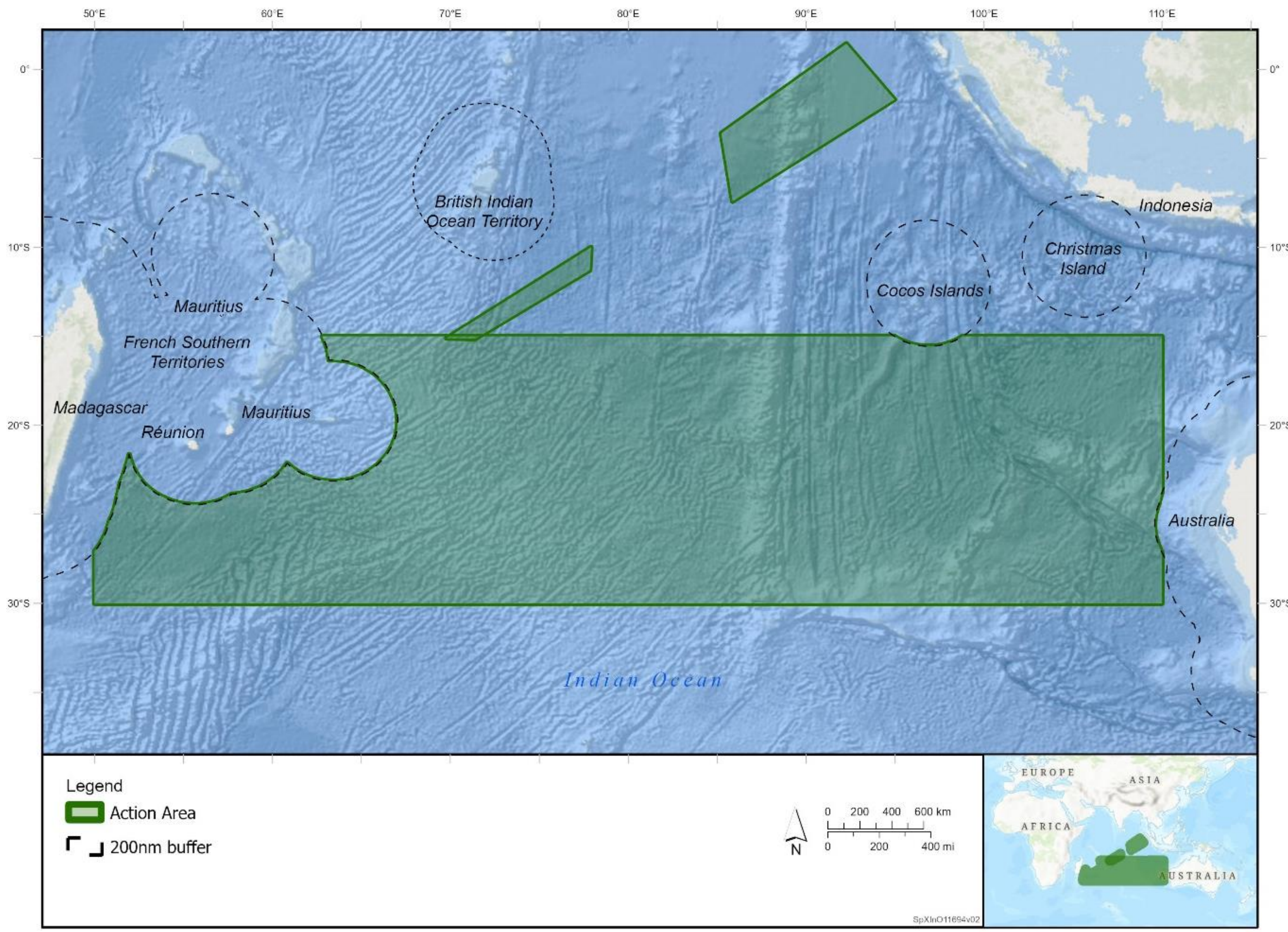

Figure 3. Indian Ocean Starship Landing Area.

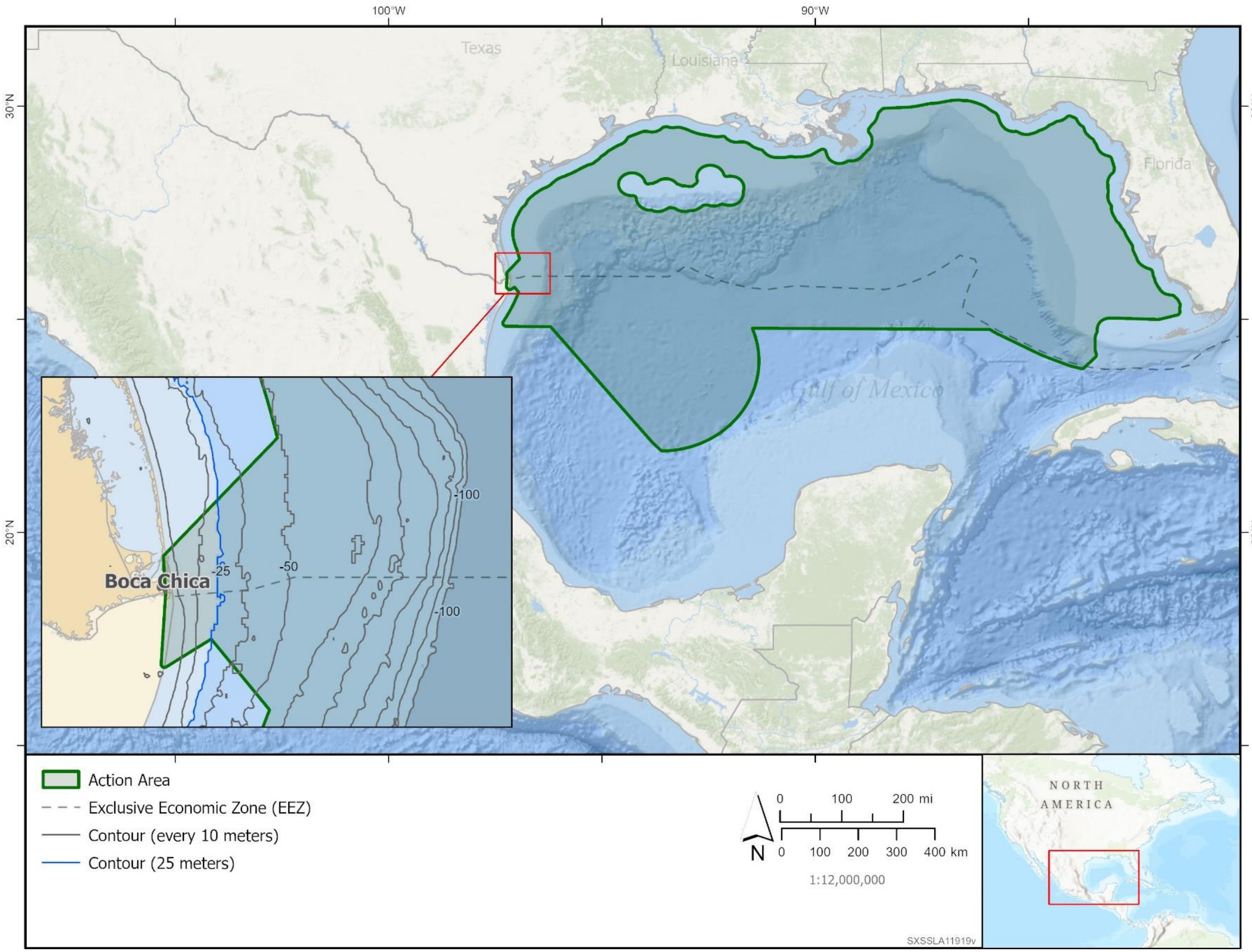

Figure 4. Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location.

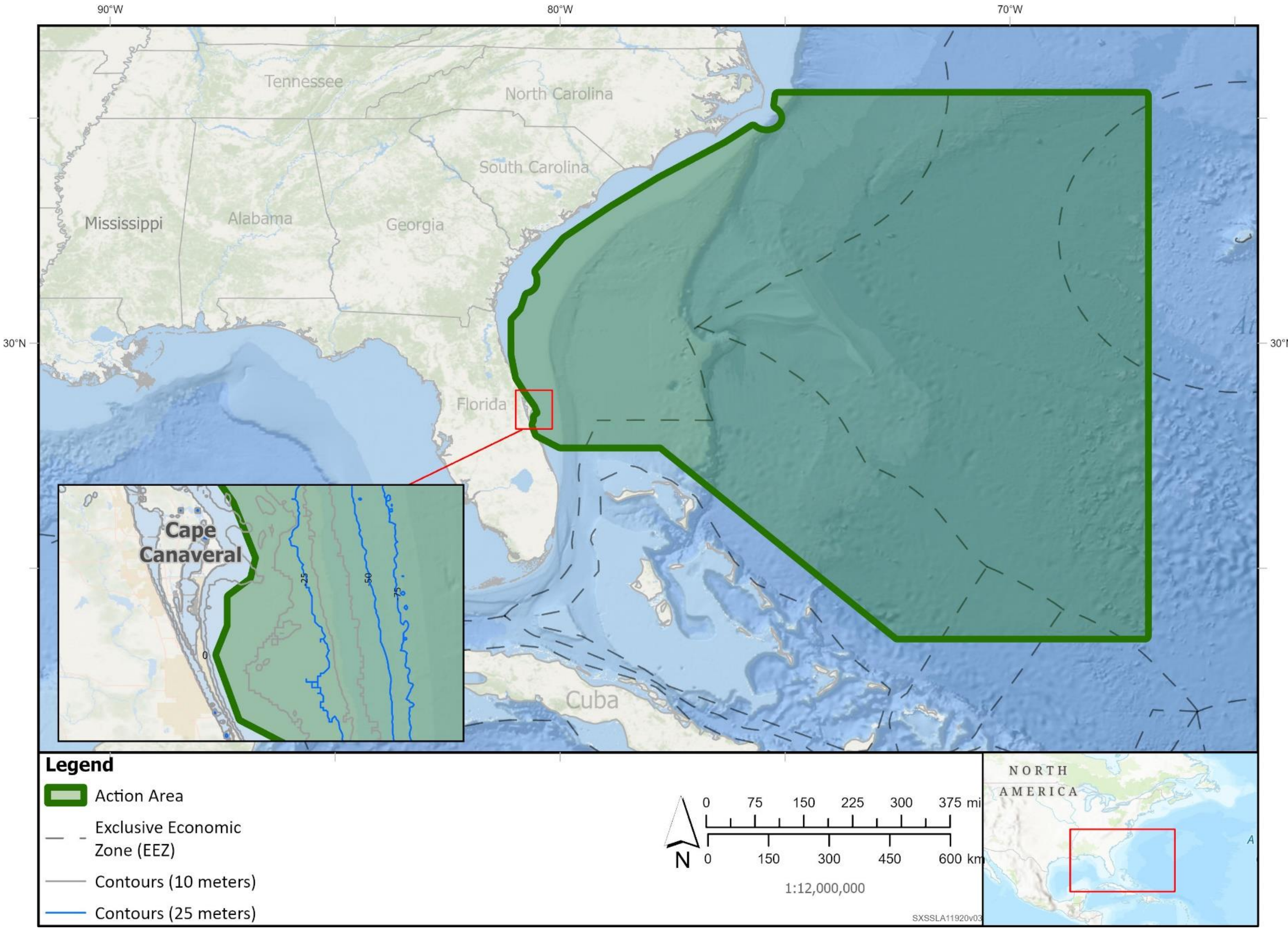

Figure 5. Atlantic Ocean Super Heavy Landing Area.

3 Marine Mammal Species Occurring in the Project Area

A total of 52 species of cetaceans and 3 pinnipeds potentially occurs within the Project Area. **Error! Bookmark not defined.** Table 3-1 summarizes the status, abundance, and densities used in the analysis for each species, and Section 4 contains additional information on each species status, population trends, and distribution within each of the six landings areas in the Project Area. The abundance estimates are for each species' stock or population and do not necessarily represent the abundance of that species in the Project Area.

3.1 Approach to Estimating Marine Mammal Densities

For all marine species, a significant amount of effort is required to collect and analyze data to produce a density estimate, and many ocean regions have not been surveyed in a manner that supports the derivation of a quantitative density estimate (Kaschner et al., 2012). The SpaceX study areas include regions that have been extensively surveyed (e.g., the U.S. East Coast), and other areas where there has been little to no systematic survey effort (e.g., Southeast Pacific Area). Available density data thus include robust, spatially-explicit density estimates derived from habitat-based density models or species distribution models (SDMs) developed from multiple years of systematic survey data (e.g., Becker et al., 2022a, 2022b; Roberts et al., 2016), as well as large scale density estimates produced from habitat suitability models or relative environmental suitability (RES) models for areas that have not been surveyed (e.g., Kaschner et al., 2006). RES models are derived from an assessment of the species occurrence in association with evaluated environmental explanatory variables that result in defining the suitability of a given environment. Abundance is estimated based on the values of the environmental variables, providing a means to estimate density for areas that have not been surveyed. The uncertainty associated with density estimates derived from RES models is very high, and results can substantially diverge from adjacent empirically-based results or from density estimates derived from actual survey data.

The marine mammal density estimates presented in Table 3-1 for each landing area include both an average of all densities and the maximum density for each species in that landing area. The maximum densities were used in the analysis as a conservative approach to estimating potential exposures, but the densities are not necessarily representative of species distributions throughout each landing area and overestimate effects from the Action. For example, a maximum density estimate for many coastal dolphin species is typically in nearshore waters over the continental shelf, while densities farther from shore, in deep waters that make up most of the area in each landing site, are orders of magnitude lower and may approach zero. To address higher than expected exposure estimates for specific species, the maximum density estimate was also calculated for each species and used in the analysis to present a more conservative analysis of potential effects. The data sources and methods used to derive average and maximum density estimates are described below for each study area.

Table 3-1. Marine mammal species status, habitat use, and stock abundance.

Species Common Name *Scientific Name*	ESA Listing Status	MMPA Status	Density within Project Area (animals/km^2)						Habitat Use in Project Area	Stock Abundance	Seasonality
			NE Pacific (Fig. 1)	NW Pacific Hawaii (Fig. 2)	SE Pacific (Fig. 3)	Indian Ocean (Fig. 4)	Gulf of MX (Fig. 5)	Atlantic (Fig. 6)			
Fin Whale *Balaenoptera physalus*	E	D/S	AVG = 0.000126 MAX = 0.003897	AVG, MAX = 0.000080	UNK	0.00087 1	-	AVG = 0.018352 MAX = 0.000029	Open ocean	11,065[1] (NE Pacific) 203[2] (Hawaii) 6,802[3] (Atlantic) (SE Pacific) Indian Ocean	Most common in the fall (Hawaii) Most common in the winter (Indian Ocean, Atlantic) (SE Pacific)
Rice's Whale *Balaenoptera ricei*	E	D/S	-	-	-	-	AVG= 0.00016 MAX= 0.01123	-	In the northwest along continental shelf break	51[4]	Year-round
Pygmy Right Whale *Carperea marginata*	-	-	-	-	UNK	-	-	-	Pelagic habitat	Insufficient data to determine abundance	Insufficient data to determine seasonality
Common Minke Whale *Balaenoptera acutorostrata*	-	-	AVG= 0.000423 MAX= 0.000680	AVG, MAX= 0.000180	UNK	0.01276 1	-	AVG= 0.000759 MAX= 0.004937	Waters over the continental shelf, including inshore bays	21,968[5] (Atlantic) (SE Pacific) (Indian Ocean)	Most common in winter (Atlantic) (SE Pacific) (Indian Ocean)
Sei Whale *Balaenoptera borealis*	E	D/S	AVG, MAX = 0.00010	AVG, MAX= 0.000160	UNK	UNK	-	AVG= 0.000141 MAX= 0.000319	Deep offshore waters	391[6] (Hawaii) 12,000[7] (Indian Ocean) 6,292[8] (Atlantic)	Winter (Atlantic) Insufficient data to determine seasonality (Hawaii, NE

[1] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-2022-Pacific-SAR.pdf)
[2] NMFS (https://media.fisheries.noaa.gov/2021-08/2020-Pacific-SARS-FinHI.pdf)
[3] NMFS (https://media.fisheries.noaa.gov/2022-08/Fin%20Whale-West%20N%20Atl%20Stock_SAR%202021.pdf)
[4] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-Atlantic-and-Gulf-of-Mexico-SAR.pdf)
[5] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-Atlantic-and-Gulf-of-Mexico-SAR.pdf)
[6] NMFS (https://media.fisheries.noaa.gov/dam-migration/pacific-2017-sei_whale-_hawaii-508.pdf)
[7] Perry et al. 1999
[8] NMFS https://media.fisheries.noaa.gov/2023-08/Final-Atlantic-and-Gulf-of-Mexico-SAR.pdf

Species Common Name ***Scientific Name***	**ESA Listing Status**	**MMPA Status**	**Density within Project Area (animals/km²)**						**Habitat Use in Project Area**	**Stock Abundance**	**Seasonality**
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										519[9] (NE Pacific) (SE Pacific)	Pacific, SE Pacific, Indian Ocean)
Antarctic Minke Whale *Balaenoptera bonaerensis*	-	-	-	-	UNK	UNK	-	-		(SE Pacific) 153,896[15] (Indian Ocean)[15]	(SE Pacific) (Indian Ocean)
Bryde's Whale *Balaenoptera edeni*	-	-	AVG= 0.000008 MAX= 0.000050	AVG= 0.000143 MAX= 0.001100	UNK	0.01276 1	-	-	Coastal and continental shelf waters (GOMEX, Indian Ocean, NE Pacific)	13,000[10] (NE Pacific) 602[11] (Hawaii) (SE Pacific) (Indian Ocean)	Summer to early winter (NE Pacific) Most common in summer and fall (Hawaii) (SE Pacific) (Indian Ocean)
Blue Whale/ Pygmy Blue Whale *Balaenoptera musculus brevicauda*	E	D/S	AVG= 0.000083 MAX= 0.004515	AVG= 0.000008 MAX= 0.00006	UNK	0.00002 81	-	AVG= 0.000018 MAX= 0.000024	Offshore waters	1,898[12] (NE Pacific) 133[13] (Hawaii) 39[14] (Atlantic) (SE Pacific) (Indian Ocean)	Summer (NE Pacific) Most common in winter (Hawaii, Atlantic) (SE Pacific) (Indian Ocean)
Omura's Whale *Balaenoptera omurai*	-	-	-	-	-	0.00032 1	-	-	Coastal waters	(Indian Ocean)	Year-round

[9] NMFS (https://media.fisheries.noaa.gov/dam-migration/sei_whale_caorwafinal2018.pdf)
[10] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-2022-Pacific-SAR.pdf)
[11] NMFS (https://media.fisheries.noaa.gov/2021-08/2020-Pacific-SARS-Brydes.pdf)
[12] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-2022-Pacific-SAR.pdf)
[13] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-2022-Pacific-SAR.pdf)
[14] NMFS (https://media.fisheries.noaa.gov/dam-migration/2019_sars_atlantic_bluewhale.pdf)
[15] Murase et al., 2020 (https://journal.iwc.int/index.php/jcrm/article/view/181/96)

Species Common Name ***Scientific Name***	**ESA Listing Status**	**MMPA Status**	**Density within Project Area (animals/km²)**						**Habitat Use in Project Area**	**Stock Abundance**	**Seasonality**
			NE Pacific (Fig. 1)	**NW Pacific Hawaii (Fig. 2)**	**SE Pacific (Fig. 3)**	**Indian Ocean (Fig. 4)**	**Gulf of MX (Fig. 5)**	**Atlantic (Fig. 6)**			
Hawaiian Monk Seal*Neomonachus schauinslandi*	E	D/S	-	AVG= 0.000033 MAX= 0.000040	-	-	-	-	Water surrounding atolls and islands, as well as near offshore reefs and submerged banks	1,465[15]	Year-round
Guadalupe Fur Seal *Arctocephalus townsendi*	T	D/S	AVG= 0.015549 MAX= 0.062830	-	-	-	-	-	Open ocean	31,019[6]	Slightly more common in summer and fall
Harbor Seal *Phoca vutulina*	-	-	-	-	-	-	-	AVG= 0.000001 MAX= 0.015492	Nearshore waters (within 20 km from shore)	61,336[16]	Year-round
North Atlantic Right Whale *Eubalaena glacialis*	E	D/S	-	-	-	-	-	AVG= 0.000003 MAX= 0.001939	Shallow coastal waters	338[17]	Winter
Humpback Whale *Megaptera novaeangliae*	E/T	D/S	AVG= 0.000128 MAX= 0.006460	AVG= 0.001938 MAX= 0.025671	UNK	0.00007 1	-	AVG= 0.000004 MAX= 0.002056	Coastal waters, with travel throughout deep oceanic	11,278[18] (Hawaii) 5,654[19] (NE Pacific) 1,396[20] (Atlantic) (SE Pacific) (Indian Ocean)	Present in fall, winter, and spring, but most common in the winter (Hawaii)

[15] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-2022-Pacific-SAR.pdf)
[16] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-Atlantic-and-Gulf-of-Mexico-SAR.pdf)
[17] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-Atlantic-and-Gulf-of-Mexico-SAR.pdf)
[18] NMFS (https://www.fisheries.noaa.gov/s3/2023-08/Humpback-Whale-Hawaii-2022-0.pdf)
[19] NMFS (https://www.fisheries.noaa.gov/s3/2023-08/Humpback-Whale-Mainland-Mexico-2022.pdf)
[20] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-Atlantic-and-Gulf-of-Mexico-SAR.pdf)

Species Common Name *Scientific Name*	ESA Listing Status	MMPA Status	Density within Project Area (animals/km^2)						Habitat Use in Project Area	Stock Abundance	Seasonality
			NE Pacific (Fig. 1)	NW Pacific Hawaii (Fig. 2)	SE Pacific (Fig. 3)	Indian Ocean (Fig. 4)	Gulf of MX (Fig. 5)	Atlantic (Fig. 6)			
									waters during migration		Most common in the winter (NE Pacific, Atlantic) (SE Pacific) (Indian Ocean)
Sperm Whale *Physeter macrocephalus*	E	D/S	AVG= 0.001361 MAX= 0.003829	AVG= 0.001089 MAX= 0.007734	UNK	0.002362	AVG= 0.00252 MAX= 0.01392	AVG= 0.002871 MAX= 0.032160	On the continental shelf edge, over the continental slope, and into mid-ocean regions	1,180[21] (GOMEX) 5,707[22] (Hawaii) 1,997[23] (NE Pacific) 4,349[24] (Atlantic) (SE Pacific) (Indian Ocean)	Year-round (GOMEX) Winter, spring (Hawaii) More common farther south in the winter (Atlantic) Year-round, but most common in late spring/early summer and fall (NE Pacific) (SE Pacific) (Indian Ocean)
Pygmy Sperm Whale *Kogia breviceps*	-	-	AVG= 0.000533 MAX= 0.004050	AVG, MAX= 0.017190	UNK	0.000041	AVG= 0.00262 MAX= 0.01905	AVG= 0.004525 MAX= 0.066876	Deep waters and along continental slopes (NE Pacific,	4,111[25] (NE Pacific) 336[26] (GOMEX) 7,750[27] (Atlantic) 42,083[28] (Hawaii)	Insufficient data to determine seasonality (NE Pacific, Hawaii, Atlantic, Indian Ocean, SE Pacific)

[21] NMFS (https://media.fisheries.noaa.gov/2021-07/f2020_AtlGmexSARs_GMexSpermWhale2.pdf?null)
[22] NMFS (https://media.fisheries.noaa.gov/2021-08/2020-Pacific-SARS-SpermwhaleHI.pdf)
[23] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-2022-Pacific-SAR.pdf)
[24] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-Atlantic-and-Gulf-of-Mexico-SAR.pdf)
[25] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-2022-Pacific-SAR.pdf)
[26] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-Atlantic-and-Gulf-of-Mexico-SAR.pdf)
[27] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-Atlantic-and-Gulf-of-Mexico-SAR.pdf)
[28] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-2022-Pacific-SAR.pdf)

Species Common Name *Scientific Name*	ESA Listing Status	MMPA Status	Density within Project Area (animals/km^2)						Habitat Use in Project Area	Stock Abundance	Seasonality
			NE Pacific (Fig. 1)	NW Pacific Hawaii (Fig. 2)	SE Pacific (Fig. 3)	Indian Ocean (Fig. 4)	Gulf of MX (Fig. 5)	Atlantic (Fig. 6)			
									Atlantic, GOMEX) Nearshore waters off Hawaiian Islands (Hawaii)	Insufficient data to determine abundance (Indian Ocean, SE Pacific)	Year-round (GOMEX)
Dwarf Sperm Whale *Kogia sima*	-	-	AVG= 0.000533 MAX= 0.004050	AVG= 0.002134 MAX= 0.01530	UNK	0.00004 1	AVG= 0.00262 MAX= 0.01905	AVG= 0.004525 MAX= 0.066876	Deep waters and along continental slopes	Unknown abundance (NE Pacific) 336[29] (GOMEX) 37,440[30] (Hawaii) 2,002[31] (Atlantic) (SE Pacific) (Indian Ocean)	Insufficient data to determine seasonality (NE Pacific, Hawaii, Atlantic) Year-round (GOMEX) (SE Pacific) (Indian Ocean)
Short-beaked Common Dolphin *Delphinus delphis*	-	-	AVG= 0.068764 MAX= 1.493164	-	UNK	-	-	AVG= 0.003522 MAX= 5.475136	Offshore areas along the continental slope	1,056,308[32] (NE Pacific) 172,825[33] (Atlantic) (SE Pacific)	Year-round (NE Pacific) Winter (Atlantic) (SE Pacific)
Pygmy Killer Whale *Feresa attenuata*	-	-	AVG, MAX= 0.00072	AVG, MAX= 0.004220	UNK	0.00101 1	AVG, MAX= 0.00358	AVG= 0.000994 MAX= 0.001819	Open ocean, with occasional presence closer to shore near	10,328[34] (Hawaii) 613[35] (GOMEX) Insufficient data to determine abundance (Atlantic)	Year-round (GOMEX, Hawaii) Insufficient data to determine seasonality (Atlantic)

29 NMFS (https://media.fisheries.noaa.gov/2023-08/Final-Atlantic-and-Gulf-of-Mexico-SAR.pdf)
30 NMFS (https://media.fisheries.noaa.gov/2023-08/Final-2022-Pacific-SAR.pdf)
31 NMFS (https://media.fisheries.noaa.gov/2023-08/Final-Atlantic-and-Gulf-of-Mexico-SAR.pdf)
32 NMFS (https://media.fisheries.noaa.gov/2023-08/Final-2022-Pacific-SAR.pdf)
33 NMFS (https://media.fisheries.noaa.gov/2023-08/Final-Atlantic-and-Gulf-of-Mexico-SAR.pdf)
34 NMFS (https://media.fisheries.noaa.gov/2023-08/Final-2022-Pacific-SAR.pdf)
35 NMFS (https://media.fisheries.noaa.gov/2023-08/Final-Atlantic-and-Gulf-of-Mexico-SAR.pdf)

Species Common Name *Scientific Name*	ESA Listing Status	MMPA Status	Density within Project Area (animals/km^2)						Habitat Use in Project Area	Stock Abundance	Seasonality
			NE Pacific (Fig. 1)	NW Pacific Hawaii (Fig. 2)	SE Pacific (Fig. 3)	Indian Ocean (Fig. 4)	Gulf of MX (Fig. 5)	Atlantic (Fig. 6)			
									oceanic islands	(SE Pacific) (Indian Ocean) (NE Pacific)	(SE Pacific) (Indian Ocean) (NE Pacific)
Short-finned Pilot Whale *Globicephala macrorhynchus*	-	-	AVG= 0.000072 MAX= 0.001260	AVG= 0.003749 MAX= 0.045285	UNK	0.027161	AVG= 0.00484 MAX= 0.07252	AVG= 0.008623 MAX= 0.260447	waters over the continental shelf break, in slope waters, and in areas of high topographic relief	836[36] (NE Pacific) 1,321[37] (GOMEX) 28,924[38] (Atlantic) 12,607[39] (Hawaii) (SE Pacific) (Indian Ocean)	Year-round (Hawaii) (GOMEX) (SE Pacific) (Indian Ocean) (Atlantic)
Long-finned Pilot Whale *Globicephala melas*	-	-	-	-	UNK	-	-	AVG= 0.008623 MAX= 0.260447	Deep offshore waters, but have been occasionally spotted near coastal waters	39,215[40] (Atlantic) (SE Pacific)	Most common in winter and early spring (Atlantic) Insufficient data to determine seasonality (SE Pacific)
Risso's Dolphin *Grampus griseus*	-	-	AVG= 0.000668 MAX= 0.020094	AVG= 0.000412 MAX= 0.013380	UNK	0.071211	AVG= 0.00209	AVG= 0.001614 MAX= 0.073700	Along the continental shelf break and over	6,336[41] (NE Pacific) 11,613[42] (Hawaii)	Year-round (NE Pacific) Most common in winter (Atlantic)

[36] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-2022-Pacific-SAR.pdf)
[37] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-Atlantic-and-Gulf-of-Mexico-SAR.pdf)
[38] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-Atlantic-and-Gulf-of-Mexico-SAR.pdf)
[39] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-2022-Pacific-SAR.pdf)
[40] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-Atlantic-and-Gulf-of-Mexico-SAR.pdf)
[41] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-2022-Pacific-SAR.pdf)
[42] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-2022-Pacific-SAR.pdf)

Species Common Name *Scientific Name*	ESA Listing Status	MMPA Status	Density within Project Area (animals/km²)						Habitat Use in Project Area	Stock Abundance	Seasonality
			NE Pacific (Fig. 1)	NW Pacific Hawaii (Fig. 2)	SE Pacific (Fig. 3)	Indian Ocean (Fig. 4)	Gulf of MX (Fig. 5)	Atlantic (Fig. 6)			
							MAX= 0.02408		the continental slope	1,974[43] (GOMEX) 7,245[44](Atlantic) (SE Pacific) Insufficient data to determine abundance (Indian Ocean)	Year-round (GOMEX) (Hawaii) (SE Pacific) (Indian Ocean)
Atlantic White-Sided Dolphin *Lagenodelphis acutus*	-	-	-	-	-	-	-	AVG= 0.000511 MAX= 0.012108	Continental shelf waters	93,233[45]	Most common in winter
White-beaked Dolphin *Lagenorhynchus albirostris*	-	-	-	-	-	-	-	AVG= 0.000002 MAX= 0.000102	Offshore on the continental slope	530,538	Most common in winter
Fraser's Dolphin *Lagenodelphis hosei*	-	-	-	AVG, MAX= 0.016730	UNK	0.001471	AVG= 0.00212 MAX= 0.00295	AVG= 0.002390 MAX= 0.002950	Deep oceanic waters	213[46] (GOMEX) Unknown abundance (Atlantic) 40,960[47] (Hawaii) (SE Pacific) (Indian Ocean)	Year-round (GOMEX) (SE Pacific) (Indian Ocean)
Southern Right Whale Dolphin *Lissodelphis peronii*	-	-	-	-	UNK	-	-	-		(SE Pacific)	(SE Pacific)
Killer Whale *Orcinus orca*	-	-	AVG= 0.000071	AVG, MAX= 0.00007	UNK	0.001003	AVG= 0.00032	AVG= 0.000025	Found in all marine habitats,	300[48] (NE Pacific—Offshore stock)	Most common in the winter (Hawaii)

[43] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-Atlantic-and-Gulf-of-Mexico-SAR.pdf)
[44] NMFS (https://repository.library.noaa.gov/view/noaa/45014)
[45] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-Atlantic-and-Gulf-of-Mexico-SAR.pdf)
[46] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-Atlantic-and-Gulf-of-Mexico-SAR.pdf)
[47] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-2022-Pacific-SAR.pdf)
[48] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-2022-Pacific-SAR.pdf)

Species Common Name *Scientific Name*	ESA Listing Status	MMPA Status	Density within Project Area (animals/km²)						Habitat Use in Project Area	Stock Abundance	Seasonality
			NE Pacific (Fig. 1)	NW Pacific Hawaii (Fig. 2)	SE Pacific (Fig. 3)	Indian Ocean (Fig. 4)	Gulf of MX (Fig. 5)	Atlantic (Fig. 6)			
			MAX= 0.000130				MAX= 0.00101	MAX= 0.000213	but most common in coastal waters and at higher latitudes	267[49] (GOMEX) Unknown abundance (Atlantic) 161[50] (Hawaii) (SE Pacific) (Indian Ocean)	(GOMEX) (Atlantic) (SE Pacific) (Indian Ocean)
Melon-Headed Whale *Peponocephala electra*	-	-	-	AVG= 0.016548 MAX= 0.016610	UNK	0.00677 1	AVG= 0.01141 MAX= 0.04613	AVG= 0.007228 MAX= 0.013369	Deep, offshore waters Rest nearshore during the day and feed at deeper waters at night (Hawaii)	Unknown abundance (Atlantic) 1,749[51] (GOMEX) 41,094[52] (Hawaii) (SE Pacific) (Indian Ocean)	Year-round (Hawaii, GOMEX) Insufficient data to determine seasonality (Atlantic) (SE Pacific) (Indian Ocean)
False Killer Whale *Pseudorca crassidens*	E	D/S	AVG= 0.001774 MAX= 0.002420	AVG= 0.000812 MAX= 0.001706	UNK	0.00020 1	AVG= 0.00526 MAX= 0.00748	AVG= 0.001388 MAX= 0.002796	Deep offshore waters, but may be closer to shore near oceanic islands	494[53] (GOMEX) 1,791[54] (Atlantic) 167[55] (Hawaii) (NE Pacific) (SE Pacific) (Indian Ocean)	Year-round (Hawaii)

[49] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-Atlantic-and-Gulf-of-Mexico-SAR.pdf)
[50] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-2022-Pacific-SAR.pdf)
[51] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-Atlantic-and-Gulf-of-Mexico-SAR.pdf)
[52] NMFS (https://media.fisheries.noaa.gov/2021-07/Pacific%202020%20SARs%20Final%20Working%20508.pdf?null%09)
[53] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-Atlantic-and-Gulf-of-Mexico-SAR.pdf)
[54] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-Atlantic-and-Gulf-of-Mexico-SAR.pdf)
[55] NMFS (https://repository.library.noaa.gov/view/noaa/44406)

Species Common Name *Scientific Name*	ESA Listing Status	MMPA Status	Density within Project Area (animals/km^2)						Habitat Use in Project Area	Stock Abundance	Seasonality
			NE Pacific (Fig. 1)	NW Pacific Hawaii (Fig. 2)	SE Pacific (Fig. 3)	Indian Ocean (Fig. 4)	Gulf of MX (Fig. 5)	Atlantic (Fig. 6)			
Australian Humpback Dolphin *Sousa sahulensis*	-	-	-	-	-	UNK	-	-	Coastal waters up to the 30m isobath	Insufficient data to determine abundance	Insufficient data to determine seasonality
Pantropical Spotted Dolphin *Stenella attenuata*	-	-	AVG= 0.089756 MAX= 0.333010	AVG= 0.040895 MAX= 0.294355	UNK	0.00729 1	AVG= 0.06909 MAX= 0.29462	AVG= 0.020542 MAX= 0.127611	Mostly found in deeper offshore waters but may approach the coast in some areas.	Insufficient data to determine abundance (Hawaii) 21,506[56] (GOMEX) 6,593[57] (Atlantic) (NE Pacific) (SE Pacific) (Indian Ocean)	Year-round (Hawaii & GOMEX) (NE Pacific) (SE Pacific) (Indian Ocean)
Clymene Dolphin *Stenella clymene*	-	S GOMEX	-	-	-	-	AVG= 0.01672 MAX= 0.20866	AVG= 0.016069 MAX= 0.184129	Deep waters beyond the continental shelf.	513[58] (GOMEX) 4,237[59] (Atlantic)	Winter, spring, and summer (GOMEX) Summer and fall (Atlantic)
Striped Dolphin *Stenella coeruleoalba*	-	S GOMEX	AVG= 0.016807 MAX= 0.130707	AVG= 0.007927 MAX= 0.045604	UNK	0.11867 1	AVG= 0.01163 MAX= 0.12304	AVG= 0.011199 MAX= 0.067718	Deep waters, and occasionally closer to shore only where deep water	29,998[60] (NE Pacific) 1,817[61] (GOMEX) 67,036[62] (Atlantic) 35,179[63] (Hawaii) (SE Pacific) (Indian Ocean)	Year-round (GOMEX) Insufficient data to determine seasonality (Hawaii)

[56] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-Atlantic-and-Gulf-of-Mexico-SAR.pdf)
[57] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-Atlantic-and-Gulf-of-Mexico-SAR.pdf)
[58] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-Atlantic-and-Gulf-of-Mexico-SAR.pdf)
[59] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-Atlantic-and-Gulf-of-Mexico-SAR.pdf)
[60] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-2022-Pacific-SAR.pdf)
[61] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-Atlantic-and-Gulf-of-Mexico-SAR.pdf)
[62] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-Atlantic-and-Gulf-of-Mexico-SAR.pdf)
[63] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-2022-Pacific-SAR.pdf)

Species Common Name *Scientific Name*	ESA Listing Status	MMPA Status	Density within Project Area (animals/km^2)						Habitat Use in Project Area	Stock Abundance	Seasonality
			NE Pacific (Fig. 1)	NW Pacific Hawaii (Fig. 2)	SE Pacific (Fig. 3)	Indian Ocean (Fig. 4)	Gulf of MX (Fig. 5)	Atlantic (Fig. 6)			
									approaches the coast.		
Atlantic Spotted Dolphin *Stenella frontalis*	-	-	-	-	-	-	AVG= 0.03328 MAX= 1.11220	AVG= 0.023162 MAX= 0.670038	Over the continental shelf and upper slope, usually at least 4.9 to 12.4 mi. offshore	39,921[64] (Atlantic) 21,506[65] (GOMEX)	(Atlantic) Year-round (GOMEX)
Spinner Dolphin *Stenella longirostris*	-	S Atlantc , GOMEX	AVG= 0.036663 MAX= 0.211728	AVG= 0.034353 MAX= 0.207773	UNK	0.005601	AVG= 0.00652 MAX= 0.10348	AVG= 0.013278 MAX= 0.025216	Shallow protected bays to during the day and offshore at night to feed (Hawaii) Offshore waters beyond the edge of the continental shelf (GOMEX, Atlantic)	3,184[66] (Hawaii) 2,991[67] (GOMEX) 4,102[68] (Atlantic) (SE Pacific) (Indian Ocean)	Year-round (Hawaii & GOMEX) (Atlantic) (SE Pacific) (Indian Ocean)

[64] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-Atlantic-and-Gulf-of-Mexico-SAR.pdf)
[65] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-Atlantic-and-Gulf-of-Mexico-SAR.pdf)
[66] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-2022-Pacific-SAR.pdf)
[67] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-Atlantic-and-Gulf-of-Mexico-SAR.pdf)
[68] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-Atlantic-and-Gulf-of-Mexico-SAR.pdf)

Species Common Name *Scientific Name*	ESA Listing Status	MMPA Status	Density within Project Area (animals/km²)						Habitat Use in Project Area	Stock Abundance	Seasonality
			NE Pacific (Fig. 1)	NW Pacific Hawaii (Fig. 2)	SE Pacific (Fig. 3)	Indian Ocean (Fig. 4)	Gulf of MX (Fig. 5)	Atlantic (Fig. 6)			
Rough-toothed Dolphin *Steno bredanensis*	-	-	AVG= 0.004429 MAX= 0.011999	AVG= 0.006275 MAX= 0.118241	UNK	0.000591	AVG= 0.00527 MAX= 0.00664	AVG= 0.003277 MAX= 0.005712	Deep oceanic waters	76,375[69] (Hawaii) 3,509[70] (GOMEX) 136[71] (Atlantic) (SE Pacific) (Indian Ocean)	(Hawaii) (GOMEX) (Atlantic) (SE Pacific) (Indian Ocean)
Indo-Pacific Bottlenose Dolphin *Tursiops aduncus*	-	-	-	-	-	UNK	-	-	Shallow, coastal waters	(Indian Ocean)	(Indian Ocean)
Common Bottlenose Dolphin *Tursiops truncatus*	-	-	AVG= 0.002422 MAX= 0.082188	AVG= 0.000775 MAX= 0.122384	UNK	0.036171	AVG= 0.05257 MAX= 1.65791	AVG= 0.019592 MAX= 1.477497	Estuarine, coastal, and continental shelf waters (stock dependent)	1,924[72] (NE Pacific) 26,434[73] (Hawaii) 119,460 (GOMEX) 81,363 (Atlantic) (SE Pacific) (Indian Ocean)	Year-round
Indo-Pacific Finless Porpoise *Neophocaena phocaenoides*	-	-	-	-	-	UNK	-	-	Shallow, coastal waters	(Indian Ocean)	
Arnoux's Beaked Whale *Berardius arnuxii*	-	-	-	-	UNK	-	-	-	Deep oceanic waters	(SE Pacific)	
Southern Bottlenose Whale *Hyperoodon planifrons*	-	-	-	-	-	0.000831	-	-	Deep oceanic waters	(Indian Ocean)	

[69] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-2022-Pacific-SAR.pdf)
[70] NMFS (https://media.fisheries.noaa.gov/2021-07/f2020_AtlGmexSARs_GMexRoughTooth2.pdf?null)
[71] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-Atlantic-and-Gulf-of-Mexico-SAR.pdf)
[72] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-2022-Pacific-SAR.pdf)
[73] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-2022-Pacific-SAR.pdf)

Species Common Name ***Scientific Name***	**ESA Listing Status**	**MMPA Status**	**Density within Project Area (animals/km²)**						**Habitat Use in Project Area**	**Stock Abundance**	**Seasonality**
			NE Pacific (Fig. 1)	**NW Pacific Hawaii (Fig. 2)**	**SE Pacific (Fig. 3)**	**Indian Ocean (Fig. 4)**	**Gulf of MX (Fig. 5)**	**Atlantic (Fig. 6)**			
Longman's Beaked Whale *Indopacetus pacificus*	-	-	-	AVG, MAX= 0.001040	-	0.00400 1	-	-	Deep, pelagic waters	2,550[74] (Hawaii) (Indian Ocean)	Insufficient data to determine seasonality (Hawaii)
Blainville's Beaked Whale *Mesoplodon densirostris*	-	-	-	AVG, MAX= 0.00046	UNK	0.00082 751	AVG= 0.00117 MAX= 0.02600	AVG= 0.002306 MAX= 0.025718	Both inshore and offshore areas (Hawaii) Along the shelf-edge and deeper oceanic waters (Atlantic)	1,132[75] (Hawaii) 10,107[76] (Atlantic) 98[77] (GOMEX) 3,044[78] (NE Pacific) (SE Pacific) (Indian Ocean)	(Hawaii) (Atlantic) (GOMEX) (NE Pacific) (SE Pacific) (Indian Ocean)
Gervais' Beaked Whale *Mesloplodon europaeus*	-	-	-	-	-	-	AVG= 0.00117 MAX= 0.02600	AVG= 0.002306 MAX= 0.025718	Along the shelf-edge and oceanic waters deeper than 500m	10,107[79] (Atlantic) 20[80] (GOMEX)	(Atlantic) Year-round (GOMEX)
Ginkgo-toothed Beaked Whale *Mesoplodon ginkgodens*	-	-	AVG= 0.001843 MAX= 0.009315	-	-	-	-	-	Along the shelf-edge and deeper oceanic waters	3,044[81] (NE Pacific)	Insufficient data to determine seasonality

[74] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-2022-Pacific-SAR.pdf)
[75] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-2022-Pacific-SAR.pdf)
[76] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-Atlantic-and-Gulf-of-Mexico-SAR.pdf)
[77] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-Atlantic-and-Gulf-of-Mexico-SAR.pdf)
[78] NMFS (https://repository.library.noaa.gov/view/noaa/18080) *combined abundance for all beaked whales in the Pacific (per Mesoplodont Beaked Whale SAR)
[79] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-Atlantic-and-Gulf-of-Mexico-SAR.pdf
[80] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-Atlantic-and-Gulf-of-Mexico-SAR.pdf)
[81] NMFS (https://repository.library.noaa.gov/view/noaa/18080) *combined abundance for all beaked whales in the Pacific (per Mesoplodont Beaked Whale SAR)

Species Common Name *Scientific Name*	ESA Listing Status	MMPA Status	Density within Project Area (animals/km^2)						Habitat Use in Project Area	Stock Abundance	Seasonality
			NE Pacific (Fig. 1)	NW Pacific Hawaii (Fig. 2)	SE Pacific (Fig. 3)	Indian Ocean (Fig. 4)	Gulf of MX (Fig. 5)	Atlantic (Fig. 6)			
Gray's Beaked Whale *Mesoplodon grayi*	-	-	-	-	UNK	-	-	-	Deep oceanic waters	(SE Pacific)	
True's Beaked Whale *Mesloplodon mirus*	-	-	-	-	-	-	AVG= 0.00117 MAX= 0.02600	AVG= 0.002306 MAX= 0.025718	Along the shelf-edge and in deeper oceanic waters	10,107[82] (Atlantic)	
Perrin's Beaked Whale *Mesoplodon perrini*	-	-	AVG= 0.001843 MAX= 0.009315	-	-	-	-	-	Insufficient data to determine habitat use	3,044[83] (NE Pacific)	Insufficient data to determine seasonality
Pygmy Beaked Whale *Mesoplodon peruvianus*	-	-	AVG= 0.001843 MAX= 0.009315	-	UNK	-	-	-	Insufficient data to determine habitat use (NE Pacific)	3,044[84] (NE Pacific) (SE Pacific)	Insufficient data to determine seasonality (NE Pacific)
Stejneger's Beaked Whale *Mesoplodon stejnegeri*	-	-	AVG= 0.001843 MAX= 0.009315	-	-	-	-	-	Deep offshore waters	Insufficient data to determine abundance	Insufficient data to determine seasonality
Spade-toothed Beaked Whale *Mesoplodon traversii*	-	-	AVG= 0.001843 MAX= 0.009315	-	-	0.000831	-	-	Insufficient data to determine habitat use	Insufficient data to determine abundance (NE Pacific, Indian Ocean)	Insufficient data to determine seasonality (NE Pacific, Indian Ocean)

[82] NMFS (https://media.fisheries.noaa.gov/2023-08/Final-Atlantic-and-Gulf-of-Mexico-SAR.pdf)
[83] NMFS (https://repository.library.noaa.gov/view/noaa/18080) *combined abundance for all beaked whales in the Pacific (per Mesoplodont Beaked Whale SAR)
[84] NMFS (https://repository.library.noaa.gov/view/noaa/18080) *combined abundance for all beaked whales in the Pacific (per Mesoplodont Beaked Whale SAR)

Species Common Name ***Scientific Name***	**ESA Listing Status**	**MMPA Status**	**Density within Project Area (animals/km^2)**						**Habitat Use in Project Area**	**Stock Abundance**	**Seasonality**
			NE Pacific (Fig. 1)	**NW Pacific Hawaii (Fig. 2)**	**SE Pacific (Fig. 3)**	**Indian Ocean (Fig. 4)**	**Gulf of MX (Fig. 5)**	**Atlantic (Fig. 6)**			
Shepherd's Beaked Whale *Tasmacetus shepherdi*	-	-	-	-	UNK	-	-	-	Deep offshore waters	(SE Pacific)	
Cuvier's Beaked Whale *Ziphius cavirostris*	-	-	AVG= 0.003119 MAX= 0.008029	AVG= 0.001719 MAX= 0.003191	UNK	0.004031	AVG= 0.00117 MAX= 0.02600	AVG= 0.002306 MAX= 0.025718	Deep, pelagic waters	5,454 (NE Pacific) 5,744 (Atlantic) 18 (GOMEX) 4,431 (Hawaii) (SE Pacific) (Indian Ocean)	Year-round

Notes: ESA = Endangered Species Act, E = Federal Endangered Species, T = Federal Threatened Species, C = Federal Candidate Species, DL = Federally De-listed Species, NL = Not Federally listed under the ESA, D = MMPA Depleted Stock, S= MMPA Strategic Stock

3.1.1 Atlantic Ocean

Density data for the Atlantic study area were acquired from habitat-based SDMs developed by a collaboration of federal, state, academic, and independent research organizations who pool scientific data and expertise to develop SDMs spanning the U.S. east coast and southeast Canada. The collaborative effort is led by the Duke Marine Geospatial Ecology Laboratory, who initially published model results in 2016 (Roberts et al. 2016) but have since updated the habitat-based SDMs with additional data (Roberts et al. 2023). The most recent SDMs use over 2.8 million linear kilometers of survey effort collected between 1992-2020, yielding density maps at approximately 5 km x 5 km spatial resolution for over 30 species and multi-species guilds, and are considered the most robust estimates of species density available for these regions.

Two separate SDMs were developed as part of this collaborative effort, one set specific to the U.S. east coast ("East Coast models") and another set that covered waters within the U.S. Navy's Atlantic Fleet Training and Testing (AFTT) study area ("AFTT models"), including U.S. East Coast and Gulf of Mexico waters. Given methodological differences, density estimates from the AFTT models were intended to cover regions offshore and beyond the geographic extents of the East Coast models (Roberts et al. 2023). Therefore, where there was overlap between the East Coast and AFTT modeled estimates, preference was given to data from the East Coast models. To provide seasonal and annual density estimates for the SpaceX Atlantic study area, the spatially-explicit density estimates were averaged within the boundaries of the study area. An area-weighted average was applied to account for the difference in sample sizes specific to each data source (i.e., the East Coast model estimates covered 31% and the AFTT model estimates covered 69% of the SpaceX Atlantic study area). In addition to the overall study area average, the maximum and minimum single cell density values within the study area were identified for each species, regardless of dataset and the maximum cell density was used to determine the take estimates for each species identified.

3.1.2 Gulf of Mexico

Similar to the Atlantic study area, two separate sources of density data were available for the SpaceX Gulf of Mexico study area, the AFTT models described above (Roberts et al., 2023) and habitat-based SDMs developed specifically for the Gulf of Mexico using data collected during NOAA Southeast Fisheries Science Center (SEFSC) surveys ("SEFSC models"; Garrison et al., 2023). Consistent with the approach used for the Atlantic study area, spatially-explicit density estimates were averaged within the boundaries of the SpaceX Gulf of Mexico study area. Where there was overlap between the SEFSC and AFTT modeled estimates, preference was given to the SEFSC data. An area-weighted average was applied to account for the difference in sample sizes specific to each data source (i.e., the SEFSC model estimates covered 27% and the AFTT model estimates covered 73% of the SpaceX Gulf of Mexico study area). In addition to the overall study area average, the maximum and minimum single cell density values within the study area were identified for each species, regardless of dataset and the maximum cell density was used to determine the take estimates for each species identified.

3.1.3 Northwest and Hawaii Pacific Ocean

Density data for the Hawaii Starship study area were acquired from density estimates derived from both design- and model-based analyses of cetacean sighting data collected during systematic surveys conducted by Southwest Fisheries Science Center (SWFSC) and Pacific Islands Fisheries Science Center (PIFSC) in the Hawaiian Islands Exclusive Economic Zone (EEZ; Bradford et al. 2020, 2021; Becker et al. 2021, 2022b) and Central North Pacific (Forney et al. 2015). The SDM predictions were available at different spatial resolutions (i.e., the Hawaiian Islands EEZ estimates were available at approximately 10 km x 10 km grid size and the Central North Pacific estimates were available at approximately 25 km x 25 km grid size), the SDM density data were re-gridded to a consistent 10 km x 10 km grid size prior to averaging. Density estimates within the SpaceX Hawaii Starship study area were then averaged to provide a mean study area estimate, as well as identifying maximum and minimum single cell density values. For those species for which only design-based estimates were available, the single values were used to represent both the study area average, as well as maximum and minimum estimates and the maximum cell density was used to determine the take estimates for each species identified.

3.1.4 Northeastern Pacific Ocean

Given the large spatial extent of this North Pacific study area, density data from multiple sources were used to provide representative estimates. Density data were available from both design- and model-based analyses of cetacean sighting data described above for the Hawaiian Islands EEZ and Central North Pacific (Bradford et al., 2020, 2021; Becker et al., 2021, 2022b; Forney et al. 2015). In addition, both design- and model-based estimates were available for waters off the Baja Peninsula, Mexico and the greater Northeastern Pacific (Becker et al., 2022a; Ferguson & Barlow 2003; Forney et al., 2012). All the SDM density data were re-gridded to a consistent 10 km x 10 km grid size prior to averaging. For areas where there were overlapping density data, preference was given to the most recent estimates, and to data derived from habitat-based SDMs (i.e., vs. uniform design-based estimates). For those species for which only design-based estimates were available, the single values were used to represent both the study area average, as well as maximum and minimum estimates and the maximum cell density was used to determine the take estimates for each species identified.

3.1.5 Southeastern Pacific Ocean

There are very limited systematic survey data in the South Pacific, particularly for offshore areas that include the SpaceX study area (Kaschner et al., 2012). A literature review was conducted in an attempt to identify potential sources of density data, but quantitative data were only available for a few coastal, shallow regions that would not be representative of offshore waters within the SpaceX study area, or the published data did not provide quantitative density data. Publications reviewed to identify appropriate density estimates includes those listed in

Table **3-2**. Results suggest that there are no suitable density data available for the SpaceX study area in the South Pacific.

Table 3-2: Publications Reviewed for Density Data Relevant to the South Pacific Study Area

	Citation
1	Aguayo-Lobo, A., Acevedo, J., Brito, J. L., Olavarría, C., Moraga, R., & Olave, C. (2008). La ballena franca del sur, Eubalaena australis (Desmoulins, 1822) en aguas chilenas: análisis de sus registros desde 1976 a 2008. Revista de Biología Marina y Oceanografía, 43(3), 653–668. https://doi.org/10.4067/s0718-19572008000300024
2	Bedriñana-Romano, L., Hucke-Gaete, R., Viddi, F. A., Johnson, D., Zerbini, A. N., Morales, J., Mate, B., & Palacios, D. M. (2021). Defining priority areas for blue whale conservation and investigating overlap with vessel traffic in Chilean Patagonia, using a fast-fitting movement model. Scientific Reports, 11(1), 2709. https://doi.org/10.1038/s41598-021-82220-5
3	Aguayo-Lobo, A., Acevedo, J., Brito, J. L., Olavarría, C., Moraga, R., & Olave, C. (2008). La ballena franca del sur, Eubalaena australis (Desmoulins, 1822) en aguas chilenas: análisis de sus registros desde 1976 a 2008. Revista de Biología Marina y Oceanografía, 43(3), 653–668. https://doi.org/10.4067/s0718-19572008000300024
4	Bedriñana-Romano, L., Hucke-Gaete, R., Viddi, F. A., Johnson, D., Zerbini, A. N., Morales, J., Mate, B., & Palacios, D. M. (2021). Defining priority areas for blue whale conservation and investigating overlap with vessel traffic in Chilean Patagonia, using a fast-fitting movement model. Scientific Reports, 11(1), 2709. https://doi.org/10.1038/s41598-021-82220-5
5	Bedriñana-Romano, L., Viddi, F. A., Artal, O., Pinilla, E., & Hucke-Gaete, R. (2023). First estimate of distribution, abundance, and risk of encounter with aquaculture vessels for the rare Chilean dolphin in the entire Northern Chilean Patagonia. Aquatic Conservation: Marine and Freshwater Ecosystems. https://doi.org/10.1002/aqc.4012
6	Bedriñana-Romano, L., Hucke-Gaete, R., Viddi, F. A., Morales, J., Williams, R., Ashe, E., Garcés-Vargas, J., Torres-Florez, J. P., & Ruiz, J. (2018). Integrating multiple data sources for assessing blue whale abundance and distribution in Chilean Northern Patagonia. Diversity and Distributions, 3(12), 177–14. https://doi.org/10.1111/ddi.12739
7	Bedriñana-Romano, L., Zarate, P. M., Hucke-Gaete, R., Viddi, F. A., Buchan, S. J., Cari, I., Clavijo, L., Bello, R., & Zerbini, A. N. (2022). Abundance and distribution patterns of cetaceans and their overlap with vessel traffic in the Humboldt Current Ecosystem, Chile. Scientific Reports, 12(1), 10639. https://doi.org/10.1038/s41598-022-14465-7
3	Aguayo-Lobo, A., Acevedo, J., Brito, J. L., Olavarría, C., Moraga, R., & Olave, C. (2008). La ballena franca del sur, Eubalaena australis (Desmoulins, 1822) en aguas chilenas: análisis de sus registros desde 1976 a 2008. Revista de Biología Marina y Oceanografía, 43(3), 653–668. https://doi.org/10.4067/s0718-19572008000300024
9	Bedriñana-Romano, L., Hucke-Gaete, R., Viddi, F. A., Johnson, D., Zerbini, A. N., Morales, J., Mate, B., & Palacios, D. M. (2021). Defining priority areas for blue whale conservation and investigating overlap with vessel traffic in Chilean Patagonia, using a fast-fitting movement model. Scientific Reports, 11(1), 2709. https://doi.org/10.1038/s41598-021-82220-5
10	Bedriñana-Romano, L., Viddi, F. A., Artal, O., Pinilla, E., & Hucke-Gaete, R. (2023). First estimate of distribution, abundance, and risk of encounter with aquaculture vessels for the rare Chilean dolphin in the entire Northern Chilean Patagonia. Aquatic Conservation: Marine and Freshwater Ecosystems. https://doi.org/10.1002/aqc.4012
11	Bedriñana-Romano, L., Hucke-Gaete, R., Viddi, F. A., Morales, J., Williams, R., Ashe, E., Garcés-Vargas, J., Torres-Florez, J. P., & Ruiz, J. (2018). Integrating multiple data sources for assessing blue whale abundance and distribution in Chilean Northern Patagonia. Diversity and Distributions, 3(12), 177–14. https://doi.org/10.1111/ddi.12739
12	Bedriñana-Romano, L., Zarate, P. M., Hucke-Gaete, R., Viddi, F. A., Buchan, S. J., Cari, I., Clavijo, L., Bello, R., & Zerbini, A. N. (2022). Abundance and distribution patterns of cetaceans and their overlap with vessel

	traffic in the Humboldt Current Ecosystem, Chile. Scientific Reports, 12(1), 10639. https://doi.org/10.1038/s41598-022-14465-7
13	Casamayor, S. C., Guidino, C., & Pacheco, A. S. (2022). Abundance and spatial distribution of baleen and sperm whales in the Peruvian sea: a historical review. Latin American Journal of Aquatic Mammals. https://doi.org/10.5597/lajam00285
14	Denkinger, J., Eguiguren, A., Rubianes, F., Munõz-Abril, L., & Oña, J. (2023). Humpback whale (Megaptera novaeangliae) winter distribution and core habitats in relation to El Ninõ Southern Oscillation and depth in coastal and oceanic waters off Ecuador. Marine Mammal Science. https://doi.org/10.1111/mms.13015
15	García-Godos, I. (2006). A note on the occurrence of sperm whales (Physeter macrocephalus) off Peru, 1995-2002. Journal of Cetacean Research and Management.
16	Guidino, C., Llapapasca, M. A., Silva, S., Alcorta, B., & Pacheco, A. S. (2014). Patterns of Spatial and Temporal Distribution of Humpback Whales at the Southern Limit of the Southeast Pacific Breeding Area. PLoS ONE, 9(11), e112627. https://doi.org/10.1371/journal.pone.0112627
17	Hucke-Gaete, R., Aguayo-Lobo, A., Pakarati, S. Y., & Flores, M. (2014). Marine mammals of Easter Island (Rapa Nui) and Salas y Gomez Island (Motu Motiro Hiva), Chile: a review and new records. Latin American Journal of Aquatic Research, 42(4), 743–751. https://doi.org/10.3856/vol42-issue4-fulltext-5
18	Hucke-Gaete, R., Bedriñana-Romano, L., Viddi, F. A., Ruiz, J. E., Torres-Florez, J. P., & Zerbini, A. N. (2018). From Chilean Patagonia to Galapagos, Ecuador: novel insights on blue whale migratory pathways along the Eastern South Pacific. PeerJ, 6(2), e4695. https://doi.org/10.7717/peerj.4695
19	Llapapasca, M. A., Pacheco, A. S., Fiedler, P., Goya, E., Ledesma, J., Peña, C., & Vásquez, L. (2018). Modeling the potential habitats of dusky, commons and bottlenose dolphins in the Humboldt Current System off Peru: The influence of non-El Niño vs. El Niño 1997-98 conditions and potential prey availability. Progress in Oceanography, 168, 169–181. https://doi.org/10.1016/j.pocean.2018.09.003
20	Llapapasca, M. A., Pardo, M. A., Grados, D., & Quiñones, J. (2022). The oxygen minimum zone relative depth is a key driver of dolphin habitats in the northern Humboldt Current System. Frontiers in Marine Science, 9, 1027366. https://doi.org/10.3389/fmars.2022.1027366
21	Pacheco, A. S., Villegas, V. K., & Riascos, J. M. (2015). Presence of fin whales (Balaenoptera physalus) in Mejillones Bay, a major seaport area in northern Chile. Revista de Biologia Marina y Oceanografía, 50(2), 383–389. http://www.revbiolmar.cl/resumenes/v503/503-383.pdf
22	Testino, J. P., Petit, A., Alcorta, B., Pacheco, A. S., Silva, S., Alfaro-Shigueto, J., Sarmiento, D., Quiones, J., Eche, A. M., Motta, E., Fernandez, S., Campbell, E., Carrillo, G., Epstein, M., Llapapasca, M., & Gonzlez-Pestana, A. (2019). Killer Whale (Orcinus orca) Occurrence and Interactions with Marine Mammals Off Peru. Pacific Science, 73(2), 261–273. https://doi.org/10.2984/73.2.7

3.1.6 Indian Ocean

The Indian Ocean is one of the most data-deprived ocean regions globally in terms of knowledge of cetacean abundance and distribution, and line-transect coverage is limited or absent throughout the majority of this ocean basin (Kaschner et al., 2012). Density estimates derived from RES models (Kaschner et al., 2006) were used in a U.S. Navy Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/SEIS) that provided density estimates for an offshore area in the Indian Ocean off the northwest coast of Australia that overlaps with the eastern portion of the SpaceX Indian Ocean study area (Department of the Navy, 2019). The Navy EIS/SEIS provided seasonal uniform density estimates for their "Northwest of Australia" study area based on the RES data, and the average seasonal estimate was used to represent average density within the SpaceX Indian Ocean study area. This was the preferred method for the Indian Ocean area since the average and maximum densities were essentially identical.

4 Affected Species Status and Distribution

4.1 Blue Whale (Balaenoptera musculus)

4.1.1 Status and Trends

The blue whale is listed as endangered under the ESA and as depleted under the MMPA throughout its range. The subspecific taxonomy has not been fully resolved, but there are five currently recognized subspecies of blue whales (National Marine Fisheries Service, 2020b). Four of the subspecies (*B.m. musculus*, *B.m. brevicauda*, *B.m. indica*, and the unnamed South Pacific Ocean subspecies) are present in the Action Areas (National Marine Fisheries Service, 2020a).

Widespread whaling over the last century is believed to have decreased the worldwide population of blue whales to approximately 1 percent of its pre-whaling population size; some authors have concluded that their population was about 200,000 animals before whaling (Branch et al., 2007). The most recent population estimates of blue whales are categorized by stock. Stock abundance information is presented in Table 3-1.

4.1.2 Distribution

The blue whale inhabits all oceans and typically occur near the coast, over the continental shelf, though they are also found in oceanic waters (Stafford et al., 2001). Most baleen whales spend their summers feeding in productive waters near the higher latitudes and winters in the warmer waters at lower latitudes (Širović et al., 2004).

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

The distribution of the blue whale (*B.m. musculus*) in the western North Atlantic generally extends from the Arctic to at least mid-latitude waters. Blue whales may be found in Labrador Current, North Atlantic Gyre, and Gulf Stream open ocean areas. Migratory movements in the western North Atlantic Ocean are largely unknown, but acoustic data indicate that blue whales winter as far north as Newfoundland and as far south as Bermuda and Florida, and they have been sighted along the mid-Atlantic ridge (Ryan et al., 2013).

Indian Ocean Starship Landing Area

The *B.m. brevicauda* and *B.m. Indica* subspecies of blue whales are found in this Action Area. *B.m. brevicauda*, known as the pygmy blue whale subspecies, is located north of the Atlantic Convergence and occurs in the portion of the Indian ocean south of Madagascar, and in the eastern Indian Ocean west of Australia and Indonesia (Ichihara, 1966). *B.m. indica*, known as the Northern Indian Ocean blue whale, appears to be located year-round between Somalia and Sri Lanka (Alling et al., 1991).

Northwestern and Hawaiian Pacific Starship Landing Area

Blue whales *(B.m. musculus*) from the Central North Pacific stock are found in Hawaii, but the sighting frequency is low and the peak abundance is seasonal, occurring in the winter (Bradford et al., 2013). Whales feeding along the Aleutian Islands and in the Gulf of Alaska likely migrate to Hawaii in winter (Stafford et al., 2001).

Southeast Pacific Starship Landing Area

The unnamed South Pacific Ocean blue whale subspecies is found in this Action Area. This blue whale subspecies is located in the southeastern Pacific Ocean Chiloense Marine Ecoregion and generally migrates to lower latitude regions such as the Northeastern Pacific and the Galapagos Islands (National Oceanic and Atmospheric Administration, 2023a).

Northeastern Pacific Starship Landing Area

Blue whales (*B.m. musculus*) in the eastern north Pacific are known to migrate between higher latitude feeding grounds of the Gulf of Alaska and the Aleutian Islands to lower latitudes including Southern California, Baja California, Mexico and the Costa Rica Dome (Calambokidis & Barlow, 2004; Calambokidis et al., 2009a; Calambokidis et al., 2009b; Mate et al., 2016; Mate et al., 2015). The West Coast is known to be a blue whale feeding area for the Eastern North Pacific stock during summer and fall (Bailey et al., 2009; Calambokidis et al., 2009a; Calambokidis et al., 2015; Mate et al., 2015).

4.1.3 Critical Habitat

Critical habitat has not been designated for this species.

4.2 False Killer Whale (*Pseudorca crassidens*)

4.2.1 Status and Trends

NMFS currently recognizes three stocks of false killer whale in Hawaiian waters: the Hawaii pelagic stock, the Northwestern Hawaiian Islands stock, and the main Hawaiian Islands insular stock (Bradford et al., 2018; Bradford et al., 2012; Bradford et al., 2015; Carretta et al., 2015; Forney et al., 2010; National Oceanic and Atmospheric Administration, 2012; Oleson et al., 2010). This species is also recognized by NMFS as the western North Atlantic stock and the northern Gulf of Mexico stock. The population found in the Gulf of Mexico is considered a separate stock from the western North Atlantic stock for management purposes; however, there are no genetic data to differentiate between the two stocks (Waring et al., 2013). Although not recognized as a stock by NMFS, populations of false killer whales are also present in the Indian Ocean and Southeast Pacific. Abundance information is presented in Table 3-1.

The main Hawaiian Islands (MHI) insular stock (considered resident to the main Hawaiian Islands consisting of Kauai, Oahu, Molokai, Lanai, Kahoolawe, Maui, and Hawaii) is listed as an endangered Distinct Population Segment under the ESA and depleted under the MMPA throughout its range (Carretta et al., 2018b; Carretta et al., 2017a). A recovery plan for the population of MHI insular false killer was completed in 2021 (National Oceanic and Atmospheric Administration, 2021b).

4.2.2 Distribution

False killer whales occur worldwide throughout warm temperate and tropical oceans in deep open-ocean waters and around oceanic islands and only rarely come into shallow coastal waters

(Baird et al., 2008a; Leatherwood & Reeves, 1983; Odell & McClune, 1999). Occasional inshore movements are associated with movements of prey and shoreward flooding of warm ocean currents.

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

Sightings of this species in the northern Gulf of Mexico (i.e., U.S. Gulf of Mexico) occur in oceanic waters, primarily in the eastern Gulf (Maze-Foley & Mullin, 2006; Mullin & Fulling, 2004). False killer whales were seen only in the spring and summer during GulfCet aerial surveys of the northern Gulf of Mexico between 1992 and 1998 (Hansen et al., 1996; Mullin & Hoggard, 2000) and in the spring during vessel surveys (Mullin & Fulling, 2004).

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

False killer whales have been sighted in U.S. Atlantic waters from southern Florida to Maine (Schmidly, 1981). There are periodic records (primarily stranding) from southern Florida to Cape Hatteras dating back to 1920 (Schmidly, 1981). Few false killer whales have been sighted during shipboard or aerial surveys, but one sighting of 11 animals occurred during a shipboard survey conducted in summer 2011 (Waring et al., 2016).

Indian Ocean Starship Landing Area

Although not well studied in the region, false killer whales have been observed throughout the Indian Ocean. The Spanish surface longline fishery targeting swordfish has encountered false killer whales in the Indian Ocean. The highest rate of interactions with this species were in the western Indian Ocean, indicating that this species may be more abundant in this region although unconfirmed (Ramos-Cartelle & Mejuto, 2008). Encounter rates were substantially lower and less frequent in the central and eastern regions of the Indian Ocean (Ramos-Cartelle & Mejuto, 2008).

Northwestern and Hawaii Starship Landing Area

The false killer whale is regularly found within Hawaiian waters and has been reported in groups of up to 100 over a wide range of depths and distance from shore (Baird et al., 2003b; Baird et al., 2013a; Bradford et al., 2012, 2017; Bradford et al., 2015; Oleson et al., 2013; Shallenberger, 1981).The ranges and stock boundary descriptions for false killer whales in the Hawaiian Islands are complex and overlapping (Bradford et al., 2017; Bradford et al., 2015). For example, although there is relatively low use by insular false killer whales, all three stocks are known to overlap in the vicinity of Kauai and Niihau.

Southeast Pacific Starship Landing Area

There is extremely limited information on the distribution of this species in the Southeast Pacific. There has been a single recorded stranding of a false killer whale individual off Easter Island in 1994 (Aguayo et al., 1998).

Northeastern Pacific Starship Landing Area

False killer whales occur throughout pelagic waters of the eastern and central North Pacific (Carretta, 2023; Hamilton et al., 2009b) and thus are expected to occur in this Action Area.

4.2.3 Critical Habitat

NMFS has designated critical habitat for the MHI insular false killer whale distinct population segment by designating waters from the 45 m depth contour to the 3,200 m depth contour around the main Hawaiian Islands from Niihau east to Hawaii effective as of August 23, 2018 (83 FR 35062; Tuesday, July 24, 2018).

The single essential feature of the MHI Insular false killer whale critical habitat has been identified as island-associated marine habitat with four characteristics that support this feature. The four characteristics include:

(1) Adequate space for movement and use within shelf and slope habitat;

(2) Prey species of sufficient quantity, quality, and availability;

(3) The habitat waters being free of pollutants; and

(4) Sound levels that will not significantly impair false killer whales' use or occupancy (83 FR 35062).

Regarding sound levels applicable to this fourth characteristic, NMFS defined those as sound levels that inhibit MHI Insular false killer whales, "…ability to receive and interpret sound for the purposes of navigation, communication, and detection of predators and prey. Such noises are likely to be long-lasting, continuous, and/or persistent in the marine environment and, either alone or added to other ambient noises, significantly raise local sound levels over a significant portion of an area" (83 FR 35062).

4.3 Fin Whale (Balaenoptera physalus)

4.3.1 Status and Trends

The fin whale is listed under the ESA as endangered throughout its range and depleted under the MMPA. A Recovery Plan was completed for the fin whale in 2010 (National Marine Fisheries Service, 2010b), and the five-year review for this species in 2019 (National Marine Fisheries Service, 2019).

The California, Oregon, and Washington; Hawaii; Northeast Pacific; and western North Atlantic stocks of fin whales are expected to occur in the Action Area. Populations of fin whales are present in the Indian Ocean and Southeast Pacific portions of the Action Area as well. Abundance information is presented in Table 3-1.

4.3.2 Distribution

The fin whale is found in all the world's oceans and is the second-largest species of whale (Jefferson et al., 2008). Fin whales prefer temperate and polar waters and are scarcely seen in warm, tropical waters (Archer et al., 2019; Reeves et al., 2002). Fin whales are not known to have a specific habitat and are highly adaptable, following prey, typically off the continental shelf (Azzellino et al., 2008; Panigada et al., 2008; Scales et al., 2017). .

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

In the mid-Atlantic region, fin whales tend to occur north of Cape Hatteras where they accounted for about 46 percent of the large whales observed in surveys conducted between 1978 and 1982 (National Marine Fisheries Service, 2010a). Fin whales have been detected frequently throughout the winter months during passive acoustic monitoring efforts conducted from 2007 through 2015 within the continental shelf break and slope waters off Onslow Bay, North Carolina (Hodge et al., 2014, 2015, 2016; U.S. Department of the Navy, 2013). Calving may take place during October to January in latitudes of the U.S. mid-Atlantic region; however, it is unknown where calving, mating, and wintering occur for most of the population (Hain et al., 1992). Based on the above literature, fin whales are expected to occur north of the Atlantic landing area for most of the year, but they do move farther south and into the landing area in winter (**Figure 6Error! Reference source not found.**). The maximum density in the landing area of 0.018352 is at the extreme northwestern corner of the area (red value in **Figure 6**). It is unlikely that Super Heavy would ever touch down in this area as the goal of Super Heavy is a return to launch site (RTLS). By the time Super Heavy comes online to fly the Atlantic trajectories, RTLS should be a reality and the likelihood of Super Heavy expending in the farthest corner of the study region is negligible. The average fin whale density used in the calculations is more representative than the maximum for estimating effects on fin whales.

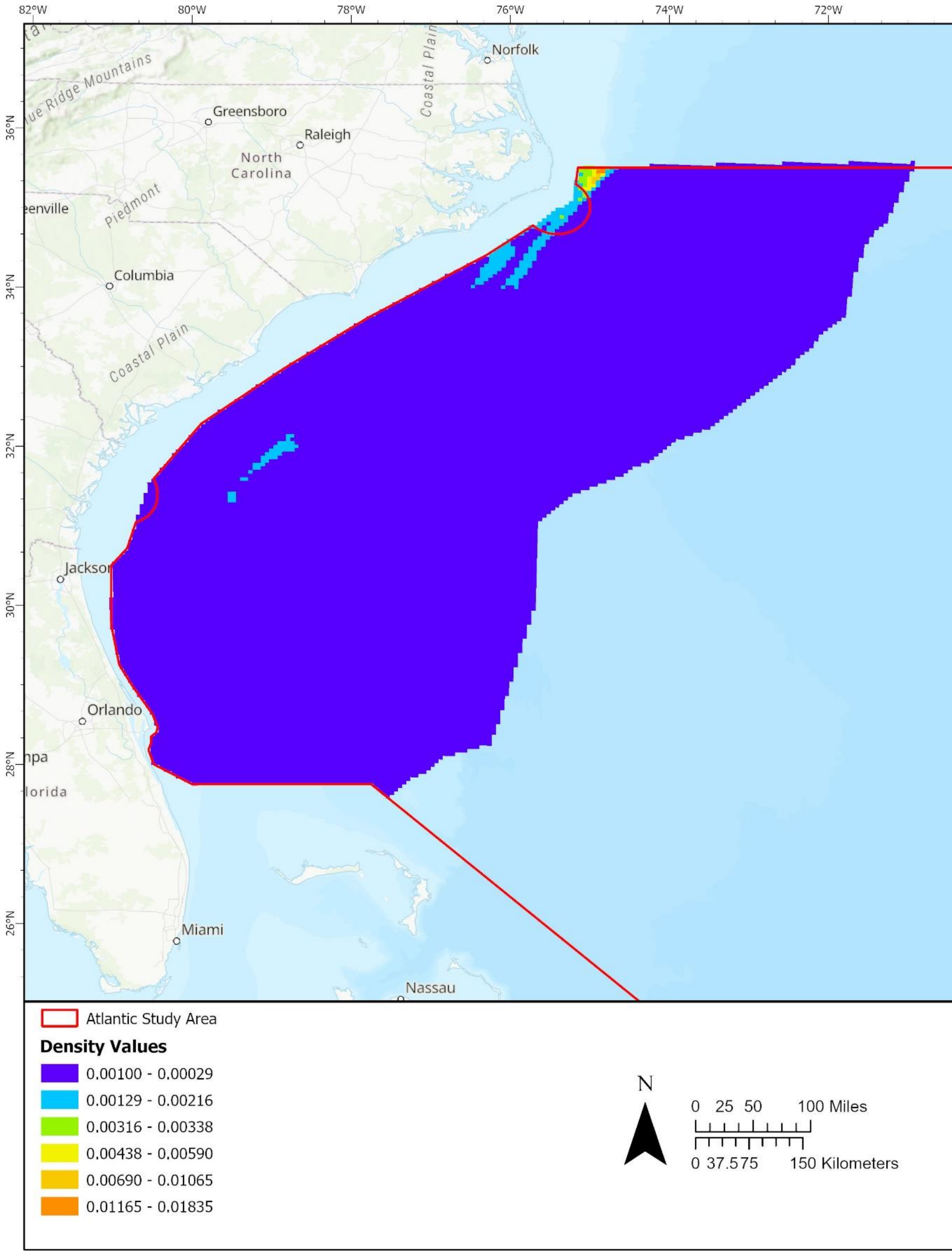

Figure 6 Density Distribution of Fin Whale in the Atlantic Landing Area.

Indian Ocean Starship Landing Area

Based on recent acoustic studies (Leroy et al., 2018) there is a high likelihood that fin whales in the Indian Ocean migrate from south to north at the end of the austral summer after summer feeding off of Antarctica, and then move northward to sub-tropical and tropical latitudes in the winter while remaining in the Southern Hemisphere (Širović et al., 2004; Širović et al., 2009). Accordingly, fin whales are probably most abundant in the Action Area during austral winter months, and likely absent during the southern hemisphere's warmer months while feeding off the Antarctic coast, with a range from approximately 25 ° S latitude to higher latitudes towards the Antarctic coast.

Northwestern and Hawaii Starship Landing Area

Fin whales have been recorded from hydrophone sites near Hawaii at all times of the year (McDonald & Fox, 1999; Moore et al., 1998), with an apparent minimum during May, June, and July (Moore et al., 1998). It is difficult to tell where the calling fin whales are with respect to the Hawaiian Islands, and many of the callers are expected to be quite distant. In summer, fin whales are likely absent from the Hawaii Action Area, and during three separate line-transect surveys of the Hawaiian Islands Exclusive Economic Zone during summer and fall, fin whales were only seen during the fall months (Barlow, 2006; Bradford et al., 2017).

Southeast Pacific Starship Landing Area

In the Southern Hemisphere, fin whales feed in high latitude areas during the summer and migrate north to temperate or tropical waters for breeding in during the austral winter. Fin whales have been historically observed in both offshore and nearshore waters off North-Central Chile. Between 1908 and 1975, a total of 8,241 fin whales were taken from whaling stations in the Southeast Pacific, specifically in Peru and Chile(Felix et al., 2022). Records indicate they were mainly caught between October and February, suggesting this this species may be more abundant in the region during this timeframe (Felix et al., 2022).

Northeastern Pacific Starship Landing Area

Fin whales have been documented from 60° to 23° N. As demonstrated by satellite tags and discovery tags[85], fin whales make long-range movements along the entire U.S. West Coast (Falcone et al., 2011; Mate et al., 2015; Mizroch et al., 2009). However, photo-identification studies of fin whales off the U.S. West Coast suggest that not all fin whales undergo long -range seasonal migrations, but instead make short-range seasonal movements in spring and fall (Falcone et al., 2011; Falcone & Schorr, 2011). Six tags were deployed on fin whales in the Southern California in August 2014 (Mate et al., 2015). The movements of these whales were highly variable, ranging from less than 1 km to approximately 232 km from the California coast, and moving as far north as the Oregon border with California and as far south as Central Baja Mexico.

[85] As a means of data collection starting in the 1930s, discovery tags having a serial number and return address were shot into the blubber of the whale by scientists and if that whale was later harvested by the whaling industry and the tag "discovered" during flensing, it could be sent back to the researchers providing data on the movement of individual whales.

4.3.3 Critical Habitat

Critical habitat has not been designated for this species.

4.4 Humpback Whale (Megaptera novaeangliae)

4.4.1 Status and Trends

The global population of humpback whales has been divided into 14 Distinct Population Segments (DPSs), with 5 of the 14 DPSs listed under the ESA (81 FR 62259).

Humpback whales from two of the DPSs listed as endangered or threatened, the Mexico DPS and the Central America DPS, would occur in the Action Areas. More specifically, humpback whales from the Central America DPS would occur seasonally within the South Pacific Action Area and the Northeast Pacific Area, and the Mexico DPS would have seasonal occurrence in the Northeast Pacific Area.

Humpback whales of the Mexico DPS are listed as threatened and those from the Central America DPS are listed as endangered under the ESA (National Marine Fisheries Service, 2016a). The Hawaii DPS is not listed under the ESA. Together the Central America DPS and part of the Mexico Distinct Population Segment, plus a small number of whales from the non-listed Hawaii Distinct Population Segment, are considered the California, Oregon, and Washington stock of humpback whales and are listed as depleted under the MMPA (Carretta et al., 2018a; Carretta et al., 2017a; Carretta et al., 2017b; National Marine Fisheries Service, 2016a).

The Atlantic, Southeast Africa/Madagascar, West Australia, and Southeastern Pacific DPSs of humpback whales are also present in the Action Area; however, none are ESA-listed. Table 4-1 summarizes the humpback whale DPSs present in each portion of the Action Area. Abundance information is presented in Table 3-1.

Table 4-1: Humpback Whale DPSs Present in the Action Area

Distinct Population Segments	Gulf of Mexico Super Heavy Landing Area	Atlantic Ocean Super Heavy Landing Area	Indian Ocean Starship Landing Area	Northwestern and Hawaii Starship Landing Area	Northeastern Pacific Starship Landing Area	Southeast Pacific Starship Landing Area
Mexico					X	
Central America					X	X
Southeastern Pacific						X
Hawaii				X	X	
West Indies		X				
Southeast Africa/ Madagascar			X			
West Australia			X			

4.4.2 Distribution

The habitat requirements of wintering humpbacks appear to be controlled by the conditions necessary for calving, such as warm water (75 to 80° Fahrenheit [24° to 28° Celsius]) and relatively shallow, low-relief ocean bottom in protected areas, nearshore or created by islands or reefs

(Clapham, 2000; Craig & Herman, 2000; Smultea, 1994). In breeding grounds, females with calves occur in significantly shallower waters than other groups of whales, and breeding adults use deeper more offshore waters (Ersts & Rosenbaum, 2003; Smultea, 1994). While most humpback whale sightings are in nearshore and continental shelf waters, humpback whales frequently travel through deep oceanic waters during migration (Calambokidis et al., 2001; Clapham, 2000; Clapham & Mattila, 1990; Mate et al., 1998).

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

The Atlantic DPS of humpback whales are present in this portion of the Action Area. Records of humpback whales off the U.S. mid-Atlantic coast (New Jersey to North Carolina) from January through March suggest these waters may represent a supplemental winter-feeding ground used by juvenile and mature humpback whales of United States and Canadian North Atlantic stocks (LaBrecque et al., 2015a).

Aerial and vessel monitoring conducted offshore of Cape Hatteras, North Carolina, in Onslow Bay, North Carolina, and offshore of Jacksonville, Florida confirmed winter occurrence of humpback whales in these three areas of the Atlantic as well as observations in Onslow Bay during the spring months (U.S. Department of the Navy, 2013).

Indian Ocean Starship Landing Area

The Southeast Africa/ Madagascar DPS and the West Australia DPS of humpback whales are present in this portion of the Action Area as they migrate to low latitude areas for breeding during the austral winter. Populations of humpback whales are known to winter in the southwest Indian Ocean, particularly in areas between east Africa and Madagascar (Cerchio et al., 2013). The IWC recognizes humpback whales that winter in this region as the Breeding Stock C, which is divided into 4 distinct sub-regions. C1 sub-region encompasses humpback whales that use east Africa as a corridor for migration to Mozambique, Tanzania, and Kenya. The C2 sub-region includes humpback whales that occur off the Comoros Islands Mayotte, and Seychelles Island. The C3 sub-region encompasses whales distributed around the island of Madagascar, while the C4 sub-region of humpback whales winter around Reunion, Mauritius, and Rodrigues. The West Australia DPS is recognized by the IWC as Breeding Stock D. Populations of humpback whales in this stock breed primarily in the Kimberly region during the winter (National Marine Fisheries Service, 2015b).

Northwestern and Hawaii Starship Landing Area

The Hawaii DPS of humpback whales breed within the main Hawaiian Islands. Approximately half of this DPS are present and migrate from most recognized feeding grounds in the North Pacific, and the other half migrate from Southeastern Alaska and Northern British Columbia (National Marine Fisheries Service, 2015b). This DPS is recognized as a discrete population as a result of significant genetic differences from other breeding areas in the North Pacific (National Marine Fisheries Service, 2015b).

Southeast Pacific Starship Landing Area

The California, Oregon, Washington stock of humpback whales is present in this Action Area as they migrate from feeding areas along the U.S West Coast, British Colombia, and Alaska to their winter breeding grounds in Mexico and Central America (Calambokidis et al., 2017; Carretta et al., 2018a). The wintering areas for Central America Distinct Population Segment are waters from southern Mexico and south along the coast of Central America (Calambokidis et al., 2008).

The Southeastern DPS of humpback whales also occurs in this portion of the Action Area. This DPS consists of humpback whale individuals that winter from Panama to Northern Peru, with high concentrations of this species in Columbia (National Marine Fisheries Service, 2015b).

Northeastern Pacific Starship Landing Area

The California, Oregon, Washington stock of humpback whales is present in this Action Area as they migrate from feeding areas along the U.S West Coast, British Colombia, and Alaska to their winter breeding grounds in Mexico and Central America (Calambokidis et al., 2017; Carretta et al., 2018a). The wintering areas for the Mexico Distinct Population Segment are the waters and islands off Mexico and for the Central America Distinct Population Segment, the wintering areas are waters from southern Mexico and south along the coast of Central America (Calambokidis et al., 2008).

The Hawaii DPS of humpback whales breed within the main Hawaiian Islands and may also be present in this Action Area, particularly those that migrate from the Hawaiian Islands to Southeastern Alaska and Northern British Columbia (National Marine Fisheries Service, 2015b).

4.4.3 Critical Habitat

In 2021, NMFS designated critical habitat for Mexico, Western North Pacific, and Central America Distinct Population Segments along the U.S. West Coast and portions of Alaska (National Oceanic and Atmospheric Administration, 2021a). Critical habitat does not overlap the Action Area.

4.5 North Atlantic Right Whale (*Eubalaena glacialis*)

4.5.1 Status and Trends

The North Atlantic right whale is listed under the ESA as endangered throughout its range and is depleted under the MMPA. The North Atlantic right whale population is considered one of the most critically endangered populations of large whales in the world (Clapham et al., 1999) A NMFS ESA status review in 1996 concluded that the western North Atlantic stock remains endangered. A recovery plan for the North Atlantic right whale is in effect (National Marine Fisheries Service, 2005). The North Atlantic right whale has been protected from commercial whaling since 1949 by the International Convention for the Regulation of Whaling (62 Stat. 1716; 161 United Nations Treaty Series 72). The Western stock of northern Atlantic right whales is expected to occur in the Action Area. Stock abundance information is presented in Table 3-1.

4.5.2 Distribution

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

Research suggests the existence of seven major habitats or congregation areas for western North Atlantic right whales. The summer feeding grounds include the Great South Channel, Jordan Basin, Georges Bank along its northeastern edge, Cape Cod and Massachusetts Bays, the Bay of Fundy, and the Roseway Basin on the Scotian Shelf. The winter range for North Atlantic right whales includes the Southeast U.S. Continental Shelf Large Marine Ecosystem. LaBrecque et al. (2015a) used habitat analyses of sea surface temperatures and water depths and aerial sightings data to delineate a calving area in the southeast Atlantic, extending from Cape Lookout, North Carolina, to Cape Canaveral, Florida, that overlaps with the Atlantic Action Area. This area, identified as biologically important, encompasses waters from the shoreline to the 25-meter (m) isobath from mid-November through late April.

Indian Ocean Starship Landing Area

This species is not expected to occur in this Action Area.

Northwestern and Hawaii) Starship Landing Area

This species is not expected to occur in this Action Area.

Southeast Pacific Starship Landing Area

This species is not expected to occur in this Action Area.

Northeastern Pacific Starship Landing Area

This species is not expected to occur in this Action Area.

4.5.3 Critical Habitat

Two ESA-designated critical habitats for North Atlantic right whales have been designated by NMFS to encompass physical and biological features essential to the conservation of the species (81 *Federal Register* 4838–4874, January 27, 2016). The northern unit includes the Gulf of Maine and Georges Bank, which are key areas essential for right whale foraging. The southern unit includes the coast of North Carolina, South Carolina, Georgia, and Florida, which are key areas essential for calving. The southern unit designated critical habitat is located within the Atlantic portion of the Action Area.

4.6 Rice’s Whale (Balaenoptera ricei)

4.6.1 Status and Trends

Rice’s whale was formerly known as the Northern Gulf of Mexico stock of Bryde’s whale. It was designated a separate species in 2021 based on genetic and morphometric data distinguishing it from other subspecies of Bryde’s whale (Rosel et al., 2021). Rice's whale is listed as endangered under the ESA and considered depleted under the MMPA. The population is very small (fewer than 100 animals), exhibits very low genetic diversity, and has a restricted range, which places the stock at great risk of demographic and environmental stochasticity. Stock abundance information is presented in Table 3-1.

4.6.2 Distribution

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

Rice's whales occur almost exclusively in the northeastern Gulf of Mexico in the De Soto Canyon area, along the continental shelf break between 100 m and 400 m depth, with a single sighting at 408 m (Hansen et al., 1996; Maze-Foley & Mullin, 2006; Mullin & Fulling, 2004; Mullin & Hoggard, 2000; Rice et al., 2014; Rosel et al., 2016; Rosel & Wilcox, 2014; Širović et al., 2014; Soldevilla et al., 2017). Rice's whales have been sighted in all seasons within the De Soto Canyon area (Deepwater Horizon Marine Mammal Injury Quantification Team, 2015; Maze-Foley & Mullin, 2006; Mullin & Hoggard, 2000). Between 2000 and 2021, data in OBIS-Seamap indicates there were 8 sightings of Rice's whales in the Gulf of Mexico, totaling 21 individuals (Halpin et al., 2009).

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Indian Ocean Starship Landing Area

This species is not expected to occur in this Action Area.

Northwestern and Hawaii Starship Landing Area

This species is not expected to occur in this Action Area.

Southeast Pacific Starship Landing Area

This species is not expected to occur in this Action Area.

Northeastern Pacific Starship Landing Area

This species is not expected to occur in this Action Area.

4.6.3 Critical Habitat

Critical habitat has not been designated for this species.

4.7 Sei Whale (Balaenoptera borealis)

4.7.1 Status and Trends

The sei whale is listed as endangered under the ESA and as depleted under the MMPA throughout its range. A recovery plan for the sei whale was completed in 2011 and provided a research strategy for obtaining data required to estimate population abundance and trends, and to identify factors that may be limiting the recovery of this species (National Marine Fisheries Service, 2011a).

The eastern North Pacific, Hawaii, and western North Atlantic stocks of sei whales are expected to occur in the Action Area. Populations of sei whales are present in the Indian Ocean and Southeast Pacific portions of the Action Area as well. Abundance information is presented in Table 3-1.

4.7.2 Distribution

Sei whales have a worldwide distribution and are found primarily in cold temperate to subpolar latitudes. During the winter, sei whales are found in warm tropical waters. Sei whales are typically found in the open ocean and are rarely observed near the coast (Horwood, 2009; Jefferson et al., 2015).

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

Passive acoustic monitoring conducted offshore of Cape Hatteras, North Carolina, since 2011 resulted in the detections of sei whales on bottom-mounted high-frequency acoustic recording packages that were not observed during visual surveys (McLellan et al., 2014). Passive acoustic monitoring conducted offshore of Jacksonville, Florida, from 2009 through 2012 also included detections of sei whales on marine acoustic recording units during the winter of 2009 to 2010 (Oswald et al., 2016) and possible detections on high-frequency acoustic recording packages during the winter of 2010 and 2011 (Hodge & Read, 2013).

Indian Ocean Starship Landing Area

There are no reliable distribution data for sei whales within the Indian Ocean; however, they likely follow the same pattern of fin whales, with an austral summer feeding season along the Antarctic coast, and northern migrations to subtropical waters within the Action Area (generally 20 to 25° S latitude as the northern limit).

Northwestern and Hawaii Starship Landing Area

Sei whales are seen infrequently in the Hawaiian Islands, and are reported to be more abundant during the cool seasons (Barlow, 2006). Sei whales had not been documented to occur in waters of the Hawaiian Islands until they were sighted during a systematic ship survey in 2002 (Barlow, 2006). The presence of these subadults was cited as evidence suggesting that the area north of the main Hawaiian Islands may be part of a reproductive area for North Pacific sei whales (Smultea et al., 2010). During two systematic ship surveys within the Hawaiian Islands EEZ there has been a total of eight sei whale sightings, allowing for a recent abundance estimate for this species (Klinck et al., 2015).

Southeast Pacific Starship Landing Area

There have been several observations of sei whales in the Southeast Pacific over the years. Off Chile, observations have been made as far north as Antofagasta and as far south as the Magellan Straight (Español-Jiménez et al., 2019). They have also been reported off the islands of Juan Fernandez. Although there have been confirmed observations, there are no vocalization records of this species in the Southeast Pacific.

Northeastern Pacific Starship Landing Area

Sei whales are encountered during the summer off California and the North America coast from approximately the latitude of the Mexican border to as far north as Vancouver Island, Canada (Horwood, 2009; Masaki, 1976, 1977; Smultea et al., 2010). Sei whales have also been observed at least as far south as 20° N into the North Pacific Gyre (Horwood, 2009; Horwood, 1987). Although sei whales have been observed south of 20° N in the winter (Fulling et al., 2011;

Horwood, 2009; Horwood, 1987), they are considered absent or at very low densities in most equatorial areas.

4.7.3 Critical Habitat

There is no designated critical habitat for this species.

4.8 Sperm Whale (Physeter macrocephalus)

4.8.1 Status and Trends

The sperm whale is listed as endangered throughout its range under the ESA. The stock structure for sperm whales remains uncertain in the Indian Ocean (Mesnick et al., 2011; Mizroch & Rice, 2013; National Marine Fisheries Service, 2015a), and sperm whales in the Indian Ocean Action Area have not been assigned to a stock (Carretta et al., 2020) . The California, Oregon, and Washington; Hawaii, North Atlantic, and northern Gulf of Mexico stocks of sperm whales are present in the Action Area. Although not assigned a stock, populations of sperm whales are also present in the Indian Ocean and Southeast Pacific portions of the Action Area. Despite lacking a stock designation, NMFS considers the Indian Ocean to support its own population that is considered separately from other populations for the purposes of conservation management and trends tracking (National Marine Fisheries Service, 2010c). Abundance information is presented in Table 3-1.

4.8.2 Distribution

Sperm whales are found throughout the world's oceans in deep waters to the edge of the ice at both poles (Leatherwood & Reeves, 1983; Rice, 1989a; Whitehead, 2002). Sperm whales show a strong preference for deep waters (Rice, 1989a; Whitehead, 2003). Their distribution is typically associated with waters over the continental shelf break, over the continental slope, and into deeper waters and midocean regions. Typically, sperm whale concentrations correlate with areas of high productivity. These areas are generally near drop-offs and areas with strong currents and steep topography (Gannier & Praca, 2007; Jefferson et al., 2015).

<u>Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location</u>

Seasonal aerial surveys confirm that sperm whales are present in the northern Gulf of Mexico in all seasons (Hansen et al., 1996; Mullin & Hoggard, 2000; Mullin et al., 1994b). The distribution of sperm whales in the Gulf of Mexico is strongly linked to surface oceanography, such as Loop Current eddies that locally increase production and availability of prey (O'Hern & Biggs, 2009). Ship-based and aerial based surveys indicate that sperm whales are widely distributed only in waters deeper than 200 m in the northern Gulf of Mexico (Waring et al., 2014), specifically inhabiting the continental slope and oceanic waters (Fulling et al., 2003; Maze-Foley & Mullin, 2006; Mullin & Fulling, 2004; Mullin & Hoggard, 2000; Mullin et al., 2004).

<u>Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location</u>

Passive acoustic monitoring conducted in Onslow Bay, North Carolina, between 2007 and 2013 confirmed year-round occurrence of sperm whales, along with a nocturnal increase in occurrence of clicks and greater vocal activity on recorders located in deeper waters of the monitoring area (Hodge, 2011; Read et al., 2014; U.S. Department of the Navy, 2013). Sperm whales were also one of the most commonly detected species on marine autonomous recording units deployed just beyond the shelf in approximate water depth of 183 m during the fall and winter of 2009 and 2010 offshore of Jacksonville (Oswald et al., 2016).

Indian Ocean Starship Landing Area

In the western Indian Ocean, there is evidence that concentrations of mixed female/immature whale groups exist south of the Seychelles (Eyre & Frizell, 2012; James & Soundararajan, 1979; Kahn et al., 1993) . In the central Indian Ocean, concentrations of sperm whales have been recorded to the north of St. Paul and Amsterdam Islands in the austral summer (Gosho, 1984).

Northwestern and Hawaii Starship Landing Area

Sperm whales occur in Hawaiian waters and are one of the more abundant large whales found in that region (Baird et al., 2003b; Barlow, 2006; Bradford et al., 2017; Mobley et al., 2000). A total of 21 sperm whale sightings were made during a summer/fall 2002 shipboard survey of waters within the U.S. Exclusive Economic Zone of the Hawaiian Islands, although only four of these sightings were around the main Hawaiian Islands (Barlow, 2006). During a follow-up survey conducted in 2010, there were 41 sperm whale sightings, mainly concentrated in the northwestern portion of the U.S. Exclusive Economic Zone of the Hawaiian Islands (Bradford et al., 2017).

Southeast Pacific Starship Landing Area

Sperm whales have been observed throughout the Southeast Pacific. They have been known to occupy waters near off the Galapagos Island for the past 200 years and have also been recognized in waters off Chile and Peru (Eguiguren et al., 2021). During a 2000 ship survey off northern Peru, there were 48 sperm whale groups observed, ranging in size from 1 to 13 individuals (Rendell et al., 2004).

Northeastern Pacific Starship Landing Area

Sperm whales are found year-round in California waters, but their abundance is temporally variable, most likely due to variation in the availability of prey species (Barlow, 1995; Barlow & Forney, 2007; Forney & Barlow, 1993; Smultea, 2014). During quarterly ship surveys conducted off southern California between 2004 and 2008, there were a total of 20 sperm whale sightings, the majority (12) occurring in summer in waters greater than 2,000 m deep (Douglas et al., 2014). Their distribution is typically associated with waters over the continental shelf break, over the continental slope, and into deeper waters (Carretta et al., 2017a; Rice, 1989b; Whitehead, 2003; Whitehead et al., 2008).

4.8.3 Critical Habitat

Critical habitat has not been designated for this species.

4.9 Guadalupe Fur Seal (A*rctocephalus townsendi*)

4.9.1 Status and Trends

The Guadalupe fur seal is listed as threatened under the ESA and depleted under the MMPA throughout its range. All fur seals alive today are recent descendants from one breeding colony at Isla Guadalupe and Isla San Benito off Mexico's Pacific coast and are considered a single stock, (Carretta et al., 2017a; Pablo-Rodríguez et al., 2016). Abundance information is presented in Table 3-1.

4.9.2 Distribution

Off the coast of North America, Guadalupe fur seals are pelagic and rarely come to shore along (Norris & Elorriaga-Verplancken, 2020). The primary breeding colony is on Guadalupe Island, located off the Baja California Peninsula, Mexico. Breeding also occurs on a smaller scale on islands in the San Benito Archipelago, which has only recently been recolonized by the fur seals and is also located near Guadalupe Island (Aurioles-Gamboa et al., 2010). Following the breeding season, Guadalupe fur seals migrate north. Some adult females nursing pups remain relatively closer to Guadalupe Island, but Navy funded tagging studies tracking Guadalupe fur seal movements from Guadalupe Island show that non-pups (adults and juveniles of both sexes) move northward along U.S. West Coast and that highest densities are in offshore waters near the Patten Escarpment or at approximately the 2,000 m depth contour (Norris, 2019; Norris & Elorriaga-Verplancken, 2020). Pups, however, migrate closer to shore than non-pups and are known to migrate farther north into waters off Oregon, Washington, and British Columbia and would not be expected in the Project Area (Gallo-Reynoso, 1994; Juárez-Ruiz et al., 2018; Melin & DeLong, 1999).

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Indian Ocean Starship Landing Area

This species is not expected to occur in this Action Area.

Northwestern and Hawaii Starship Landing Area

This species is not expected to occur in this Action Area.

Southeast Pacific Starship Landing Area

This species is not expected to occur in this Action Area.

Northeastern Pacific Starship Landing Area

Guadalupe fur seals can be found in both deeper waters of the open ocean and coastal waters in the eastern North Pacific; however, they are only likely to occur in the northeastern portion of this Project Area, in the vicinity and north of Guadalupe Island (Hanni et al., 1997; Jefferson et al., 2015; Norris, 2017).

4.9.3 Critical Habitat

Critical habitat has not been designated for this species.

4.10 Hawaiian Monk Seal (*Neomonachus schauinslandi*)

4.10.1 Status and Trends

The Hawaiian monk seal was listed as endangered under the ESA in 1976 (National Marine Fisheries Service, 1976) and is listed as depleted under the MMPA throughout its range (Carretta et al., 2018a, 2018b). Hawaiian monk seals are managed as a single stock. Stock abundance information is presented in Table 3-1.

A new approach was developed to estimate the abundance range-wide and for individual island-specific subpopulations (Baker et al., 2016). The new approach incorporates multiple methods of estimating site-specific abundances (e.g., direct counts, counts corrected for seals at sea, capture-recapture) and combines the results into a model (Harting et al., 2017). The Monte Carlo-style model is employed to overcome inconsistent field survey data, which, due to the difficulty of surveying numerous remote islands simultaneously, are collected years apart and often using differing, non-standardized methods. Based on the most recent count data and modeling results, the range-wide abundance is estimated at 1,437 monk seals (Carretta et al., 2022). The model also indicted that the monk seal population increased at a rate of 2 percent per year from 2013-2019, countering previous trend analysis indicating the population was in decline (Carretta et al., 2022; Robinson et al., 2022).

A recovery plan for the Hawaiian monk seal was completed in 1983 and is currently undergoing revision (National Marine Fisheries Service, 2007, 2011b, 2016b). Due to the proximity of the Hawaiian monk seal to human development, commerce, recreation, and culture, the 2007 revised Recovery Plan included a recommendation to develop a management specifically addressing issues in the main Hawaiian Islands (National Marine Fisheries Service, 2007). In response to that recommendation, a "Main Hawaiian Islands Monk Seal Management Plan" was developed (National Marine Fisheries Service, 2016b).

4.10.2 Distribution

The Hawaiian monk seal is one of the world's most endangered seals and is the only pinniped regularly found in the Hawaiian Islands (Carretta et al., 2022). The majority of the population is distributed in the Northwestern Hawaiian Islands with subpopulations on French Frigate Shoals, Laysan Island, Lisianski Island, Pearl and Hermes Reef, Midway Atoll, Kure Atoll, and Necker and Nihoa Islands (Baker et al., 2016; Carretta et al., 2022). A smaller subpopulation in the Main Hawaiian Islands has been increasing in recent years; whereas the larger population in the Northwestern Hawaiian Island was thought to have been in a long-term decline (Antonelis et al., 2006; Baker et al., 2016; Baker et al., 2011; Baker & Johanos, 2004) until the new approach for estimating abundance and trends was implemented (Carretta et al., 2022; Robinson et al., 2022).

Robinson et al. (2022) provided a comprehensive review of Hawaiian monk seal behavior and social interactions, including habitat use and foraging behavior. The authors note that occurrence is concentrated within the 200 m depth contour with foraging dives typically less than 50 m. Monk seals forage at or near the seafloor and tend to concentrate where bathymetry supports foraging activity, such as at reefs, seamounts, and shallow banks. While this generally means that monk seals are concentrated in shallow waters surrounding natal islands, they are known to travel hundreds of kilometers over deeper waters to reliable foraging sites (Robinson et al., 2022). For example, in the Northwestern Hawaiian Islands, monk seals residing on Kure Atoll and Midway Atoll both transit through deeper waters to forage at the Nero Seamount located between the two atolls. In the Main Hawaiian Islands, over two thirds of monk seals move between islands, but most prefer to forage close to the island on which they commonly haul out (Robinson et al., 2022; Wilson et al., 2017).

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Indian Ocean Starship Landing Area

This species is not expected to occur in this Action Area.

Northwestern and Hawaii Starship Landing Area

Hawaiian monk seals are generally only present in the main Hawaiian Islands and Northwest Hawaiian Islands, but sightings have been reported at Johnston Atoll, Wake Island, and Palmyra Atoll (south of the Hawaiian Island chain; (Carretta et al., 2010; Gilmartin & Forcada, 2009; Harting et al., 2017; Jefferson et al., 2015; National Marine Fisheries Service, 2009, 2010d)). The six main breeding sites are in the northwestern Hawaiian Islands: Kure Atoll, Midway Islands, Pearl and Hermes Reef, Lisianski Island, Laysan Island, and French Frigate Shoals. Smaller breeding sites are on Necker Island and Nihoa Island (Harting et al., 2017), and monk seals have been observed at Gardner Pinnacles and Maro Reef. There is a small breeding population of monk seals found throughout the main Hawaiian Islands and births have been documented on most of the major islands, predominately on Kauai and Niihau (Gilmartin & Forcada, 2009; National Marine Fisheries Service, 2007, 2010d). Monk seal occurrence in deep offshore waters of the Project Area would not be anticipated.

Southeast Pacific Starship Landing Area

This species is not expected to occur in this Action Area.

Northeastern Pacific Starship Landing Area

This species is not expected to occur in this Action Area.

4.10.3 Critical Habitat

Critical habitat for Hawaiian monk seals was designated August 21, 2015 (National Oceanic and Atmospheric Administration, 2015). The critical habitat encompasses 16 different areas within the Northwestern Hawaiian Islands and the main Hawaiian Islands. The critical habitat for the Northwestern Hawaiian Islands includes specific areas in Kure Atoll, Midway Islands, Pearl and Hermes Reef, Lisianski Island, Laysan Island, Maro Reef, Gardner Pinnacles, French Frigate Shoals, Necker Island, and Nihoa Island (National Oceanic and Atmospheric Administration, 2023b). The critical habitat for the main Hawaiian Islands includes specific areas in Kaula, Niihau, Kauai, Oahu, Maui Nui (including Kahoolawe, Lanai, Maui, and Molokai), and Hawaii (National Oceanic and

Atmospheric Administration, 2023b). The essential features of the critical habitat were identified as:

(1) Adjacent terrestrial and aquatic areas with characteristics preferred by monk seals for pupping and nursing.

(2) Marine areas from 0 to 200 m in depth that support adequate prey quality and quantity for juvenile and adult monk seal foraging

(3) Significant areas used by monk seals for hauling out, resting, or molting (National Oceanic and Atmospheric Administration, 2015).

4.11 Killer Whale (*Orcinus Orca*)

4.11.1 Status and Trends

Killer whales present in the Action Areas are not ESA-listed species. The western North Atlantic, Gulf of Mexico, Hawaii, and eastern North Pacific stocks of killer whales designated by NMFS are present in the Action Area. Although not designated as a stock by NMFS, populations of killer whales are also present in the Indian Ocean and Southeast Pacific portion of the Action Area as well. Abundance information is presented in Table 3-1.

There is only a single species of killer whale currently recognized, but strong and increasing evidence indicates the possibility of several different species of killer whales worldwide, many of which are called "ecotypes" (Ford, 2008).

4.11.2 Distribution

Killer whales are found in all marine habitats, from the coastal zone (including most bays and inshore channels) to deep oceanic basins and from equatorial regions to the polar pack ice zones of both hemispheres. Although killer whales are also found in tropical waters and the open ocean, they are generally most numerous in coastal waters and at higher latitudes (Dahlheim & Heyning, 1999).

<u>Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location</u>

Survey sightings of killer whales in the Gulf of Mexico from 1921 to 1995 were in water depths ranging from 840 to 8,700 ft., with an average of 4,075 ft., and were most frequent in the north-central region of the Gulf of Mexico (Waring et al., 2013). Killer whales were seen only in the summer during GulfCet aerial surveys of the northern Gulf of Mexico between 1992 and 1998 (Hansen et al., 1996; Mullin & Hoggard, 2000), were reported from May through June during vessel surveys (Maze-Foley & Mullin, 2006; Mullin & Fulling, 2004) and recorded in May, August, September and November by earlier opportunistic ship-based sources (O'Sullivan & Mullin, 1997).

<u>Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location</u>

Killer whales are considered rare and uncommon in waters of the U.S. Exclusive Economic Zone in the Atlantic Ocean (Katona et al., 1988; Waring et al., 2010, 2013). Deployment of high-frequency acoustic recording packages offshore of Cape Hatteras, Onslow Bay, Jacksonville, and the offshore areas near Norfolk Canyon from 2009 through 2015 have resulted in zero killer whale detections. During the fall and winter of 2009 and 2010, passive acoustic monitoring was conducted by marine autonomous recording units deployed over the continental shelf, just beyond the shelf, and offshore from the shelf break off Jacksonville, Florida. Recordings included detections of the blackfish group of cetaceans, which includes killer whales, along with melon-headed whales, pygmy killer whales, false killer whales, and short-finned pilot whales. Blackfish were detected every day during monitoring but there were no obvious differences in the occurrence of blackfish vocalizations relative to water depth and diel patterns were not apparent (Oswald et al., 2016). Since five species are combined into the blackfish category, vocalization patterns and behaviors may have masked by the presence of other species (Oswald et al., 2016).

Indian Ocean Starship Landing Area

This species was recorded in the Indian Ocean during the inception of tuna longline fisheries in the 1950s (Sivasubramaniam, 1964). Killer whales were reported to have preyed on the tuna caught on the longline, causing significant monetary losses to the industry. In 1993, there was only one sighting of a killer whale between the island of Seychelles and the east coast of Africa (Eyre & Frizell, 2012; Forney & Wade, 2006) . During a two-month ship survey from Australia to Israel in 1995, there was one sighting of a group of 10 killer whales in cool, deep oceanic waters east of Australia (Eyre & Frizell, 2012). Several sightings near waters of the Crozet Archipelago and Marion Island may indicate they are more likely to occur in the Southern Indian Ocean than in other regions (Forney & Wade, 2006).

Northwestern and Hawaii Starship Landing Area

Although killer whales apparently prefer cooler waters, they have been observed in Hawaiian waters (Baird, 2013; Barlow, 2006; Mobley et al., 2001; Shallenberger, 1981). Sightings are extremely infrequent in Hawaiian waters, and typically occur during winter, suggesting those sighted are seasonal migrants to Hawaii (Baird, 2013; Baird et al., 2003a; Mobley et al., 2001). Baird (Baird et al., 2006a; 2006) documented 21 killer whale sightings within the Hawaiian Exclusive Economic Zone, primarily around the main Hawaiian Islands, during relatively nearshore small boat surveys occurring between 1994 and 2004. A pod of killer whales was observed off the southwest Coast of the island of Hawaii in May 2014 (Pacific Fishery Management Council, 2014).

Southeast Pacific Starship Landing Area

Killer whales have been identified in the Southeast Pacific Ocean, although likely rare in this region. Based on detection function estimates between 1986 and 1993, 75 killer whales were estimated in waters off Ecuador (Forney & Wade, 2006). Sightings of killer whales in waters surrounding the Galapagos Islands have also indicated that the species is uncommon but may be regular in the area(Merlen, 1999). Capella et al. (2018) identified rake marks on the flukes of humpback whales and determined that predation by killer whales likely occurs most often in areas that are known breeding grounds for humpback whales, such as waters off southern Ecuador, Galapagos Archipelago, and along the coast of Chile.

Northeastern Pacific Starship Landing Area

Killer whales are known to occur year-round in waters surrounding the Baja California Peninsula. The waters in this region are highly productive and contain many prey species for killer whales, including both fish and other marine mammals (Olson & Gerrodette, 2008; Vargas-Bravo et al., 2020). Based on photo catalogs from ship surveys of waters from Baja California to Peru between 1986 and 2006, there were a total of 179 groups of killer whales sighted (Olson & Gerrodette, 2008).

4.12 Common Minke Whale (Balaenoptera acutorostrata)

4.12.1 Status and Trends

Minke whales are not an ESA-listed species. Minke whales are classified as a single species with three recognized subspecies: *Balaenoptera acutorostrata davidsoni* in the North Atlantic, *Balaenoptera acutorostrata* in the North Pacific, and a subspecies that is formally unnamed but generally called the dwarf minke whale, which mainly occurs in the southern hemisphere (Jefferson et al., 2015).

The California, Oregon, Washington; Hawaii; and Canadian East Coast stocks of minke whales are expected to occur in the Action Area. Populations of minke whales are also present in the Indian and Southeast Pacific Ocean portions of the Action Area as well. Abundance information is presented in Table 3-1.

4.12.2 Distribution

Minke whales have a cosmopolitan distribution in temperate and tropical waters in the northern and southern hemispheres, and generally occupy waters over the continental shelf, including inshore bays and even occasionally estuaries (Hayes et al., 2018). However, records from whaling catches and research surveys worldwide indicate there may be an open-ocean component to the minke whale's habitat (Jefferson et al., 2015; Perrin & Brownell, 2009)).

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

The minke whale is common and widely distributed within the U.S. Exclusive Economic Zone in the Atlantic Ocean (Cetacean and Turtle Assessment Program, 1982). Minke whales occur in the warmer waters of the southern United States during winter. While no minke whale mating or calving founds have been found in U.S. Atlantic waters (LaBrecque et al., 2015a), other data suggest a potential winter breeding area offshore the southeastern United States and the Caribbean based on seasonal migration patterns, acoustic survey results, calf stranding records, and sightings of mother-calf pairs in Onslow Bay and offshore of Jacksonville, Florida (Risch et al., 2014). Aerial and vessel surveys conducted offshore of Cape Hatteras, North Carolina since 2011, Onslow Bay, North Carolina since 2007 and Jacksonville, Florida since 2009 resulted in minke whale primarily during the winter months at all three locations (McLellan et al., 2014).

Indian Ocean Starship Landing Area

This species is not expected to occur in this Action Area.

Northwestern and Hawaii Starship Landing Area

This species is not expected to occur in Hawaiian waters but may occur east of the Hawaiian Islands near the boundary with the Northeastern Pacific Starship Landing Area.

Southeast Pacific Starship Landing Area

Although this species is rarely observed in Southeast Pacific, the have been a few dwarf minke whale observations in oceanic waters off Chile, ranging from central Chile as far south as Drake's Passage (Pastene et al., 2006). The distribution of minke whales in the Southeast Pacific is unknown.

Northeastern Pacific Starship Landing Area

Minke whales occur year-round off California (Forney & Barlow, 1998; Forney et al., 1995), mainly in nearshore areas (Barlow & Forney, 2007; Hamilton et al., 2009a; Smultea, 2014). During systematic ship surveys conducted in summer and fall off the U.S. West Coast between 1991 and 2014, there were 28 minke whale sightings (Barlow, 2016).

The migration paths of the minke whale include travel between breeding and feeding grounds and have been shown to follow patterns of prey availability (Jefferson et al., 2015). There is insufficient information to determine if the year-round low numbers of minke whales detected in Southern California suggest there may be resident animals although acoustic monitoring data indicating only occasional minke boing presence in spring and late fall (Debich et al., 2015; Hildebrand et al., 2012) would be consistent with a general seasonal migration pattern.

4.13 Bryde's Whale (Balaenoptera edeni)

4.13.1 Status and Trends

Bryde's whales are not an ESA-listed species. Bryde's whales are among the least known of the baleen whales. The species-level taxonomy remains unresolved as well as the number of species or subspecies (Alves et al., 2010; Jefferson et al., 2015; Kato & Perrin, 2009). The Society for Marine Mammalogy's Committee on Taxonomy (2015) recognizes two subspecies of Bryde's whale: (1) B. edeni (Eden's whale) and (2) B. *brydei* (offshore Bryde's whale). In addition, a Bryde's whale's "pygmy form" known as Omura's whale(Kato & Perrin, 2009); Rice, 1998) has been described. The International Whaling Commission continues to use the taxonomic name *Balaenoptera edeni* for all Bryde's-like whales, although at least two species are recognized.

The Northeastern Pacific, Hawaii, and Northen Gulf of Mexico stocks of Bryde's whales are present in the Action Area. Populations of Bryde's whales are also present in the Indian Ocean and Southeast Pacific portions of the Action Area. Abundance information is presented in Table 3-1.

4.13.2 Distribution

Unlike other baleen whale species, Bryde's whales are restricted to tropical and subtropical waters and do not generally occur beyond latitude 40° in either the northern or southern hemisphere (Kato & Perrin, 2009). Long migrations are not typical of Bryde's whales, although limited shifts in distribution toward and away from the equator in winter and summer were observed (Best, 1996; Cummings, 1985).

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

Based on assessment surveys, Bryde's whales do not consistently inhabit the southeast U.S. Atlantic (Rosel et al., 2016). The primary range of Bryde's whales in the Atlantic is in tropical waters south of the Caribbean, with the exception of the Gulf of Mexico. Bryde's whales may range as far north as Virginia (Kato & Perrin, 2009).

Indian Ocean Starship Landing Area

Bryde's whales were commonly observed by Japanese research vessels in the southwestern and eastern regions of the Indian Ocean from 1977 through 1979 (Kawamura, 1980). Research activities in 1977 and 1978 resulted in the scientific catch of 105 Bryde's whales in the waters off southern Madagascar and 120 in waters of the eastern Indian Ocean near Indonesia, indicating potential concentrations of Bryde's whales in these areas (Kawamura, 1980).

Northwestern and Hawaii Starship Landing Area

Bryde's whales in Hawaii have been designated by NMFS as the Hawaiian stock (Carretta et al., 2018b; Carretta et al., 2017a). They are distributed throughout the North Pacific Gyre and North Pacific Transition Zone, in the Hawaiian portion of the Action Area.

Southeast Pacific Starship Landing Area

Records indicate that Bryde's whales are present in the Southeast Pacific. Early reports of Bryde's whales in the region date back to 1914, where they were sighted by whalers off Isla de la Plata, Ecuador and further north near Gorgona Island, Columbia (Casamayor et al., 2022). Sighting and catch distribution data suggests that Bryde's whales also occur in waters off Peru year-round, with abundance varying seasonally (Pastene et al., 2015). The oceanic form of Bryde's whales has been observed in the spring and summer off Paita, Peru often 200 NM or more from shore (Casamayor et al., 2022). Additionally, a total of 2 Bryde's whales were also observed during a 1994 winter season cruise from Valparaiso to Easter Island from approximately 81°W to 87°W latitude and 26°S to 27°S longitude (Aguayo et al., 1998).

Northeastern Pacific Starship Landing Area

Bryde's whales in Southern California region are assigned to the Northeastern Pacific stock (Carretta et al., 2018b; Carretta et al., 2017a). A total of 160 Bryde's whales were sighted in the Gulf of California and the eastern North Pacific based off visual small boat surveys from 1982 through 1986 (International Whaling Commission, 1990) .

4.14 Dwarf/Pygmy Sperm Whale (Kogia sima and Kogia breviceps)

4.14.1 Status and Trends

Dwarf and pygmy sperm whales are not ESA-listed species. Before 1966, dwarf and pygmy sperm whales were thought to be a single species, until form and structure distinction were shown (Handley, 1966); misidentifications of these two species are still common (Jefferson et al., 2015). Rare sightings indicate they may avoid human activity, and they are rarely active at the sea surface. Because of the scarcity of biological information available for individual dwarf and pygmy sperm whales, both species are presented collectively here with species-specific information if available. Although virtually nothing is known of population status for these species, stranding frequency suggests they may not be as uncommon as sighting records would suggest (Jefferson et al., 2015; Maldini et al., 2005).

4.14.2 Distribution

Dwarf and pygmy sperm whales appear to be distributed worldwide in temperate to tropical waters (Caldwell & Caldwell, 1989; McAlpine, 2002). Dwarf and pygmy sperm whales can occur close to shore and sometimes over the outer continental shelf. However, several studies show that they may also generally occur beyond the continental shelf edge (Bloodworth & Odell, 2008; MacLeod et al., 2004). The pygmy sperm whale may frequent more temperate habitats than the dwarf sperm whale, which is more of a tropical species. The dwarf sperm whale may also have a more pelagic distribution, and dive deeper during feeding bouts, than pygmy sperm whales (Barros & Wells, 1998). Although deep oceanic waters may be the primary habitat for this species, there are very few oceanic sighting records offshore (Waring et al., 2014). The lack of sightings may have more to do with the difficulty of detecting and identifying these animals at sea and lack of effort than with any real distributional preferences.

<u>Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location</u>

Pygmy sperm whales were one of the most sighted species in the northern Gulf of Mexico from 1992 to 1994 and from 1996 to 2001 (Mullin & Fulling, 2004). Data from the Gulf of Mexico suggest that dwarf and pygmy sperm whales may associate with frontal regions along the continental shelf break and upper continental slope, where squid densities are higher (Baumgartner et al., 2001; Jefferson et al., 2015).

<u>Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location</u>

In the Atlantic Action Area, dwarf and pygmy sperm whales are found primarily in the Northeast and Southeast U.S. Continental Shelf Large Marine Ecosystems and Caribbean Sea (Bloodworth & Odell, 2008; Caldwell & Caldwell, 1989; Cardona-Maldonado & Mignucci-Giannoni, 1999). Analysis of vocalizations collected during passive acoustic monitoring efforts conducted offshore of Onslow Bay, North Carolina between 2007 and 2013 indicate that dwarf and pygmy sperm whales only occur sporadically in this area (Hodge, 2011; U.S. Department of the Navy, 2013). Additional passive acoustic data collected in Onslow Bay between August 2011 and October 2012 resulted in dwarf and pygmy sperm whales click detections during August to December 2011 and July to October 2012 deployments with a peak in vocal activity in late November 2011(Hodge & Read, 2013).

Indian Ocean Starship Landing Area

Pygmy and Dwarf sperm whales have been identified in the Southwest Indian Ocean in pelagic waters around South Africa (Elwen et al., 2013). Pygmy sperm whales have been mainly observed at sea near Mayotte and Tromelin island. They have also been reported once near Seychelles, and twice in waters near Madagascar (Kiszka et al., 2009). There has been one stranding record of this species in the Southwest region, specifically off La Reunion Island (Kiszka et al., 2009).

Northwestern and Hawaii Starship Landing Area

A year-round biologically important small and resident population area has been identified for dwarf sperm whales off the West Coast of the Island of Hawaii (Baird et al., 2015a). The delineated area forms a rough triangle around 55 sightings of dwarf sperm whales sighted in the area between 2002 to 2012 (Baird et al., 2015a).

Southeast Pacific Starship Landing Area

There is limited information on the distribution of dwarf and minke sperm whales in the Southeast Pacific. Records of pygmy sperm whales from the eastern Pacific suggest that its range includes the waters off Southern California to Chile (Meza-Yáñez et al., 2021). Stranding records of a subadult dwarf sperm off Huasco, Northern Chile also suggests that this species may be present in this region (Alvarado-Rybak et al., 2020).

Northeastern Pacific Starship Landing Area

Records of pygmy sperm whales from the eastern Pacific suggest that its range includes the waters off Southern California to Chile (Meza-Yáñez et al., 2021) 1. In 2017, the first recorded stranding of pygmy sperm whales on the Mexican Central Pacific coast was reported in Tenacatita Bay, Jalisco. Strandings have also been recorded in 2020 at Azul Beach in Colima and Colola Beach in Michoacan (Meza-Yáñez et al., 2021). In 1983, a group of 12 individuals, identified as either dwarf or pygmy sperm whales, were observed off the Isla de Guadalupe, indicating that they may be present in this region(Gallo-Reynoso & Figueroa-Carranza, 1998).

4.15 Short-Beaked Common Dolphin (*Delphinus delphis*)

4.15.1 Status and Trends

The short-beaked common dolphin is not an ESA-listed species. Common dolphins are represented by two species for management purposes in NMFS Pacific Stock Assessment Report (Carretta et al., 2017a), the short-beaked common dolphin (*Delphinus delphis*) and long-beaked common dolphin (*Delphinus capensis*). The short-beaked common dolphin is recognized in the Action Area as the Atlantic stock and the California, Oregon, and Washington stock. Populations of short-beaked common dolphins are present in the Indian and Southeast Pacific Ocean portions of the Action Area as well. Abundance information is presented in Table 3-1.

4.15.2 Distribution

The short-beaked common dolphin is widely distributed in tropical and cool temperate waters in the Atlantic and Pacific Oceans, although they do not occur in the Gulf of Mexico or in most waters in the Caribbean Sea bottoms (Jefferson et al., 2015). This species seems to prefer areas with upwellings and steep sea-bottoms (Jefferson et al., 2015).

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

The Atlantic stock of short-beaked common dolphins are present within this Action Area. They mainly occur in offshore waters, ranging from Canada maritime provinces to the Florida/Georgia border (Waring et al., 2010). They are less common south of Cape Hatteras, although schools were reported as far south as the Georgia/South Carolina border (32° N) (Jefferson et al., 2009).

Indian Ocean Starship Landing Area

This species is not expected to occur in this Action Area.

Northwestern and Hawaii Starship Landing Area

This species is not expected to occur in this Action Area.

Southeast Pacific Starship Landing Area

A ship survey off the coast of Northern Chile reported sightings of short-beaked common dolphins. Data suggests an increased presence of this species and other delphinids in the area's coastal upwelling ecosystem (Buscaglia, 2020). Additionally, a 2010 study that monitored 8 fishing trips in waters off Northern Chile reported the incidental capture of 58 short-beaked common dolphins, indicating the presence of this species in the Southeast Pacific (González-But & Sepúlveda, 2016).

Northeastern Pacific Starship Landing Area

Common dolphins are distributed in the Northeastern Pacific from 36°N to at least 13°S (Dizon et al., 1994). The short-beaked common dolphin is found year-round in this region, often distributed between the coast and approximately 345 mi. from shore (Barlow, 2016; Barlow & Forney, 2007; Forney & Barlow, 1998).

4.16 Rough-Toothed Dolphin (*Steno bredanensis*)

4.16.1 Status and Trends

The rough-toothed dolphin is not an ESA-listed species. The Hawaii, Northern Gulf of Mexico, and western North Atlantic stocks of rough-toothed dolphins are expected to occur in the Action Area. Although not recognized by stock, populations of rough-toothed dolphins are also present in the Indian Ocean and Southeast Pacific Ocean portions of the Action Area as well. Abundance information is presented in Table 3-1. Rough-toothed dolphins are among the most widely distributed species of tropical dolphins, but little information is available on population status (Jefferson et al., 2008; Jefferson et al., 2015).

4.16.2 Distribution

Rough-toothed dolphins are considered a pelagic species and are distributed worldwide in tropical and subtropical waters. They are generally observed from 35° N to 40° S and have been documented in a range of water depths (National Oceanic and Atmospheric Administration, 2022a). Their habitat use has often been associated with availability of prey.

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

The northern Gulf of Mexico stock of rough toothed dolphins have been observed year-round in the Gulf of Mexico, although they have a relatively low density in this region (Hayes et al., 2021). They are mainly sighted in oceanic waters, although they have also been occasionally found in continental shelf waters in this region as well (Hayes et al., 2021).

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

The western North Atlantic stock of rough-toothed dolphins is present within this portion of the Action Area. Although rare, this species has been observed in waters between central Virginia and central Florida, based off 2011 ship survey data (Hayes et al., 2019). Information from five tagged rough-toothed dolphins also suggests that they move through a range of water depths in the Atlantic, averaging a depth of 100 NM, and they often stay close to the surface (Hayes et al., 2019).

Indian Ocean Starship Landing Area

There are limited records of rough-toothed dolphins in the Indian Ocean, and they are likely uncommon in this region. Their occurrence in the areas has been documented by a few sighting and stranding records, particularly in waters off Indonesia, China, and the Gulf of Oman through the Andaman Sea (Anoop et al., 2015). They were also observed once in deep, mid-oceanic waters during a forty-day ship survey from Australia to Israel in 1995 (Eyre & Frizell, 2012).

Northwestern and Hawaii Starship Landing Area

Rough-toothed dolphins are well known in deep ocean waters off the Hawaiian Islands but are also seen relatively frequently during nearshore surveys (Baird et al., 2015c; Baird et al., 2008b; Barlow et al., 2008; Bradford et al., 2013; Carretta et al., 2015; Pitman & Stinchcomb, 2002; Shallenberger, 1981; Webster et al., 2015). Habitat-based models developed from systematic ship survey data collected in the central North Pacific show the strong island association of rough-toothed dolphins (Becker et al., 2012; Forney et al., 2015). Using genetic samples obtained from rough toothed dolphins in the Hawaiian Islands and islands in Samoa and French Polynesia, the Central Pacific population structure in rough-toothed dolphins was found to consist of multiple insular Pacific populations and island-specific genetically isolated insular populations attached to islands in each archipelago (Albertson et al., 2011).

Southeast Pacific Starship Landing Area

Sightings of rough-toothed dolphins in the Southeast Pacific have occurred as far as southern Peru (Jefferson, 2009; Ortega-Ortiz et al., 2014).

Northeastern Pacific Starship Landing Area

Sightings of rough-toothed dolphins in the Northeast Pacific have occurred from the U.S. West coast to southern Peru (Jefferson, 2009; Ortega-Ortiz et al., 2014). Marine surveys conducted from 2011 to 2013 off Manzanillo, Mexico observed rough-toothed dolphins with no significant differences in seasonality, indicating that this species may be present year-round in the region (Ortega-Ortiz et al., 2014). Sightings of this species in the area have also been correlated to tropical oligotrophic waters (Jefferson, 2009; Ortega-Ortiz et al., 2014).

4.17 Melon-Headed Whale (*Peponocephala electra*)

4.17.1 Status and Trends

Melon-headed whales are not ESA-listed species. The Hawaiian Islands, Kohala Resident, northern Gulf of Mexico, and the western North Atlantic stock of melon-headed whales are present in the Action Area. For management purposes, the western North Atlantic population and Gulf of Mexico population of melon-headed whales are considered separate stocks, although genetic data that differentiate these two stocks is lacking (Waring et al., 2007; Waring et al., 2010, 2013). Although not recognized by NMFS as stocks, populations of melon-headed whales are also present in the Indian Ocean and Southeast Pacific Ocean portions of the Action Area. Abundance information is presented in Table 3-1.

4.17.2 Distribution

Melon-headed whales are found worldwide in tropical and subtropical waters. They are occasionally reported at higher latitudes, but these movements are considered to be beyond their typical range because the records indicate these movements occurred during incursions of warm water currents (Perryman et al., 1994). Melon-headed whales are most often found in offshore deep waters.

<u>Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location</u>

This northern Gulf of Mexico stock of melon-headed whales has been observed in deep waters of the Gulf of Mexico, well beyond the edge of the continental shelf and in waters over the abyssal plain, primarily west of Mobile Bay, Alabama (Davis & Fargion, 1996; Mullin et al., 1994c). Sightings of melon-headed whales in the northern Gulf of Mexico were documented in all seasons during GulfCet aerial surveys 1992 and 1998 (Hansen et al., 1996; Mullin & Hoggard, 2000).

<u>Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location</u>

The western North Atlantic stock of melon-headed whales is within this portion of the Action Area. This species may occur in the southern parts of the Gulf Stream and North Atlantic Gyre open ocean areas. Sightings of whales from the western North Atlantic stock are rare, but a group of 20 whales was sighted during surveys in 1999 offshore of Cape Hatteras, and a group of 80 whales was also sighted off Cape Hatteras, in 2002, in waters greater than 2,500 m deep (Waring et al., 2013).

<u>Indian Ocean Starship Landing Area</u>

The distribution of melon-headed whales in the Indian Ocean is poorly known and there have only been few records of this species in the region. One record identified a total of 12 melon-headed whales in the southwest Indian Ocean in waters surrounding Mayotte island (Kiszka et al., 2010). The have also been occasionally sighted in waters around the Union of the Comoros in the Mozambique Channel, which suggests this species may be concentrated in the southwest region of the Indian Ocean (Kiszka et al., 2010).

Northwestern and Hawaii Starship Landing Area

The melon-headed whale is regularly found within Hawaiian waters (Baird et al., 2010; Baird et al., 2015b; Baird et al., 2003a; Baird et al., 2003b; Mobley et al., 2000; Shallenberger, 1981). Large groups are seen regularly, especially off the Waianae coast of Oahu, the north Kohala coast of Hawaii, and the leeward coast of Lanai (Baird, 2006; Oleson et al., 2013; Shallenberger, 1981). The Kohala resident stock and the Hawaiian Islands stock overlap throughout the range of the Kohala resident stock, and are present in this portion of the Action Area. Brownell et al. (2009a) found that melon-headed whales near oceanic islands rest near shore during the day, and feed in deeper waters at night.

Southeast Pacific Starship Landing Area

The melon-headed whale is known to occur in the Southeast Pacific Ocean. During ship-based bird surveys in the Northeastern Pacific, this species was observed from the U.S.-Mexico border south to Peru, with its distribution typically associated with pelagic sea birds while foraging (Pitman & Ballance, 1992).

Northeastern Pacific Starship Landing Area

The U.S.-Mexico border represents the northern limit of this species' range in the Pacific ocean (Pitman & Ballance, 1992). They have been observed from the U.S.-Mexico border south to Peru, with its distribution typically associated with pelagic sea birds while foraging (Pitman & Ballance, 1992). Ships surveys supported by a 1986 NMFS research program observed 14 melon-headed whales throughout the Northeastern Pacific (Wade & Gerrodette, 1993).

4.18 Pygmy Killer Whale (*Feresa attenuate*)

4.18.1 Status and Trends

The pygmy killer whale is not an ESA-listed species. Although the pygmy killer whale has an extensive global distribution, it is not known to occur in high densities in any region and is, therefore, probably one of the least abundant pantropical delphinids (Waring et al., 2013). The Hawaii, northern Gulf of Mexico, and western North Atlantic stocks of pygmy killer whales are present in the Action Area. Populations of pygmy killer whales are also present in the Indian Ocean, Northeast Pacific, and Southeast Pacific portions of the Action Area as well. Abundance information is presented in Table 3-1.

4.18.2 Distribution

The pygmy killer whale is generally an open ocean deepwater species plain (Davis et al., 2000). This species has a worldwide distribution in tropical and subtropical oceans. Pygmy killer whales generally do not range poleward of 40° N or of 35° S (Donahue & Perryman, 2009; Jefferson et al., 2015).

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

In the northern Gulf of Mexico, the pygmy killer whale is found primarily in deeper waters off the continental shelf and in waters over the abyssal plain (Davis et al., 2000; Würsig et al., 2000). The majority of sightings are in the eastern oceanic Gulf of Mexico.

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

A group of 6 pygmy killer whales was sighted during a 1992 vessel survey of the western North Atlantic off of Cape Hatteras, North Carolina, in waters greater than 1,500 m deep, but this species was not sighted during subsequent surveys (Waring et al., 2007). Deployment of high-frequency acoustic recording packages offshore of Cape Hatteras, Onslow Bay, Jacksonville and the offshore areas near Norfolk Canyon from 2009 through 2015 have resulted in zero pygmy killer whale detections. However, passive acoustic monitoring data was collected from marine autonomous recording units deployed on the continental shelf, just beyond the shelf, and offshore from the shelf break off Jacksonville, Florida in late 2009 and early 2010. Recordings included detections of pygmy killer whales, along with several other species.

Indian Ocean Starship Landing Area

Although difficult to identify, pygmy killer whales have been observed on few occasions in the Indian Ocean. In 2006, there were approximately 16 mass stranding events of this species in Bali, Indonesia (Brownell et al., 2009b). There have also been a few scattered records of sightings as far west as South Africa and the French Southern Indian Ocean territories (Brownell et al., 2009b).

Northwestern and Hawaii Starship Landing Area

This species' range in the open ocean generally extends to the southern regions of the North Pacific Gyre and the southern portions of the North Pacific Transition Zone. Many sightings have occurred from cetacean surveys of the Northeastern Pacific (Au & Perryman, 1985; Barlow & Gisiner, 2006; Wade & Gerrodette, 1993). This species is also known to be present in the western Pacific (Wang & Yang, 2006). Its range is generally considered to be south of 40° N and continuous across the Pacific (Donahue & Perryman, 2009; Jefferson et al., 2008). Groups of pygmy killer whales were sighted five times during the NMFS 2010 survey of the Hawaiian Islands (Bradford et al., 2017).

Southeast Pacific Starship Landing Area

The southernmost record of this species in Eastern Pacific is off Peru. In 1984, skeletal remains of the pygmy killer whale were found in the small fishing town of Pucusana, Peru (Van Waerebeek & Reyes, 1988). The skeletal remains of this species along with other cetaceans are a result of the practices of the local Peruvian small cetacean fishery. Most of the local fishing in the area occurs close to shore, likely well within 100 NM, suggesting that this species may occur in nearshore waters (Van Waerebeek & Reyes, 1988).

Northeastern Pacific Starship Landing Area

The pygmy killer whale is generally an open-ocean deepwater species (Davis et al., 2000; McSweeney et al., 2009; Oleson et al., 2013; Würsig et al., 2000). Movement patterns for this species are poorly understood. This species' range in the open ocean generally extends to the southern regions of the North Pacific Gyre and the southern portions of the North Pacific Transition Zone. Many sightings have occurred from cetacean surveys of the Northeastern Pacific (Au & Perryman, 1985; Barlow & Gisiner, 2006; Wade & Gerrodette, 1993). Its range is generally considered to be south of 40° N and continuous across the Pacific (Donahue & Perryman, 2009; Jefferson et al., 2008).

4.19 Short-Finned Pilot Whale (*Globicephala macrorhynchus*)

4.19.1 Status and Trends

The short-finned pilot whale is not an ESA-listed species. The short-finned pilot whale is recognized in the Action Area as the California, Oregon, and Washington stock; Hawaiian stock; Northern Gulf of Mexico stock; and the western North Atlantic stock. Populations of short-finned pilot whales are present in the Indian Ocean and Southeast Pacific portions of the Action Area as well. Abundance information is presented in Table 3-1.

4.19.2 Distribution

The short-finned pilot whale is widely distributed throughout most tropical and warm temperate waters of the world and occurs in waters over the continental shelf break, in slope waters, and in areas of high topographic relief (Baird, 2013; Olson, 2009). Short-finned pilot whales are not considered a migratory species, although seasonal shifts in abundance have been noted in some portions of the species' range. A number of studies in different regions suggest that the distribution and seasonal inshore/offshore movements of pilot whales coincide closely with the abundance of squid, their preferred prey (Bernard & Reilly, 1999; Hui, 1985; Payne & Heinemann, 1993).

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

The short-finned pilot whale is found year-round in the Gulf of Mexico. The northern Gulf of Mexico stock are primarily observed on the continental slope west of 98°W longitude (Hayes et al., 2021). The northern Gulf of Mexico stock is currently managed separately from the western North Atlantic stock, although it is not known if these populations differ.

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

Sightings of pilot whales (*Globicephala* spp.) in the western North Atlantic occur primarily near the continental shelf break ranging from Florida to the Nova Scotian Shelf (Fulling et al., 2003). Genetic analysis of stranded pilot whales, evaluated as a function of sea surface temperature and water depth, indicated that short-finned pilots whales were not likely to be found at water temperatures less than 22°C and highly likely to occur where water temperatures were greater than 25°C. Probability of a short-finned pilot whale also increased with increasing water depth.

Short-finned and long-finned pilot whales overlap spatially along the mid-Atlantic shelf break between New Jersey and the southern flank of Georges Bank (Hayes et al., 2021). Short-finned pilot whales are likely found in the Gulf Stream open ocean area.

Indian Ocean Starship Landing Area

Short-finned pilot whales are distributed throughout temperate and tropical waters of the world (Jefferson et al., 2015). A single stock is recognized in the Indian Ocean. The best available abundance estimate is extrapolated from the Northeastern Pacific (Table 3-1) (Wade & Gerrodette, 1993).

Northwestern and Hawaii Starship Landing Area

Short-finned pilot whales in the Hawaiian Islands were the most commonly encountered species of odontocete during near-shore surveys in depths over 2,000 m and were the second most common odontocete encountered during the NMFS 2002 (25 sightings) and 2010 (36 sightings) systematic ship surveys of the Hawaiian Exclusive Economic Zone (Baird, 2013; Barlow, 2006; Bradford et al., 2013; Oleson et al., 2013). Habitat-based models developed from systematic ship survey data collected in the central North Pacific show some of the highest short-finned pilot whale densities around the Hawaiian Islands (Becker et al., 2012; Forney et al., 2015).

Southeast Pacific Starship Landing Area

Unknown.

Northeastern Pacific Starship Landing Area

Short-finned pilot whale distribution off Southern California changed dramatically after El Niño in 1982–1983, when squid did not spawn as usual in the area, and pilot whales virtually disappeared from the area for 9 years (Jefferson & Schulman-Janiger, 2018; Shane, 1995). Short-finned pilot whales were not sighted during 18 aerial surveys conducted in the Southern California Bight between 2008 and 2013 (Jefferson et al., 2014a). A group of approximately 50 individuals was encountered off San Diego in May 2015 and included an individual photo-identified previously off Ensenada, Mexico (Kendall-Bar et al., 2016).

4.20 Long-Finned Pilot Whale *(Globicephala melas)*

4.20.1 Status and Trends

The long-finned pilot whale is not an ESA-listed species. The western North Atlantic stock is expected to occur in the Action Area. Although not recognized by NMFS as stocks, Populations of long-finned pilot whales are also present in the Southeast Pacific portion of the Action Area as well. Stock abundance information is presented in Table 3-1.

4.20.2 Distribution

Long-finned pilot whales occur along the continental shelf break, in continental slope waters, and in areas of high topographic relief, inhabiting temperate and subpolar zones from North Carolina to North Africa (and the Mediterranean) and north to Iceland, Greenland and the Barents Sea (Abend & Smith, 1999; Buckland et al., 1993; Leatherwood et al., 1976; Sergeant, 1962).

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

In U.S. Atlantic waters, pilot whales (Globicephala spp.) are distributed principally along the continental shelf edge off the northeastern U.S. coast in winter and early spring, moving onto more northern waters in late spring (Abend & Smith, 1999; Cetacean and Turtle Assessment Program, 1982; Hamazaki, 2002; Payne & Heinemann, 1993). They remain in these areas through late autumn (Cetacean and Turtle Assessment Program, 1982; Payne & Heinemann, 1993). Pilot whales tend to occupy areas of high relief or submerged banks. They are also associated with the Gulf Stream wall and thermal fronts along the continental shelf edge. Long- and short-finned pilot whales overlap spatially along the mid-Atlantic shelf break between Cape Hatteras, North Carolina, and New Jersey (Payne & Heinemann, 1993).

Indian Ocean Starship Landing Area

This species is not expected to occur in this Action Area.

Northwestern and Hawaii Starship Landing Area

This species is not expected to occur in this Action Area.

Southeast Pacific Starship Landing Area

Unknown.

Northeastern Pacific Starship Landing Area

This species is not expected to occur in this Action Area.

4.21 Spinner Dolphin (Stenella longirostris)

4.21.1 Status and Trends

The spinner dolphin is not an ESA-listed species. Four well-differentiated geographical forms of spinner dolphins have been described as separate subspecies: *Stenella longirostris longirostris, S. l. orientalis, S. l. centroamericana,* and *S. l. rosiventris.* The *S.l. longirostris* subspecies is known as the Gray's spinner dolphin and occurs in the Atlantic, Indian, and western and central Pacific oceans (National Oceanic and Atmospheric Administration, 2022b). *S.I Orientalis* subspecies is found in the Northeastern Pacific Ocean, and *S. l. centroamericana* is found in waters off Central America (National Oceanic and Atmospheric Administration, 2022b). The last subspecies, *S. l. rosiventris*, is recognized as the dwarf spinner dolphin and is present in waters ranging from Southeast Asia to northern Australia (National Oceanic and Atmospheric Administration, 2022b).

The Hawaiian Islands Stock Complex, northern Gulf of Mexico, and western North Atlantic stocks of spinner dolphins are present in the Action Area. Although not recognized by NMFS as stocks, populations of spinner dolphins are also present in Indian Ocean and Southeast Pacific portions of the Action Area. Abundance information is presented in Table 3-1.

4.21.2 Distribution

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

In the northern Gulf of Mexico, spinner dolphins are found mostly in offshore waters beyond the edge of the continental shelf (Waring et al., 2013). This species was seen during all seasons in the northern Gulf of Mexico during aerial surveys between 1992 and 1998 (Waring et al., 2013).

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

In the western North Atlantic, these dolphins occur in waters along most of the United States coast south to the West Indies and Venezuela (Waring et al., 2014). Although spinner dolphins have been sighted and stranded off the southeastern U.S. coast, they are not common in those waters, except perhaps off southern Florida (Waring et al., 2010).

Indian Ocean Starship Landing Area

Spinner dolphins are commonly observed in several regions of the Indian Ocean. From 2008 through 2014, approximately 743 spinner dolphins were sighted in the Southwest Indian Ocean off the coast of Mauritius (Aulah & Zakaria, 2022). From 2008 through 2008, approximately 241 spinner dolphins observed off the coast of La Reunion Island during surveys conducted up to 12NM from shore (Condet & Dulau-Drouot, 2016). They were also spotted in deep, mid-oceanic waters during a forty-day ship survey from Australia to Israel in 1995 (Eyre & Frizell, 2012). Spinner dolphins have also been largely observed in all Indonesian waters.

Northwestern and Hawaii Starship Landing Area

In the Hawaiian Islands, spinner dolphins occur along the leeward coasts of all the major islands and around several of the atoll's northwest of the main Hawaiian Islands. Spinner dolphins occur year-round throughout the Hawaiian Islands, with primary occurrence from the shore to the 4,000 m depth. This considers nearshore resting habitat and offshore feeding areas. Spinner dolphins are expected to occur in shallow water resting areas (about 50 m deep or less) throughout the middle of the day, moving into deep waters offshore during the night to feed (Heenehan et al., 2016; Heenehan et al., 2017; Norris & Dohl, 1980).

Southeast Pacific Starship Landing Area

Research ship surveys conducted in the Southeast Pacific have observed spinner dolphins as far offshore as 126°W longitude and near 10°N latitude (Au & Perryman, 1985). Spinner and spotted dolphins have a similar distribution in the region and have been observed in mixed schools together (Au & Perryman, 1985).

Northeastern Pacific Starship Landing Area

The distribution of spinner dolphins in the Northeastern Pacific (ETP) has been associated with surface yellow-fin tunas and the porpoise-tuna fishery. Ships surveys supported by a 1986 NMFS research program observed a total of 390 spinner dolphins in the ETP, indicating that they are present in this region (Wade & Gerrodette, 1993).

4.22 Risso's Dolphin (*Grampus griseus*)

4.22.1 Status and Trends

Risso's dolphins are not an ESA-listed species. The Hawaii; California, Oregon, and Washington; northern Gulf of Mexico; and western North Atlantic stocks of Risso's dolphins are present in the Action Area. Although not recognized by NMFS as a stock, populations of Risso's dolphins are present in the Indian Ocean and Southeast Pacific portions of the Action Area as well. Abundance information is presented in Table 3-1.

4.22.2 Distribution

Risso's dolphins are distributed worldwide in tropical and temperate waters along the continental shelf break and over the continental slope and outer continental shelf (Baumgartner, 1997; Cañadas et al., 2002; Cetacean and Turtle Assessment Program, 1982; Davis et al., 1998; Green et al., 1992; Kruse et al., 1999; Mignucci-Giannoni, 1998). Risso's dolphins were also found in association with submarine canyons (Mussi et al., 2004).

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

Risso's dolphins in the northern Gulf of Mexico occur throughout oceanic waters but are concentrated in continental slope waters(Baumgartner, 1997; Maze-Foley & Mullin, 2006). Risso's dolphins were seen in all seasons during GulfCet aerial surveys of the northern Gulf of Mexico between 1992 and 1998 (Hansen et al., 1996; Mullin & Hoggard, 2000).

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

The range of the Risso's dolphin distribution in open-ocean waters of the North Atlantic is known to include the Gulf Stream and the southwestern portions of the North Atlantic Gyre. In the northwest Atlantic, Risso's dolphins occur from Florida to eastern Newfoundland (Baird & Stacey, 1991; Leatherwood et al., 1976). In general, the population occupies the mid-Atlantic continental shelf edge year-round and is rarely seen in the Gulf of Maine. Risso's dolphins were also one of the most commonly encountered pelagic dolphins found during surveys conducted in Onslow Bay, North Carolina and offshore of Jacksonville, Florida (U.S. Department of the Navy, 2013).

Indian Ocean Starship Landing Area

Risso's dolphins most commonly occur over continental and island slopes in the Indian Ocean, although they may be found in deeper oceanic waters as well. During a two-month ship survey from Australia to Israel in 1995, a total of 53 Risso's dolphins were observed in the Arabian sea and mid-oceanic waters (Eyre & Frizell, 2012). Risso's dolphins are also known as one of several species involved in longline depredation for tuna fisheries, particularly in the southwest region of the Indian Ocean (Anderson, 2014).

Northwestern and Hawaii Starship Landing Area

Risso's dolphins had been considered rare in Hawaiian waters (Shallenberger, 1981). However, during a more recent 2010 systematic survey of the Hawaiian Islands U.S. Exclusive Economic Zone, there were 13 sightings of Risso's dolphins (Bradford et al., 2017). In December through January of 2014, using a passive acoustic recording device onboard an unmanned glider south of Oahu, Risso's dolphins were acoustically detected throughout the entire survey except for the southernmost part between Bishop Seamount and McCall Seamount (Klinck et al., 2015).

Southeast Pacific Starship Landing Area

Risso's dolphin occurrence in the Southeast Pacific has been documented by sightings and rare stranding events. Numerous offshore surveys around the Galapagos Islands have recorded this species in the area (Jefferson et al., 2014b). Sighting records of Risso's dolphins off Chile suggest that they may have a continuous distribution along 20°S to 40°S (Yates & Palavecino-Sepúlveda, 2011). Studies have also indicated that Risso's dolphins may feed over the continental slope in this region (Yates & Palavecino-Sepúlveda, 2011).

Northeastern Pacific Starship Landing Area

Records of Risso's dolphins in the Northeast Pacific indicate that this species is present throughout the region. There are numerous records of Risso's dolphin in both nearshore and offshore waters from the coast of California south to Columbia (Jefferson et al., 2014b). During ship surveys conducted quarterly off Southern California from 2004 to 2008, Risso's dolphins were encountered year-round, with highest number of encounter during the cold-water months (Douglas et al., 2014), consistent with previously observed seasonal shifts in distribution (Carretta et al., 2000; Forney & Barlow, 1998; Henderson et al., 2014; Soldevilla, 2008)

4.23 Atlantic White-Sided Dolphin (*Lagenodelphis acutus*)

4.23.1 Status and Trends

Atlantic white-sided dolphins are not ESA-listed species. Atlantic white-sided dolphins are recognized by NMFS as the western North Atlantic stock on the U.S. East Coast. Stock abundance information is presented in Table 3-1.

4.23.2 Distribution

This species is found primarily in cold temperate to subpolar continental shelf waters to the 328 ft. (100 m) depth contour (Cetacean and Turtle Assessment Program, 1982; Mate et al., 1994; Selzer & Payne, 1988). Before the 1970s, Atlantic white-sided dolphins were found primarily offshore in waters over the continental slope; however, since then, they occur primarily in waters over the continental shelf, replacing white-beaked dolphins, which were previously sighted in the area. This shift may have been the result of an increase in sand lance and a decline in herring in continental shelf waters (Payne et al., 1990).

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

Atlantic white-sided dolphins would be expected to occur in the Labrador Current and possibly in the northern extent of the Gulf Stream open ocean area. Sightings occur year-round south of Georges Bank, particularly around Hudson Canyon, but in low densities (Cetacean and Turtle Assessment Program, 1982; Palka et al., 1997; Payne et al., 1990; Waring et al., 2004). A few strandings were collected on Virginia and North Carolina beaches, which appear to represent the southern edge of the range for this species (Cipriano, 2009; Testaverde & Mead, 1980). Occurrence of Atlantic white-sided dolphins in the northeastern United States probably reflects fluctuations in food availability as well as oceanographic conditions (Palka et al., 1997; Selzer & Payne, 1988).

Indian Ocean Starship Landing Area

This species is not expected to occur in this Action Area.

Northwestern and Hawaii Starship Landing Area

This species is not expected to occur in this Action Area.

Southeast Pacific Starship Landing Area

This species is not expected to occur in this Action Area.

Northeastern Pacific Starship Landing Area

This species is not expected to occur in this Action Area.

4.24 Pantropical Spotted Dolphin (*Stenella attenuata*)

4.24.1 Status and Trends

Pantropical spotted dolphins are not ESA-listed. They are recognized by NMFS as the Hawaiian Islands Stock Complex, Gulf of Mexico stock, and western North Atlantic stock in the Action Area. In the Southeast Pacific portion of the Action Area, populations of pantropical dolphins are recognized as the northern offshore and southern offshore stocks. Although not recognized by stock, populations of this species are present in the Indian Ocean as well. Abundance information is presented in Table 3-1.

4.24.2 Distribution

The pantropical spotted dolphin is distributed in offshore tropical and subtropical waters of the Pacific, Atlantic, and Indian Oceans between about 40° N and 40° S (Baldwin et al., 1999; Perrin, 2009). Pantropical dolphins are much more abundant in the lower latitudes of its range. It is found mostly in deeper offshore waters but does approach the coast in some areas (Jefferson et al., 2008; Perrin, 2001).

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

The pantropical spotted dolphin is the most commonly sighted species of cetacean in the oceanic waters of the northern Gulf of Mexico. Pantropical spotted dolphins were seen in all seasons during GulfCet aerial surveys of the northern Gulf of Mexico between 1992 and 1998 (Hansen et al., 1996; Mullin & Hoggard, 2000). Most sightings of this species in the Gulf of Mexico and Caribbean occur over the lower continental slope (Mignucci-Giannoni et al., 2003).

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

Along the U.S. Atlantic coast, sightings have been concentrated in the slope waters east of New England and Florida, and sightings extend into the deeper slope and offshore waters of the mid-Atlantic east of Cape Hatteras (Waring et al., 2014). Pantropical spotted dolphins may occur in the Gulf Stream open ocean area.

Indian Ocean Starship Landing Area

In the Indian Ocean, pantropical dolphins are known to occur from the Red Sea and Seychelles to waters off southern Australia (Dizon et al., 1994). Pantropical spotted dolphins are one of the more commonly observed *Stenella* species, specifically in the southwest region of the Indian Ocean (Kiszka et al., 2009). They are known to inhabit areas in the region as far as approximately

33°S latitude (Perrin, 2009). Pantropical spotted dolphins sighted off Madagascar are determined to have a distinct offshore distribution.

Northwestern and Hawaii Starship Landing Area

Based on sightings during small boat surveys from 2000 through 2012 in the main Hawaiian Islands, pantropical spotted dolphins were the most abundant species of cetacean, although they were frequently observed leaping out of the water which likely increased their detectability (Baird, 2013). Known habitat preferences and sighting data indicate the primary occurrence for the pantropical spotted dolphin in Hawaiian waters is in shallow coastal waters to depths of 5,000 m, although the peak sighting rates occur in depths from 1,500 to 3,500 m (Baird et al., 2013b; Bradford et al., 2013; Oleson et al., 2013).

Southeast Pacific Starship Landing Area

The southern limit of this species' range in the Pacific is approximately 17°S near southern Peru (Perrin, 2009). Pantropical spotted dolphins are most frequently sighted in the Pacific in waters with a sharp thermocline and depths less than 50 m and water temperatures over 25°C (Perrin, 2009). Waters are similar to these conditions year-round along waters both north and south to the equator in the Pacific.

Northeastern Pacific Starship Landing Area

The northern limit of this species' range in the Pacific is approximately 25°N near southern Baja California, Mexico (Perrin, 2009). A hiatus in the distribution of this species near 2°S in the Northeastern Pacific is reflective of their preference for tropical surface waters and is reflective of the boundary at 1°S that segregates the northern offshore and southern offshore stocks (Dizon et al., 1994). Information received from tagging almost 3,000 individuals from the northern offshore stock revealed that there was no evidence of north-south movement across the 1°S boundary (Dizon et al., 1994). Instead, information suggests that this species may have onshore migrations during the fall and offshore migrations during the spring (Dizon et al., 1994). The range of pantropical spotted dolphins throughout the Northeastern Pacific is commonly associated with the presence yellowfin tuna(Scott et al., 2012).

4.25 Clymene Dolphin (*Stenella clymene*)

4.25.1 Status and Trends

The Clymene dolphin is not an ESA-listed species. In the tropical Atlantic Ocean, the northern Gulf of Mexico and western North Atlantic stocks of Clymene dolphins are present in the Action Area. Stock abundance information is presented in Table 3-1.

4.25.2 Distribution

Clymene dolphins are a tropical to subtropical species, primarily sighted in deep waters well beyond the edge of the continental shelf (Fertl et al., 2003).

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

Clymene dolphins in the Gulf of Mexico are observed most frequently on the lower slope and deepwater areas, primarily west of the Mississippi River, in regions of cyclonic or confluent circulation (Davis et al., 2002; Mullin et al., 1994a). Clymene dolphins were seen in the winter, spring and summer during GulfCet aerial surveys of the northern Gulf of Mexico during 1992 to 1998 (Hansen et al., 1996; Mullin & Hoggard, 2000).

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

In the western North Atlantic, Clymene dolphins were observed as far north as New Jersey, although sightings were primarily in offshore waters east of Cape Hatteras over the continental slope and are likely to be strongly influenced by oceanographic features of the Gulf Stream (Fertl et al., 2003; Moreno et al., 2005; Mullin & Fulling, 2003). Monthly aerial surveys conducted offshore of Cape Hatteras since May 2011 have resulted in 10 total Clymene dolphin sightings (U.S. Department of the Navy, 2013). All Clymene dolphin sightings were documented primarily during the summer and fall months.

Indian Ocean Starship Landing Area

This species is not expected to occur in this Action Area.

Northwestern and Hawaii Starship Landing Area

This species is not expected to occur in this Action Area.

Southeast Pacific Starship Landing Area

This species is not expected to occur in this Action Area.

Northeastern Pacific Starship Landing Area

This species is not expected to occur in this Action Area.

4.26 Striped Dolphin (Stenella coeruleoalba)

4.26.1 Status and Trends

The striped dolphin is not an ESA-listed species. The California, Oregon, Washington; Hawaii, northern Gulf of Mexico, and western North Atlantic stocks of striped dolphins are present in the Action Area. Populations of striped dolphins are also present in the Indian Ocean and Southeast Pacific portions of the Action Area. Abundance information is presented in Table 3-1.

For management purposes, the Gulf of Mexico population of striped dolphin is provisionally considered a separate stock, although there are not sufficient genetic data to differentiate the Gulf of Mexico stock from the western North Atlantic stock (Waring et al., 2010). There is very little information on stock structure in the western North Atlantic and insufficient data to assess population trends of this species (Hayes et al., 2019).

4.26.2 Distribution

The striped dolphin is one of the most common and abundant dolphin species, with a worldwide range that includes both tropical and temperate waters (Waring et al., 2014). Although primarily a warm-water species, the range of the striped dolphin extends higher into temperate regions than those of any other species in the genus *Stenella.* Striped dolphins are generally restricted to oceanic regions and are seen close to shore only where deep water approaches the coast. In some areas (e.g., the Northeastern Pacific), they are mostly associated with convergence zones and regions of upwelling (Au & Perryman, 1985; Reilly, 1990).

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

Striped dolphins are found throughout the deep, offshore waters of the northern Gulf of Mexico. Sightings of striped dolphins in the northern Gulf of Mexico typically occur in oceanic waters and during all seasons (Hayes et al., 2021).

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

Striped dolphins are relatively common in the cooler offshore waters of the U.S. East Coast. Along the mid-Atlantic ridge in oceanic waters of the North Atlantic Ocean, striped dolphins are sighted in significant numbers south of 50° N (Hayes et al., 2021). Regular periodic aerial surveys in the offshore area near Norfolk Canyon from 2015 to 2019 resulted in six striped dolphin sightings (McAlarney et al., 2016). Aerial surveys offshore of Cape Hatteras from 2011 to 2017 have resulted in a total of five striped dolphin sightings, primarily in late winter and early spring.

Indian Ocean Starship Landing Area

Striped dolphins are considered one of the more common *Stenella* species in the southwest Indian Ocean. They are mainly observed in pelagic waters, although there have been a few sightings closer to shore (Kiszka et al., 2009). This species has been documented as far south as 41° S latitude (Gilpatrick, 1987). There has been a total of 97 individuals reported stranded off western Australia between 1981 through 2010 (Groom & Coughran, 2012). Strandings for this species in the region reportedly peaked in the fall season.

Northwestern and Hawaii Starship Landing Area

The striped dolphin regularly occurs around the Hawaiian Islands. Two comprehensive shipboard surveys of the Hawaiian U.S. Exclusive Economic Zone resulted in 15 sightings of striped dolphins in 2002 (Barlow, 2006) and 25 sightings in 2010 (Bradford et al., 2017). Resulting density estimates from these surveys suggest that they are one of the most abundant cetacean species in the Hawaiian Exclusive Economic Zone. Based on sighting records, this species occurs primarily seaward of the 1,000-m depth contour. Striped dolphins are occasionally sighted closer to shore in Hawaii, so an area of secondary occurrence is expected from a depth range of 100 to 1,000 m.

<u>Southeast Pacific Starship Landing Area</u>

Unknown.

<u>Northeastern Pacific Starship Landing Area</u>

The striped dolphin ranks third in abundance for dolphins in the Northeastern Pacific region (Perrin et al., 2008). Based on sighting records, striped dolphins appear to have a continuous distribution in offshore waters from California to Mexico (Mangels & Gerrodette, 1994). The striped dolphin also occurs far offshore, in waters affected by the warm Davidson Current as it flows northward (Archer, 2009; Jefferson et al., 2008). In the Northeastern Pacific, striped dolphins inhabit areas with large seasonal changes in surface temperature and thermocline depth, as well as seasonal upwelling (Au & Perryman, 1985; Reilly, 1990). In some areas, this species appears to avoid waters with sea temperatures less than 68°F (20°C) (Van Waerebeek et al., 1998).

4.27 Fraser's Dolphin (*Lagenodelphis hosei*)

4.27.1 Status and Trends

Fraser's dolphins are not ESA-listed species. The Hawaii, northern Gulf of Mexico, and western North Atlantic stocks of Fraser's dolphins are present in the Action Area. Populations of Fraser's dolphins are present in the Indian Ocean and Southeast Pacific portions of the Action Area as well. Abundance information is presented in Table 3-1.

4.27.2 Distribution

Fraser's dolphin is a tropical, oceanic species, except where deep water approaches the coast (Dolar, 2009).

<u>Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location</u>

The first record for the Gulf of Mexico was a mass stranding in the Florida Keys in 1981 (Hersh & Odell, 1986; Leatherwood et al., 1993). Sightings of Fraser's dolphin in the northern Gulf of Mexico now typically occur in oceanic waters greater than 200 m. This species was observed in the northern Gulf of Mexico during all seasons.

<u>Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location</u>

This species is assumed to occur in the tropical western North Atlantic, although only a single sighting of approximately 250 individuals was recorded in waters 3,300 m deep in the waters off Cape Hatteras during a 1999 vessel survey. Monthly aerial surveys offshore of Cape Hatteras since May 2011 have resulted in only one sighting of Fraser's dolphins offshore of the 1,500 m isobaths (U.S. Department of the Navy, 2013).

<u>Indian Ocean Starship Landing Area</u>

Fraser's dolphins have been observed in the Indian Ocean; however, there is limited information on their abundance and distribution in the region. Records indicate that they have been sighted in the off Mayotte, La Reunion, the Union of the Comoros, northeastern Madagascar, and Zanzibar (Kiszka et al., 2009). Between 1981 and 2010, there has only been one recorded stranding of this species off western Australia (Groom & Coughran, 2012).

Northwestern and Hawaii Starship Landing Area

Fraser's dolphins have been documented within Hawaiian waters, with the first published sightings occurring during a 2002 cetacean survey (Barlow, 2006). Fraser's dolphin vocalizations have also been documented in the Hawaiian Islands (Barlow et al., 2008; Barlow et al., 2004). Based on line-transect survey data collected in summer/fall of 2010, Fraser's dolphin was one of the most abundant species within the Exclusive Economic Zone ocean areas around the Hawaiian Islands; having a notably large group size in the pods observed with a mean of 283 animals (Bradford et al., 2013). In small boat surveys nearshore around the Hawaiian Islands, Fraser's dolphins have only been seen twice in 10 years (both times off the Kona Coast of Hawaii Island) (Baird, 2013). It is not known whether Fraser's dolphins found in Hawaiian waters are part of the same population that occurs in the Northeastern Pacific (Carretta et al., 2010). There are no records for strandings of this species in the Hawaiian Islands (Maldini et al., 2005; National Marine Fisheries Service, 2015c).

Southeast Pacific Starship Landing Area

Unknown.

Northeastern Pacific Starship Landing Area

Fraser's dolphins are known to occur in the Northeastern Pacific. A 6-year research program initiated by NMFS in 1989 reported observations of this species throughout the Northeastern Pacific (Wade & Gerrodette, 1993). Additional records from research cruise surveys in 1976, 1977, 1979, and 1980 found that Fraser's dolphins were most frequently encountered between 110°W and 145°W (Au & Perryman, 1985).

4.28 White-Beaked Dolphin (*Lagenorhynchus albirostris*)

4.28.1 Status and Trends

The white-beaked dolphin is not an ESA-listed species. The western North Atlantic stock of white-beaked dolphins is expected to occur in the Action Area. Stock abundance information is presented in Table 3-1.

4.28.2 Distribution

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

In the western North Atlantic Ocean, the white-beaked dolphin occurs throughout northern waters of the U.S. East Coast and eastern Canada, from eastern Greenland through the Davis Strait and south to Massachusetts (Lien et al., 2001). White-beaked dolphins would be expected to occur in the Labrador Current. Before the 1970s, these dolphins were found primarily in waters over the continental shelf of the Gulf of Maine and Georges Bank. Since then, they occur mainly in waters over the continental slope and are replaced by large numbers of Atlantic white-sided dolphins (Katona et al., 1993; Palka, 1997). This habitat shift might be a result of an increase in sand lance and a decline in herring in continental shelf waters (Payne et al., 1990).

Indian Ocean Starship Landing Area

This species is not expected to occur in this Action Area.

Northwestern and Hawaii Starship Landing Area

This species is not expected to occur in this Action Area.

Southeast Pacific Starship Landing Area

This species is not expected to occur in this Action Area.

Northeastern Pacific Starship Landing Area

This species is not expected to occur in this Action Area.

4.29 Atlantic Spotted Dolphin (*Stenella frontalis*)

4.29.1 Status and Trends

The Atlantic spotted dolphin is not an ESA-listed species. The northern Gulf of Mexico and western North Atlantic stocks of this species are present in the Action Area. The western North Atlantic population is provisionally being considered a separate stock from the Gulf of Mexico stock for management purposes based on genetic analysis (Waring et al., 2014; Waring et al., 2016)). Stock abundance information is presented in Table 3-1.

The Atlantic spotted dolphin occurs in two forms that may be distinct subspecies (Perrin et al., 1987; Rice, 1998): the large, heavily spotted form, which inhabits the continental shelf and is usually found inside or near the 200-m isobath; and the smaller, less spotted island and offshore form, which occurs in the Atlantic Ocean but is not known to occur in the Gulf of Mexico (Fulling et al., 2003).

4.29.2 Distribution

The Atlantic spotted dolphin is found in nearshore tropical to warm-temperate waters, predominantly over the continental shelf and upper slope (Waring et al., 2013, 2014). The large, heavily spotted coastal form of the Atlantic spotted dolphin typically occurs over the continental shelf but usually at least 4.9 to 12.4 mi. offshore (Davis et al., 1998; Perrin, 2002). In the eastern Gulf of Mexico, for instance, the species often occurs over the mid-shelf (Griffin & Griffin, 2003). In the western Atlantic, this species is distributed from New England to Brazil and is found in the Gulf of Mexico (Perrin, 2008c). Atlantic spotted dolphins may occur in the Gulf Stream open ocean area.

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

In the Gulf of Mexico, Atlantic spotted dolphins occur primarily from continental shelf waters 10 to 200 m deep to slope waters greater than 500 m deep (Fulling et al., 2003; Maze-Foley & Mullin, 2006; Mullin & Fulling, 2004). Atlantic spotted dolphins were seen in all seasons during aerial surveys of the northern Gulf of Mexico from 1992 to 1998 (Hansen et al., 1996; Mullin & Hoggard, 2000).

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

Atlantic spotted dolphin sightings have been concentrated in the slope waters north of Cape Hatteras, but in the shelf waters south of Cape Hatteras sightings extend into the deeper slope and offshore waters of the mid-Atlantic (Mullin & Fulling, 2003; Waring et al., 2014). Aerial and shipboard surveys conducted between 2007 and 2010 in offshore waters of Onslow Bay, North Carolina indicate that spotted dolphins have a strong preference for waters over the continental shelf and do not typically occur beyond the shelf break (Read et al., 2014).

Photo-identification catalogs of Atlantic spotted dolphins from Cape Hatteras, Onslow Bay, Jacksonville survey areas have been compared, but no matches have been identified (Foley et al., 2015; Swaim et al., 2014) suggesting a high degree of residency to these areas. Atlantic spotted dolphins were one of the dominant species sighted during vessel surveys conducted along the continental shelf break and pelagic waters offshore of Jacksonville, Florida from July 2009 through December 2013 (Swaim et al., 2014). Higher numbers of spotted dolphins are reported over the west Florida continental shelf from November to May than during the rest of the year, suggesting that this species may migrate seasonally (Griffin & Griffin, 2003).

Indian Ocean Starship Landing Area

This species is not expected to occur in this Action Area.

Northwestern and Hawaii Starship Landing Area

This species is not expected to occur in this Action Area.

Southeast Pacific Starship Landing Area

This species is not expected to occur in this Action Area.

Northeastern Pacific Starship Landing Area

This species is not expected to occur in this Action Area.

4.30 Common Bottlenose Dolphin (*Tursiops truncatus*)

4.30.1 Status and Trends

The common bottlenose dolphin is not an ESA-listed species. There are two morphologically and genetically distinct bottlenose dolphin morphotypes (distinguished by physical differences) (Duffield, 1987; Duffield et al., 1983) described as coastal and offshore forms.

Along the U.S. East Coast and northern Gulf of Mexico, the bottlenose dolphin stock structure is well studied. There are currently 53 management stocks identified by NMFS in the western North Atlantic and Gulf of Mexico, including oceanic, coastal, and estuarine stocks (Hayes et al., 2018; Hayes et al., 2017; Waring et al., 2016; Waring et al., 2015). Most stocks in the Atlantic and Gulf of Mexico portions of the Action Area are designated as Strategic or Depleted under the MMPA. The California, Oregon, Washington Offshore stock and the Hawaiian Island stock complex also occur in the Pacific Ocean portion of the Action Area, and populations of common bottlenose dolphins are also present in the Indian Ocean and Southeast Pacific portions of the Action Area. Stock abundance information is presented in Table 3-1.

4.30.2 Distribution

Common bottlenose dolphins typically are found in coastal and continental shelf waters of tropical and temperate regions of the world(Jefferson et al., 2008; Wells & Scott, 2009). They generally do not range north or south of 45° latitude (Jefferson et al., 2015; Wells et al., 2008). They occur in most enclosed or semi-enclosed seas in habitats ranging from shallow, murky, estuarine waters to deep, clear offshore waters in oceanic regions (Jefferson et al., 2015; Wells & Scott, 2009).

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

In the Gulf of Mexico alone, 32 distinct stocks are recognized, although the structure of these stocks is uncertain but appears to be complex. Residency patterns of dolphins in bays, sounds, and estuaries range from transient to seasonally migratory to stable resident communities, and various stocks may overlap at times. Year-round residency patterns of some individual bottlenose dolphins in bays, sounds, and estuaries have been reported for almost every survey area where photo-identification or tagging studies have been conducted.

LaBrecque et al. (2015b)delineated 11 small and resident population areas for bottlenose dolphins within the Gulf of Mexico. These areas include bays, sounds, and estuaries ranging from Aransas Pass, Texas to the Florida Keys, Florida and were substantiated through a combination of extensive photo-identification data, genetic analyses, radio-tracking data, and expert knowledge (LaBrecque et al., 2015b). Both coastal and offshore forms of common bottlenose dolphins inhabit waters in the Gulf of Mexico (Curry & Smith, 1997; Hersh & Duffield, 1990; Mead & Potter, 1995) .

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

Both coastal and offshore forms of common bottlenose dolphins inhabit waters in the western North Atlantic Ocean (Curry & Smith, 1997; Hersh & Duffield, 1990; Mead & Potter, 1995) along the U.S. Atlantic coast. The coastal morphotype of bottlenose dolphin is continuously distributed along the Atlantic coast south of Long Island, New York, around the Florida peninsula, and along the Gulf of Mexico coast. The range of the offshore bottlenose dolphin includes waters beyond the continental slope (Kenney, 1990), and offshore bottlenose dolphins may move between the Gulf of Mexico and the Atlantic (Wells et al., 1999). Dolphins with characteristics of the offshore type have stranded as far south as the Florida Keys.

Similar with other U.S. Atlantic coast areas, bottlenose dolphins were among the most frequently observed cetacean species during vessel surveys conducted along the continental shelf break and pelagic waters offshore of Jacksonville, Florida from July 2009 through December 2013. Bottlenose dolphins were encountered throughout the area including within deeper pelagic waters (Swaim et al., 2014). Genetic analyses of biopsy samples confirmed that all sampled bottlenose dolphins were off the offshore morphotype, suggesting there is limited overlap between coastal and offshore populations in this area of the Atlantic Ocean (Swaim et al., 2014).

Indian Ocean Starship Landing Area

Common bottlenose dolphins occur in nearshore and continental shelf waters throughout the Indian Ocean. Over 785,000 dolphins are estimated to occur in the Indian Ocean with 3,000 occurring off Western Australia (Wade & Gerrodette, 1993).

Northwestern and Hawaii Starship Landing Area

Common bottlenose dolphins occur throughout the Hawaiian Islands, and they are typically observed throughout the main islands and from the Island of Hawaii to Kure Atoll (Baird, 2013; Shallenberger, 1981). In the Hawaiian Islands, this species is found in both shallow coastal waters and deep offshore waters (Baird et al., 2003b; Barlow et al., 2008; Bradford et al., 2013; Mobley et al., 2000). Habitat-based models developed from systematic ship survey data collected in the central North Pacific show some of the highest common bottlenose dolphin densities around the Hawaiian Islands (Becker et al., 2012; Forney et al., 2015).

Photo-identification and genetics indicate the presence of island- associated populations of bottlenose dolphins in the Hawaiian Islands (Martien et al., 2012). Four broad areas covering the main Hawaiian Islands have been identified for Small and Resident Populations of bottlenose dolphins (Baird et al., 2015a). These delineated areas are based on the range for each of the four recognized stocks around each island region, with the offshore extent defined by the 1,000 m depth contour (Baird et al., 2015a).

Southeast Pacific Starship Landing Area

Unknown.

<u>Northeastern Pacific Starship Landing Area</u>

Coastal bottlenose dolphins are found generally from Point Conception to as far south as San Quintin, Mexico (Carretta et al., 1998; Defran & Weller, 1999; Hwang et al., 2014). During surveys off California, offshore common bottlenose dolphins were generally found at distances greater than 1.9 mi. from the coast and throughout the waters of Southern California (Barlow, 2016; Barlow & Forney, 2007; Bearzi et al., 2009; Hamilton et al., 2009a). Sighting records off California and Baja California suggest a continuous distribution of offshore common bottlenose dolphins in these regions (Mangels & Gerrodette, 1994). Analyses of sighting data collected during winter aerial surveys in 1991–1992 and summer shipboard surveys in 1991 indicated no significant seasonal shifts in distribution (Forney & Barlow, 1998).

Photo identification analyses suggest that there may be two separate stocks of coastal bottlenose dolphins that exhibit limited integration, a California Coastal stock and a Northern Baja California stock (Defran et al., 2015), but they are not yet managed by NMFS as two stocks (Carretta et al., 2017a). The results from relatively contemporaneous surveys at Ensenada, San Diego, Santa Monica Bay, and Santa Barbara between 1996 and 2001 provided samples of the speed and distances individual coastal bottlenose dolphins routinely traveled (Hwang et al., 2014). The minimum travel speed observed as 53 km per day and the maximum was 95 km per day and the total distances traveled between points was between 104 km and 965 km (Hwang et al., 2014).

4.31 Harbor Seal (*Phoca vitulina*)

4.31.1 Status and Trends

The harbor seal is not an ESA-listed species. The U.S. east coast population of harbor seals are recognized by NMFS as the western North Atlantic stock. Stock abundance information is presented in Table 3-1.

4.31.2 Distribution

The harbor seal is one of the most widely distributed seals, found in temperate to polar coastal waters of the northern hemisphere (Jefferson et al., 2015). Harbor seals occur in nearshore waters and are rarely found more than 20 km from shore; they frequently occupy bays, estuaries, and inlets (Baird, 2001). Haul-out sites vary but include intertidal and subtidal rock outcrops, sandbars, sandy beaches, and even peat banks in salt marshes (Burns, 2009; Gilbert & Guldager, 1998; Prescott, 1982; Schneider & Payne, 1983; Wilson, 1978).

<u>Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location</u>

This species is not expected to occur in this Action Area.

<u>Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location</u>

The approximate year-round coastal range of harbor seals in the Atlantic includes the northeast U.S. continental shelf down to the Virginia/North Carolina border. Harbor seal distribution along the U.S. Atlantic coast has shifted in recent years, with an increased number of seals reported in southern New England to the mid-Atlantic region (Hayes et al., 2018; Kenney, 2014). Winter haul-out sites for a small number of seals (less than 50) have been reported for Chesapeake Bay and near Oregon Inlet, North Carolina (Waring et al., 2016). Many strandings were reported for the coast of Virginia (Swingle et al., 2016). Rare sightings have occurred south of Oregon Inlet, North Carolina, and strandings have been recorded as far south as Florida (Hayes et al., 2018).

Indian Ocean Starship Landing Area

This species is not expected to occur in this Action Area.

Northwestern and Hawaii Starship Landing Area

This species is not expected to occur in this Action Area.

Southeast Pacific Starship Landing Area

This species is not expected to occur in this Action Area.

Northeastern Pacific Starship Landing Area

This species is not expected to occur in this Action Area.

4.32 Cuvier's Beaked Whale (*Ziphius cavirostris*)

4.32.1 Status and Trends

Cuvier's beaked whales are not ESA-listed species. The California, Oregon, and Washington; Hawaii; northern Gulf of Mexico; and western North Atlantic stocks of blue whales are present in the Action Area. Although not recognized by NMFS as stocks, populations of Cuvier's beaked whales are present in the Indian Ocean and Southeast Pacific portions of the Action Area. Abundance information is presented in Table 3-1.

4.32.2 Distribution

Cuvier's beaked whales have an extensive range that includes all oceans, from the tropics to the polar waters of both hemispheres. Similar to other beaked whale species, this oceanic species generally occurs in waters past the edge of the continental shelf and occupies almost all temperate, subtropical, and tropical waters of the world, as well as subpolar and even polar waters in some areas (Waring et al., 2014). Cuvier's beaked whales are generally sighted in waters with a bottom depth greater than 200 m and are frequently recorded in waters with bottom depths greater than 1,000 m (Bradford et al., 2013; Falcone et al., 2009; Jefferson et al., 2015). Acoustic sampling of bathymetrically featureless areas off Southern California detected many beaked whales over an abyssal plain, which counters a common misperception that beaked whales are primarily found over slope waters, in deep basins, or over seamounts (Griffiths & Barlow, 2016).

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

Cuvier's beaked whales have been detected in the Gulf of Mexico using passive acoustic monitoring methods (Hildebrand et al., 2015). They have been primarily observed in waters greater than 1,000 m and have been detected in year-round particularly in the northern Gulf of Mexico (Hayes et al., 2021). As of 2015, there have been 18 recorded strandings of this species in the region (Hildebrand et al., 2015).

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

The distribution of Cuvier's beaked whales in the Atlantic is poorly known and is based mainly on stranding records (Leatherwood et al., 1976). Strandings were reported from Nova Scotia along the eastern U.S. coast south to Florida and within the Caribbean (Leatherwood et al., 1976). Cuvier's beaked whale sightings have occurred principally along the continental shelf edge in the mid-Atlantic region off the northeast U.S. coast (Cetacean and Turtle Assessment Program, 1982; Hamazaki, 2002; Palka, 2006; Waring et al., 1992; Waring et al., 2001) in late spring or summer, although strandings and sightings were reported in the Caribbean Sea and the Gulf of Mexico as well (Dalebout et al., 2006). Cuvier's beaked whales are generally sighted in waters with a bottom depth greater than 200 m and are frequently recorded in waters with bottom depths greater than 1,000 m (Falcone et al., 2009; Jefferson et al., 2008; Jefferson et al., 2015).

Indian Ocean Starship Landing Area

Cuvier's beaked whales have been observed in the Indian Ocean; however, there is limited information on their abundance and distribution in the region. In the region, this species is reported to have stranded in South Africa, Oman, the Comoros, Sri Lanka, Indonesia, and the Maldives, which suggests Cuvier's beaked whales may have a distribution throughout the Indian Ocean (MacLeod & Mitchell, 2006). According to reports, there have also been 8 strandings of this species recorded off western Australia, specifically between Perth and Cape Riche (Groom et al., 2014).

Northwestern and Hawaii Starship Landing Area

Cuvier's beaked whales are regularly found in waters surrounding the Hawaiian Islands (Baird, 2013; Baird et al., 2009; Baird et al., 2015d; Barlow, 2006; Baumann-Pickering et al., 2010; Baumann-Pickering et al., 2014; Bradford et al., 2013; Lammers et al., 2015; Mobley, 2004; Oleson et al., 2013; Oleson et al., 2015; Shallenberger, 1981). In Hawaii, Cuvier's beaked whales have been occasionally observed breaching and this along with their large size and visible blows likely increases their detectability (Barlow et al., 2013). During NMFS' 2010 survey of the Hawaiian Islands Exclusive Economic Zone, there were 23 sightings of Cuvier's beaked whales, which were commonly seen nearshore in the Northwestern Hawaiian Islands (Bradford et al., 2013; Oleson et al., 2013; Oleson et al., 2015). Sightings have been reported off the Hawaiian Islands of Lanai, Maui, Hawaii, Niihau, and Kauai, supporting the hypothesis that there is a resident population found in the Hawaiian Islands (Baird, 2013; Baird et al., 2015a; Baird et al., 2009; Barlow, 2016; Mobley, 2004; Oleson et al., 2013; Oleson et al., 2015; Shallenberger, 1981). A year-round biologically important small and resident population area has been identified for

Cuvier's beaked whales surrounding Hawaii Island, including the Alenuihaha Channel across to Maui (Baird et al., 2015a).

Southeast Pacific Starship Landing Area

Unknown.

Northeastern Pacific Starship Landing Area

Cuvier's beaked whales are found from Alaska to Baja California, Mexico, and there are no apparent seasonal changes in distribution (Mead, 1989; Pitman et al., 1988). However, Mitchell (1968) reported that strandings from Alaska to Baja California were the most common between February and September. During ship surveys conducted quarterly off southern California from 2004 to 2008, there were only six beaked whale sightings and half of these were Cuvier's beaked whales (Douglas et al., 2014). In a test of drifting passive acoustic recorders off California in fall 2014, Griffiths and Barlow (2016) reported beaked whale detections over slopes and seamounts, which was not unexpected, and also over deep-ocean abyssal plains, which was a novel finding.

4.33 Longman's Beaked Whale (*Indopacetus pacificus*)

4.33.1 Status and Trends

Longman's beaked whale is not listed under the ESA. A Hawaiian stock, consisting of those individuals present within the EEZ around Hawaii, is the only stock identified in the Pacific Stock Assessment Report (Carretta et al., 2018b; Carretta et al., 2017a; Carretta et al., 2017b). Although not recognized by stock, populations of Longman's beaked whales are also expected to occur in the Indian Ocean and Northeast Pacific portions of the Action Area. Abundance information is presented in Table 3-1.

4.33.2 Distribution

Longman's beaked whale is found in warm tropical waters, with most sightings occurring in waters with sea surface temperatures warmer than 78 °F (26°C) (Anderson et al., 2006; MacLeod et al., 2006; MacLeod & D'Amico, 2006). Although the full extent of this species' distribution is not fully understood, there have been many recorded sightings at various locations in tropical waters of the Pacific and Indian Oceans (Afsal et al., 2009; Dalebout et al., 2002; Dalebout et al., 2003; Moore, 1972).

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Indian Ocean Starship Landing Area

A total of 32 records of Longman's beaked whales have been reported in the western Indian Ocean, which is defined as the region north of 40°S and west of 80°E (Anderson et al., 2006). Sighting records suggest that Longman's beaked whales are typically found in the warmer waters of the region, particularly over deep bathymetric slopes of 200 to 2,000+ m (Anderson et al., 2006).

Northwestern and Hawaii Starship Landing Area

There was a single sighting of approximately 18 Longman's beaked whales during the 2002 Hawaiian Islands Cetacean and Ecosystem Assessment survey (Barlow, 2006). During the follow-on 2010 survey, there were three sightings of Longman's beaked whales, with group sizes ranging from approximately 32 to 99 individuals (Bradford et al., 2017). Longman's beaked whales have also been sighted off Kona (Cascadia Research, 2012) and there have been two known strandings of this species in the main Hawaiian Islands (Maldini et al., 2005; National Marine Fisheries Service, 2015c; West et al., 2012).

Southeast Pacific Starship Landing Area

This species is not expected to occur in this Action Area.

Northeastern Pacific Starship Landing Area

Records of Longman's beaked whales suggest they may be present in the eastern, central, and western Pacific, including waters off the coast of Mexico. Based on systematic survey data collected from 1986-2005 in the eastern Pacific, all Longman's beaked whale sightings were south of 25° N (Hamilton et al., 2009a).

4.34 Gervais's Beaked Whale (*Mesloplodon europaeus*)

4.34.1 Status and Trends

Gervais' beaked whale is not an ESA-listed species. The northern Gulf Mexico and western North Atlantic stocks of Gervais' beaked whales are present in the Action Area. Stock abundance information is presented in Table 3-1.

4.34.2 Distribution

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

Gervais' beaked whales occur only in the Atlantic Ocean and Gulf of Mexico, within a range both north and south of the equator to a latitude of 40° (Jefferson et al., 2008; Jefferson et al., 2015; MacLeod & Mitchell, 2006). They have been detected in the Gulf of Mexico using passive acoustic monitoring methods (Hildebrand et al., 2015). As of 2015, a total of 18 strandings of Gervais' beaked whales have been recorded in the Gulf of Mexico (Hildebrand et al., 2015).

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

Gervais' beaked whales occur only in the Atlantic Ocean and Gulf of Mexico, within a range both north and south of the equator to a latitude of 40° (Jefferson et al., 2008; Jefferson et al., 2015; MacLeod & Mitchell, 2006). Although the distribution of Gervais' beaked whales seems to range across the entire temperate and tropical Atlantic, most records are from the western North Atlantic waters from New York to Texas (more than 40 published records), and they are the most common species of *Mesoplodon* to strand along the U.S. Atlantic coast (Waring et al., 2014).

Indian Ocean Starship Landing Area

This species is not expected to occur in this Action Area.

Northwestern and Hawaii Starship Landing Area

This species is not expected to occur in this Action Area.

Southeast Pacific Starship Landing Area

This species is not expected to occur in this Action Area.

Northeastern Pacific Starship Landing Area

This species is not expected to occur in this Action Area.

4.35 Ginko-Toothed Beaked Whale (*Mesoplodon ginkgodens*)

4.35.1 Status and Trends

The ginkgo-toothed beaked whale is not listed under the ESA. Due to the difficulty in distinguishing the different *Mesoplodon* species from one another at sea during visual surveys, the United States management unit is defined to include all *Mesoplodon* species that occur in the area (Carretta et al., 2015; Jefferson et al., 2008). The ginkgo-toothed beaked whale has been combined with five other *Mesoplodon* species to make up the California, Oregon, and Washington stock in the Pacific (Carretta et al., 2018b; Carretta et al., 2015). Stock abundance information is presented in Table 3-1.

4.35.2 Distribution

Worldwide, beaked whales normally inhabit continental slope and deep ocean waters (greater than 200 m) and are only occasionally reported in waters over the continental shelf (Cañadas et al., 2002; Ferguson et al., 2006; MacLeod & Mitchell, 2006; Pitman, 2009; Waring et al., 2001).

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Indian Ocean Starship Landing Area

This species is not expected to occur in this Action Area.

Northwestern and Hawaii Starship Landing Area

This species is not expected to occur in this Action Area.

Southeast Pacific Starship Landing Area

This species is not expected to occur in this Action Area.

Northeastern Pacific Starship Landing Area

The distribution of the ginkgo-toothed beaked whale likely includes deep waters off the Pacific coast of North America. The handful of known records of the ginkgo-toothed beaked whale are from strandings, one of which occurred in California (Jefferson et al., 2015; MacLeod & D'Amico, 2006).

4.36 True's Beaked Whale (*Mesloplodon mirus*)

4.36.1 Status and Trends

True's beaked whale is not an ESA-listed species. Due to the difficulty of distinguishing between different *Mesoplodon* species at sea, True's beaked whales have been combined with several other beaked whale species to make up the western North Atlantic stock established by NMFS (Waring et al., 2009).

4.36.2 Distribution

Worldwide, beaked whales normally inhabit continental slope and deep oceanic waters (greater than 200 m) (Cañadas et al., 2002; Ferguson et al., 2006; MacLeod & Mitchell, 2006; Pitman, 2009; Waring et al., 2001). They are occasionally reported in waters over the continental shelf (Pitman & Stinchcomb, 2002). True's beaked whales are known to be temperate-water species.

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

In the Atlantic, True's beaked whales have been reported as far south as the Bahamas (Waring et al., 2009). Starting January 2015, monthly aerial surveys have been conducted in the offshore area near Norfolk Canyon and have resulted in only one True's beaked whale sighting to date. Passive acoustic monitoring conducted offshore of Cape Hatteras between March and April 2012 recorded beaked whale clicks on nearly 40 percent of the recording days (Stanistreet et al., 2013). Closer examination of these beaked whale click events suggested they belonged to Cuvier's and Gervais' beaked whales (Stanistreet et al., 2012).

During aerial surveys conducted between May 2011 and December 2014, beaked whales were observed in every month of the year offshore of Cape Hatteras, with Cuvier's beaked whale being the most commonly encounter beaked whale species (McLellan et al., 2015). The highest number of beaked sightings occurred between May and August and all sightings occurred along the continental shelf break (McLellan et al., 2015).

Indian Ocean Starship Landing Area

This species is not expected to occur in this Action Area.

Northwestern and Hawaii Starship Landing Area

This species is not expected to occur in this Action Area.

Southeast Pacific Starship Landing Area

This species is not expected to occur in this Action Area.

Northeastern Pacific Starship Landing Area

This species is not expected to occur in this Action Area.

4.37 Perrin's Beaked Whale (Mesoplodon perrini)

4.37.1 Status and Trends

Perrin's beaked whale is not an ESA-listed species. Perrin's beaked whale was described as a new species of marine mammal in 2002 (Dalebout et al., 2002). Due to the difficulty in distinguishing the *Mesoplodon* species at sea during visual surveys, the management unit has been defined by NMFS to include all *Mesoplodon* species that occur in the area. Perrin's beaked whale has been combined with other *Mesoplodon* species to make up the California, Oregon, and Washington stock in the Pacific (Carretta et al., 2018b; Carretta et al., 2017a). Abundance information is presented in Table 3-1.

4.37.2 Distribution

Worldwide, beaked whales normally inhabit continental slope and deep oceanic waters (greater than 200 m) and are only occasionally reported in waters over the continental shelf (Cañadas et al., 2002; Ferguson et al., 2006; MacLeod & Mitchell, 2006; Pitman, 2009; Waring et al., 2001).

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Indian Ocean Starship Landing Area

This species is not expected to occur in this Action Area.

Northwestern and Hawaii Starship Landing Area

This species is not expected to occur in this Action Area.

Southeast Pacific Starship Landing Area

This species is not expected to occur in this Action Area.

Northeastern Pacific Starship Landing Area

Perrin's beaked whale is known only from five strandings along the California coastline from 1975 to 1997 (Dalebout et al., 2002; MacLeod & Mitchell, 2006). These stranded animals were previously identified as Hector's beaked whale but have been reclassified as Perrin's beaked whale (Dalebout et al., 2002; Mead, 1981, 1989; Mead & Baker, 1987). While this stranding pattern suggests an eastern North Pacific Ocean distribution, too few records exist for this to be conclusive (Dalebout et al., 2002). Due to the scarcity of data, the full extent of Perrin's beaked whale distribution is unknown; however, it likely occurs primarily in oceanic waters of the eastern north Pacific with depths exceeding 1,000 m (MacLeod & Mitchell, 2006).

A Bayesian trend analysis of systematic survey data collected from 1991-2008 suggested a decline in the abundance of beaked whales found in waters off California, Oregon, and Washington (Moore & Barlow, 2013). However, a more recent survey in 2014 (Barlow, 2016), and a new analysis incorporating information from all surveys between 1991 and 2014, suggests an increasing abundance for the U.S. West Coast trend over that time, which is a reversal of the previously reported population decline (Carretta et al., 2017b; Moore & Barlow, 2017).

4.38 Spade-Toothed Beaked Whale (*Mesoplodon traversii*)

4.38.1 Status and Trends

Spade-toothed beaked whales are not ESA-listed species.

4.38.2 Distribution

There is extremely limited information on the global distribution and abundance of this species.

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Indian Ocean Starship Landing Area

The spade-toothed beaked whale is currently known of from three stranding records in the south-western Pacific; in New Zealand, the Chatham Islands, and the Juan Fernandez Archipelago (Dalebout et al., 2002). These three records suggest a Southern Hemisphere distribution in temperate waters approximately 33 - 44°S in the South Pacific (MacLeod et al., 2006).

Northwestern and Hawaii Starship Landing Area

This species is not expected to occur in this Action Area.

Southeast Pacific Starship Landing Area

This species is not expected to occur in this Action Area.

Northeastern Pacific Starship Landing Area

This species is not expected to occur in this Action Area.

4.39 Shepherd's Beaked Whale (*Tasmacetus shepherdi*)

4.39.1 Status and Trends

Shepherd's beaked whale is not an ESA-listed species. This species is not assigned to a stock by NMFS because it is not known to occur in U.S. waters and is therefore not managed under U.S. jurisdiction. Abundance information is presented in Table 3-1.

4.39.2 Distribution

Scattered stranding reports suggest that this species may have a circumpolar distribution in the Southern Hemisphere in colder waters (MacLeod et al., 2006). Given that records of this species are extremely limited, information on the distribution of Shepherd's beaked whales is unconfirmed.

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Indian Ocean Starship Landing Area

This species is not expected to occur in this Action Area.

Northwestern and Hawaii Starship Landing Area

This species is not expected to occur in this Action Area.

Southeast Pacific Starship Landing Area

There is extremely limited information on the distribution and range of this species in the Southeast Pacific. In 1970, a cranium, left mandible, and cervical vertebrae were found off the Juan Fernandez Archipelago, which suggest that this species may be present in the region (Brownell Jr et al., 1976). Photographs of the remains were taken and confirmed to belong to the Shepherd's beaked whale.

Northeastern Pacific Starship Landing Area

This species is not expected to occur in this Action Area.

4.40 Blainville's Beaked Whale *(Mesoplodon densirostris)*

4.40.1 Status and Trends

Blainville's beaked whale is not listed under the ESA. Due to the difficulty in distinguishing different *Mesoplodon* species from one another at sea during visual surveys, the United States management unit is usually defined to include all *Mesoplodon* species that occur in an area. The Blainville's beaked whale has been combined with five other *Mesoplodon* species to make up the California, Oregon, and Washington stock in the Pacific (Carretta et al., 2018b; Carretta et al., 2015). This is not, however, the case for this species in Hawaii. Based on the number of sightings and genetic analysis of individuals around the Hawaiian Islands, NMFS recognizes a Hawaiian stock of Blainville's beaked whale (Carretta et al., 2018b; Carretta et al., 2015; Oleson et al., 2013). Although not recognized by NMFS as stocks, populations of Blainville's beaked whales are expected to occur in the Indian Ocean and Southeast Pacific portions of the Action Area as well. Abundance information is presented in Table 3-1.

4.40.2 Distribution

Blainville's beaked whales are one of the most widely distributed of the distinctive toothed whales in the *Mesoplodon* genus (Jefferson et al., 2008; MacLeod et al., 2006). This species is observed in offshore temperate and tropical waters and are globally distributed in lower and mid-latitudes (Hildebrand et al., 2015).

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

Passive acoustic monitoring methods have detected and confirmed the presence of Blainville's beaked whales in the Gulf of Mexico in deepwater areas. In Hildebrand et al. (2015), a total of 22 Blainville's beaked whales were encountered during the acoustic data collection. All recorded detections were located at Green Canyon in the Northern Gulf of Mexico. As of 2015, there has also been 4 recorded strandings of this species in the Gulf of Mexico, all located in the northern region of the gulf (Hildebrand et al., 2015).

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

There are records for Blainville's beaked whales off the east coast of the United States and Canada, from as far north as Nova Scotia and south to Florida and the Bahamas (MacLeod & Mitchell, 2006).

Indian Ocean Starship Landing Area

Blainville's beaked whale is likely the most common Ziphiidae, specifically in the Southwest Indian Ocean (Kiszka et al., 2009). In the Southwest region, there have been recoded strandings off South Africa, Seychelles, and Mauritius (MacLeod et al., 2006). This species has been observed in off waters Sri Lanka, the Maldives, and west of Australia as well, indicating this distribution of this species may occur throughout the Indian Ocean (MacLeod et al., 2006).

Northwestern and Hawaii Starship Landing Area

Blainville's beaked whales are regularly sighted in Hawaiian waters (Baird et al., 2015a; Baird et al., 2003b; Baird et al., 2006b; Baird et al., 2006c; Bradford et al., 2017; McSweeney et al., 2007), and their vocalizations have been routinely detected in acoustic monitoring in the Hawaiian Islands (Henderson et al., 2015; Klinck et al., 2015; Lammers et al., 2015; Manzano-Roth et al., 2016; Manzano-Roth et al., 2013; Rankin & Barlow, 2007). Blainville's beaked whale sounds were detected once at Cross Seamount during a 6-month acoustic monitoring in 2005-2006 (McDonald et al., 2009). In the winter of 2014–2015 during a 3-week period (December to January), Blainville's beaked whale sounds were acoustically detected by an autonomous glider operating in an open ocean area to the south of Oahu and East of Hawaii Island (Klinck et al., 2015).

Population studies in Hawaii have demonstrated some evidence for residency (McSweeney et al., 2007). A year-round biologically important small and resident population area has been identified for Blainville's beaked whales off the West Coast and North Kohala portion of the Island of Hawaii (Baird et al., 2015a). The area forms a rough polygon around satellite tag locations for 10 whales in the area from 2009-2011 (Baird et al., 2015a).

Southeast Pacific Starship Landing Area

Unknown.

Northeastern Pacific Starship Landing Area

There are a handful of known records of Blainville's beaked whale from the coast of California and Baja California, Mexico, but this species does not appear to be common in the region (Hamilton et al., 2009a; Mead, 1989; Pitman et al., 1988).

4.41 Gray's Beaked Whale *(Mesoplodon grayi)*

4.41.1 Status and Trends

Gray's beaked whale is not an ESA-listed species. This species is not assigned to a stock by NMFS because it is not known to occur in U.S. waters and is therefore not managed under U.S. jurisdiction. Abundance information is presented in Table 3-1.

4.41.2 Distribution

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Indian Ocean Starship Landing Area

Between 1940 and 2010, there have been 33 recorded strandings (48 individuals) of Gray's beaked whale off the western coast of Australia (Groom et al., 2014). Most standing occurred between December and April. The frequency of strandings, including a mass stranding of 7 whales, suggests that waters offshore of Western Australia may be an important area for Gray's beaked whales and in particular immature whales. While standings may be indicative of habitat use in the area, it is also possible that stranded whales are transport into the region by currents outside of the Project Area. Groom et al. (2014) and Groom and Coughran (2012) noted that Gray's beaked whales prefer cooler temperate and subantarctic waters over the warmer waters typically occurring off Western Australia. In summer, the southward flowing Leeuwin Current weakens and cooler water from the northward flowing Cape Current moves into the region perhaps bringing the beaked whales into waters off Western Australia.

Considering that stranded Gray's beaked whales are the only records of occurrence, this species is not expected to occur in this Action Area.

Northwestern and Hawaii Starship Landing Area

This species is not expected to occur in this Action Area.

Southeast Pacific Starship Landing Area

There is extremely limited information on the distribution and range of this species in the Southeast Pacific. A single stranding of this species has been recorded off Peru at approximately 13.8°S. This stranding record is significantly further north in comparison to most other strandings of this species in the Southern Hemisphere, which are mainly south of 30°S (MacLeod et al., 2006). It can be assumed that the presence of this species off Peru and surrounding areas is unlikely.

Northeastern Pacific Starship Landing Area

This species is not expected to occur in this Action Area.

4.42 Pygmy Beaked Whale (*Mesoplodon peruvianus*)

4.42.1 Status and Trends

The pygmy beaked whale is not an ESA-listed species. Due to the difficulty in distinguishing the *Mesoplodon* species at sea during visual surveys, the management unit has been defined by NMFS to include all *Mesoplodon* species that occur in the area. The pygmy beaked whale has been combined with other *Mesoplodon* species to make up the California, Oregon, and Washington stock in the Pacific (Carretta et al., 2018b; Carretta et al., 2017a). Abundance information is presented in Table 3-1.

4.42.2 Distribution

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Indian Ocean Starship Landing Area

This species is not expected to occur in this Action Area.

Northwestern and Hawaii Starship Landing Area

This species is not expected to occur in this Action Area.

Southeast Pacific Starship Landing Area

The pygmy beaked whale was first identified in 1991 from stranded individuals and bycatch records off Peru between approximately 11°12’S and 15°19’S latitude off Lima and Ica, Peru (MacLeod et al., 2006; Reyes et al., 1991). Although there are limited records of this species in the Southeast Pacific, they have since been mostly identified through strandings along North and South America between 29.2°S and 27.9°N (MacLeod et al., 2006).

Northeastern Pacific Starship Landing Area

Before pygmy beaked whales were established as a species, Pitman et al. (1988) reported observations of an unidentified beaked whale, which later Pitman and Lynn (2001) identified as the pygmy beaked whale. A 2006 NOAA Southwest Fisheries marine mammal vessel survey reported 16 sightings of this species throughout the waters off Mexico (Jackson, 2008). Sightings indicate that this species may be endemic to the Northeastern Pacific region (MacLeod et al., 2006).

4.43 Southern Right Whale Dolphin (*Lissodelphis peronii*)

4.43.1 Status and Trends

The southern right whale dolphin is not an ESA-listed species. The southern right whale dolphin is one of two finless dolphins belonging to the genus *Lissodelphis*. This species is not assigned to a stock by NMFS because it is not known to occur in U.S. waters and is therefore not managed under U.S. jurisdiction. Abundance information is presented in Table 3-1.

4.43.2 Distribution

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Indian Ocean Starship Landing Area

This species is not expected to occur in this Action Area.

Northwestern and Hawaii Starship Landing Area

This species is not expected to occur in this Action Area.

Southeast Pacific Starship Landing Area

The southern right whale dolphin has a circumpolar distribution and has mainly been observed between 30° and 65° South (Pinto-Torres et al., 2019; Van Waerebeek et al., 1991). A record of this species near Putuscana, Peru represents one of the northernmost records of this species in the Southeast Pacific (Pinto-Torres et al., 2019; Van Waerebeek et al., 1991). Although there is limited information on distribution of this species, they are likely somewhat common in parts of the region as they were the second most commonly observed cetacean in Northen Chile during 1986 shipboard surveys (Van Waerebeek et al., 1991). It is inferred that they have a distribution extending to at least 170 km offshore in areas north of 40° S off Chile (Pinto-Torres et al., 2019).

Northeastern Pacific Starship Landing Area

This species is not expected to occur in this Action Area.

4.44 Australian Humpback Dolphin *(Sousa sahulensis)*

4.44.1 Status and Trends

The Australian humpback dolphin is not an ESA-listed species. There are currently four recognized species of humpback dolphins that have minimal overlap in their ranges. Australian humpback dolphins are not recognized by stock because they not known to occur in U.S. waters and therefore are not managed under U.S. jurisdiction. Abundance information is presented in Table 3-1.

4.44.2 Distribution

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Indian Ocean Starship Landing Area

There is limited information of the distribution of this species in the Indian Ocean Starship Landing Area. The Australian humpback dolphin may have a potential distribution in Western Australia in coastal waters up to 30m isobath (Hanf et al., 2016). The inferred distribution ranges from the Northern Territory Western Australia border Southwest to Shark Bay (Hanf et al., 2016).

Northwestern and Hawaii Starship Landing Area

This species is not expected to occur in this Action Area.

Southeast Pacific Starship Landing Area

This species is not expected to occur in this Action Area.

Northeastern Pacific Starship Landing Area

This species is not expected to occur in this Action Area.

4.45 Antarctic Minke Whale (*Balaenoptera bonaerensis*)

4.45.1 Status and Trends

The Antarctic minke whale is not an ESA listed species. The Antarctic minke whale was once recognized as the Southern minke whale but has now been considered a separate species since 2000 (Murase et al., 2020). This species is not assigned to a stock by NMFS because it is not known to occur in U.S. waters and is therefore not managed under U.S. jurisdiction. Abundance information is presented in Table 3-1.

4.45.2 Distribution

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Indian Ocean Starship Landing Area

During the winter, Antarctic minke whales likely migrate from their austral summer feeding grounds around the Antarctic to breeding grounds located between 7° and 35° South (Murase et al., 2020). Research also suggests that the Indian Ocean population of Antarctic Minke whales may feed in separate areas in the Antarctic than the population that migrates to the South Pacific during the winter (Murase et al., 2020).

Northwestern and Hawaii Starship Landing Area

This species is not expected to occur in this Action Area.

Southeast Pacific Starship Landing Area

There is extremely limited information on the presence and distribution of Antarctic minke whales in the Southeast Pacific. The first evidence of this species off Peru was not until 1991, where an Antarctic minke whale (previously recognized as the Southern minke whale) was entangled near the village of Pucusana, Lima (Casamayor et al., 2022). Another individual was observed a month later in the same area. There has been no further information available to determine the status and distribution of this species in the region (Casamayor et al., 2022).

Northeastern Pacific Starship Landing Area

This species is not expected to occur in this Action Area.

4.46 Indo-Pacific Bottlenose Dolphin *(Tursiops aduncus)*

4.46.1 Status and Trends

The Indo-Pacific bottlenose dolphin is not an ESA-listed species. This species is not recognized by stock because it is not known to occur in U.S. waters and is therefore not managed under U.S. jurisdiction. Abundance information is presented in Table 3-1.

4.46.2 Distribution

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Indian Ocean Starship Landing Area

The Indo-Pacific bottlenose dolphin is one of the most observed cetacean species in the Southwest Indian Ocean. They are encountered year-round mainly along coastal areas in waters with an average depth of 22m (Condet & Dulau-Drouot, 2016). This species is also observed along the northern Western Australia coast in a range of different marine habitats (Hanf et al., 2016).

Northwestern and Hawaii Starship Landing Area

This species is not expected to occur in this Action Area.

Southeast Pacific Starship Landing Area

This species is not expected to occur in this Action Area.

Northeastern Pacific Starship Landing Area

This species is not expected to occur in this Action Area.

4.47 Omura's Whale (Balaenoptera omurai)

4.47.1 Status and Trends

Omura's whale is not an ESA-listed species. Omura's whales were first recognized as a species in 2003. They were previously confused as Bryde's whale until molecular genetic studies confirmed that they are separate species (Jefferson et al., 2015). Omura's whales are not assigned to a stock by NMFS because it is not known to occur in U.S. waters and is therefore not managed under U.S. jurisdiction. Abundance information is presented in Table 3-1.

4.47.2 Distribution

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Indian Ocean Starship Landing Area

The distribution of Omura's whales in the Indian Ocean is not well-known. Records indicate this species has been mainly observed in the eastern Indian Ocean in areas such as the Coco's islands and Indonesia (Jefferson et al., 2015). However, there was also a record of this species near Madagascar, indicating Omura's whales may be present throughout the Indian Ocean (Jefferson et al., 2015). (Cerchio et al., 2019) report that Omura's whale generally prefers coastal habitat.

Northwestern and Hawaii Starship Landing Area

This species is not expected to occur in this Action Area.

<u>Southeast Pacific Starship Landing Area</u>

This species is not expected to occur in this Action Area.

<u>Northeastern Pacific Starship Landing Area</u>

This species is not expected to occur in this Action Area.

4.48 Pygmy Right Whale (*Carperea marginata*)

4.48.1 Status and Trends

The pygmy right whale is not an ESA-listed species.

4.48.2 Distribution

<u>Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location</u>

This species is not expected to occur in this Action Area.

<u>Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location</u>

This species is not expected to occur in this Action Area.

<u>Indian Ocean Starship Landing Area</u>

This species is not expected to occur in this Action Area.

<u>Northwestern and Hawaii Starship Landing Area</u>

This species is not expected to occur in this Action Area.

<u>Southeast Pacific Starship Landing Area</u>

This species maybe present in the eastern South Pacific; however, there is insufficient data to estimate an abundance or a density.

<u>Northeastern Pacific Starship Landing Area</u>

This species is not expected to occur in this Action Area.

4.49 Arnoux's Beaked Whale *(Berardius arnuxii)*

4.49.1 Status and Trends

The Arnoux's beaked whale is not an ESA-listed species. Arnoux's beaked whales are one of four beaked whale species belonging to the genus *Berardius*. This species is not assigned to a stock by

NMFS because it is not known to occur in U.S. waters and is therefore not managed under U.S. jurisdiction. Abundance information is presented in Table 3-1.

4.49.2 Distribution

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Indian Ocean Starship Landing Area

This species is not expected to occur in this Action Area.

Northwestern and Hawaii Starship Landing Area

This species is not expected to occur in this Action Area.

Southeast Pacific Starship Landing Area

The distribution of this species in the Southeast Pacific is largely unknown. There have been no definitive sightings in the region (MacLeod et al., 2006).

Northeastern Pacific Starship Landing Area

This species is not expected to occur in this Action Area.

4.50 Southern Bottlenose Whale *(Hyperoodon planifrons)*

4.50.1 Status and Trends

The southern bottlenose whale is not an ESA-listed species. This species is not assigned to a stock by NMFS because it is not known to occur in U.S. waters and is therefore not managed under U.S. jurisdiction. Abundance information is presented in Table 3-1.

4.50.2 Distribution

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

<u>**Indian Ocean Starship Landing Area**</u>

The Most sightings of southern bottlenose whales have occurred in the Antarctic waters between 50° and 57°S, although there have been a few stranding records of this species in Australia (Groom et al., 2014). A specimen found off western Australia at 26°S represents the most northern record of this species in the Indian Ocean.

<u>**Northwestern and Hawaii Starship Landing Area**</u>

This species is not expected to occur in this Action Area.

<u>**Southeast Pacific Starship Landing Area**</u>

This species is not expected to occur in this Action Area.

<u>**Northeastern Pacific Starship Landing Area**</u>

This species is not expected to occur in this Action Area.

4.51 Juan Fernandez Fur Seal (*Arctocephalus philippii*)

4.51.1 Status and Trends

The Juan Fernandez fur seal is not an ESA-listed species. Juan Fernandez fur seals were targeted and hunted in the past at a magnitude that almost pushed this species to extinction. According to IUCN criteria, this species was considered "Near Threatened" until 2008 (Alava et al., 2022). The population is gradually recovering and has been listed as of "Least Concern" since the last IUCN assessment in 2014 (Aurioles-Gamboa, 2015). Abundance information is presented in Table 3-1.

4.51.2 Distribution

<u>**Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location**</u>

This species is not expected to occur in this Action Area.

<u>**Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location**</u>

This species is not expected to occur in this Action Area.

<u>**Indian Ocean Starship Landing Area**</u>

This species is not expected to occur in this Action Area.

<u>**Northwestern and Hawaii Starship Landing Area**</u>

This species is not expected to occur in this Action Area.

Southeast Pacific Starship Landing Area

The Juan Fernandez fur seal is known to inhabit the Juan Fernandez Archipelago off Chile (Alava et al., 2022). In the more recent years, this species has been recorded in areas outside of its usual range in the Southeast Pacific, indicating that the range of species may be expanding. Juan Fernandez fur seals have now been observed in Ecuador, Peru, the mainland coast of Chile, Columbia, and the Galapagos islands (Alava et al., 2022). The unusual occurrences of this species in areas outside of its range may be due to changing oceanic conditions as a result of climate change, such as ocean warming and El Niño Southern Oscillation events (Alava et al., 2022).

Northeastern Pacific Starship Landing Area

This species is not expected to occur in this Action Area.

4.52 Northern Elephant Seal (*Mirounga angustirostris*)

4.52.1 Status and Trends

The northern elephant seal is not an ESA-listed species and are not listed as depleted or strategic under the MMPA. Populations of Northern elephant seals off California and Mexico were nearly hunted to extinction in the 19th century; however, the population has since recovered (Carretta et al., 2022) The breeding populations off California and Baja California are considered demographically isolated, and therefore are considered separate stocks (Carretta et al., 2022). There are currently no international agreements regarding joint management of this species by the U.S. and Mexico. Abundance information is presented in Table 3-1.

4.52.2 Distribution

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Indian Ocean Starship Landing Area

This species is not expected to occur in this Action Area.

Northwestern and Hawaii Starship Landing Area

This species is not expected to occur in this Action Area.

Southeast Pacific Starship Landing Area

This species is not expected to occur in this Action Area.

Northeastern Pacific Starship Landing Area

Major breeding rookeries for Northern elephant seals are known to occur in areas off Baja California, Mexico, and the U.S. West Coast. Breeding areas often occur on offshore island insular regions (Carretta et al., 2022). The main breeding sites in Mexico are Guadalupe Island, San Benito Islands, and Cedros Islands. Northern elephant seals at these breeding sites make up over 99 percent of the population of this species in Baja California (Garcia-Aguilar et al., 2018). Coronados and Todos Islands are also recognized as permanent breeding areas, although the number of births there are less than 30 per year (Garcia-Aguilar et al., 2018). Northern elephant seals are known to migrate from breeding locations to feeding locations twice annually.

4.53 Southern Elephant Seal *(Mirounga leonina)*

4.53.1 Status and Trends

The southern elephant seal is not an ESA-listed species. This species is not assigned to a stock by NMFS because it is not known to occur in U.S. waters and is therefore not managed under U.S. jurisdiction. Abundance information is presented in Table 3-1.

4.53.2 Distribution

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Indian Ocean Starship Landing Area

This species is not expected to occur in this Action Area.

Northwestern and Hawaii Starship Landing Area

This species is not expected to occur in this Action Area.

Southeast Pacific Starship Landing Area

Southern elephant seals in this region mainly have a circumpolar distribution outside of the Southeast Pacific Starship Landing Area, apart from a few northern observations that overlap the Action Area. Some of the northernmost records of this species off the South American continent include observations off Guayaquil, Ecuador and the Galapagos Islands (Elorriaga-Verplancken et al., 2020). Historical records from previous centuries have also indicated that this species was present in the Juan Fernandez Archipelago; however, was hunted to extinction in the region (Acevedo et al., 2016).

Northeastern Pacific Starship Landing Area

This species is not expected to occur in this Action Area.

4.54 California Sea Lion (*Zalophus californianus*)

4.54.1 Status and Trends

The California sea lion is not an ESA-listed species. Mitochondrial DNA analyses have identified five distinct populations of this species in the North Pacific. The population present in the Project Area is recognized as the western Baja California stock (Carretta et al., 2018b). Abundance information is provided in Table 3-1. California sea lions from the U.S. stock (also recognized as the Pacific Temperate stock) may range into waters of the Baja California Peninsula, Mexico (Carretta et al., 2018b).

4.54.2 Distribution

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

This species is not expected to occur in this Action Area.

Indian Ocean Starship Landing Area

This species is not expected to occur in this Action Area.

Northwestern and Hawaii Starship Landing Area

This species is not expected to occur in this Action Area.

Southeast Pacific Starship Landing Area

This species is not expected to occur in this Action Area.

Northeastern Pacific Starship Landing Area

The California sea lion occurs in the eastern north Pacific from Puerto Vallarta, Mexico, through the Gulf of California and north along the West Coast of North America to the Gulf of Alaska (Barlow et al., 2008; Jefferson et al., 2008; Maniscalco et al., 2004). Typically, during the summer, California sea lions congregate near rookery in the Channel Islands off southern and central California, north of the Project Area. California sea lions are usually found in waters over the continental shelf and slope; however, they are also known to venture farther offshore in deep, oceanic waters, including off Guadalupe Island and Alijos Rocks off Baja California (Jefferson et al., 2008; Melin et al., 2008; Urrutia & Dziendzielewski, 2012; Zavala-Gonzalez & Mellink, 2000). California sea lions from the West Coast of the Baja California peninsula are may migrate to Southern California during the fall and winter (Lowry & Forney, 2005).

5 Type of Incidental Take Authorization Requested

The term "take," as defined in Section 3 of the MMPA, means "to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal" (16 U.S.C. § 1362[13]). "Harassment" was further defined in the 1994 amendments to the MMPA, which provided two levels of "harassment," Level A (potential injury) and Level B (potential disturbance). In this Application, SpaceX requests an IHA for the take of marine mammal's incidental to Starship-Super Heavy launch and reentry operations, as described in Sections 1 and 2, for one year following the date of issuance. In order to support the proposed Starship-Super Heavy launch and reentry operations, the Incidental Take Authorization requested herein is for the authorization of Level A (auditory injury) and Level B (harassment) to marine mammals protected under the MMPA that are identified in Chapter 6.

6 Take Estimates for Marine Mammals

This section evaluates how, and to what degree, the Action would potentially impact marine mammals known to occur within the Project Area. The following stressors associated with the Action were considered in developing take estimates for marine mammals that would potentially occur within the Project Area:

- Acoustic (in-air overpressure events resulting from sonic booms)
- Impact by fallen objects
- Near Surface Explosions (acoustic in-water impulsive noise events)

6.1 Sonic Boom Overpressure Events

A sonic boom is the sound associated with the shock waves created by a vehicle traveling through the air faster than the speed of sound on reentry. As described OPR-2021-02908, Programmatic Concurrence for Launch Vehicle and Reentry Operations (NMFS 2022), sonic booms that would occur during Starship-Super Heavy reentry operations would intercept the ocean's surface. However, exceptionally little energy from in-air noise is transmitted into water (FAA 2017). For Starship, due to the low magnitude of the sonic booms (no greater than 2 pounds per square foot [psf]) and: (1) substantial reflection of energy from the shock wave at the air/water interface reducing the amount of energy penetrating the surface, and (2) exponential attenuation with water depth, sonic booms would only result in impacts on marine species at or near the surface. Although the Super Heavy sonic booms could reach up to 12 psf, the sonic booms are also not expected to affect marine species underwater. Acoustic energy in the air does not effectively cross the air/water interface and most of the noise is reflected off the water surface (FAA 2017, Richardson et al. 1995) and underwater sound pressure levels from in-air noise are not expected to reach or exceed threshold levels for injury or harassment to ESA-listed species. Previous research conducted by the USAF supports this conclusion with respect to sonic booms, indicating the lack of harassment risk for protected marine species in water (U.S. Air Force Research Laboratory 2000). The researchers used a threshold for harassment of marine mammals and sea turtles by impulsive noise of 12 pound per square inch which equates to 1,728 psf peak pressure. The researchers found that to produce 12 psi in the water, there needs to be nearly 900 psf at the water surface, assuming excellent coupling conditions. They also noted that it is very difficult to create sonic booms that even approach 50 psf. Impacts to marine species below the surface are not anticipated for either vehicle.

When at sea, cetaceans and pinnipeds spend most of their time (~90 percent 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 head exposed briefly to allow breathing. This minimizes sonic boom exposure, both natural and anthropogenic, essentially 100 percent of the time because their ears are nearly always below the water's surface. Sonic booms are not expected to have an effect on hauled out pinnipeds.

In-air noise caused by sonic boom during re-entry activities are therefore unlikely to result in take of marine mammals.

6.2 Impact by Fallen Objects

A near-surface Super Heavy or Starship explosion or a high-altitude breakup of Super Heavy or Starship on decent would create a debris field comprised of mostly heavy-weight metals and some composite (e.g., carbon fiber) materials. Most of these materials would sink rapidly through the water column, while some items may stay buoyant on the surface or suspended in the water column before sinking towards the seafloor.

If debris from a Super Heavy or Starship near surface explosion or high-altitude disintegration struck a marine mammal near the water's surface, the animal could be injured or killed. Therefore, debris strike from an expended Super Heavy or Starship has the potential to affect marine mammals at the surface at the time of debris impact within the Action Area. Direct strikes by debris would be extremely unlikely due to the relatively small size of most components that would impact the surface and low densities of marine mammals in the Project Area. Given that relatively few Starship or Super Heavy ocean descents and landings would occur over very small portions of the Project Area, and the fact that marine mammals spend the majority of their time submerged as opposed to at the surface, it is extremely unlikely a marine mammal would be struck by falling debris. The availability of animals at the surface in the debris field at the time of impact combined with the low frequency of the Proposed Action, further reduces the likelihood of a physical strike or disturbance.

There are no known interactions between marine mammals and falling debris over decades of similar rocket launches and reentries. Accordingly, adverse interactions between marine mammals and expended debris are considered discountable (unlikely to occur).

6.3 Near Surface Explosions/Overpressurization Events

In-water impulsive noise events would result from an explosion within Starship or Super Heavy resulting in an over pressurization event at the sea surface. A marine mammal in close proximity to the Starship or Super Heavy landing location at the time of an explosion could be at risk of mortality, physical injury, permanent or temporary loss of hearing sensitivity (i.e., auditory injury [PTS] or TTS), or react by changing behavior. SpaceX developed a methodology to analyze impacts from such an explosion that relies on the robust application of scientific principles; a conservative estimation of the necessary coefficients based on available, existing reference data; and the application of appropriate species harassment thresholds taken directly from NMFS. The approach for this analysis was derived from the assessment developed in the 2023 NMFS Consultation Letter, Consultation response, and Underwater Noise Analysis Methodology for Starship-Super Heavy Attachment 142 (FAA 2023). This analysis was used to estimate the affected area from the overpressure event over which NMFS thresholds could be exceeded for marine mammals, if present.

Upon impact with the ocean surface, Starship would have approximately 31 metric tons and 70 metric tons of propellant remaining in the header tanks and main tanks, respectively. For the header tanks, an explosive weight of 3,648 kilograms (kg) was used based on an 11.9 percent explosive yield, which is highly conservative value based on a simulation of uncontained mixing between two close coupled masses of propellant and no barriers impeding their mixing. This is comparable to the conditions of the intact impact at terminal velocity of the Starship landing on the ocean surface. For the main tanks, an explosive weight of 6,300 kg was used based on a 9 percent explosive yield. The analysis for 9 percent yield was used in the 2023 NMFS Consultation, and due to the small variation in propellant mass and small change to the propellant mass fill geometry, the assumption that the manner of propellant mixing will remain consistent is still appropriate.

The impact of an in-air explosive yield from a fuel explosion of the Super Heavy close to the water surface uses the methodology outlined in the March 2024 NMFS Consultation for SpaceX Starship Indian Ocean Landings. The remaining propellant is approximately 74 metric tons and a yield factor of 9%. Starship and Super Heavy have similar characteristics and include: (1) the transfer tube location is situated in the middle of the booster (9m diameter tank), (2) the booster has headers and a main tank like the ship, (3) the Kingery Bulmash calculator is used to determine the propellent remaining in the booster and (4) the most likely explosive scenario is a rupture of the transfer tube (FAA 2024). The main differences from the previous methodology for Starship are: (1) the header is imbedded in the main tank of the booster and (2) since the booster engines are the heaviest part, the booster would impact the ocean engines down. This will put the transfer tubes 3.0 m from the water surface, instead of the 4.5 m for the Starship. Starship and Super Heavy explosions are considered an impulsive source as defined by NMFS because it produces a single explosive event, the sound is transient (less than 1 second), broadband, and consists of a high peak sound pressure with rapid rise time and rapid decay.

For Starship, the TNT Yield would be approximately 4,974 kg (9,948 kg/2). For booster, it would be 3330 kg (6,660 kg/2). Since the in-air explosion sends half of the remaining energy into air, the final TNT yield entering the water would be 6660kg/2=3330 kg. Using the Kingery Bulmash calculator to determine the incident pressure in air yields 17207.90 kilo-Pascals (kPa) at an explosive distance of 3.0 m. Transitioning this to surface pressure in water yields 34398.6 kPa and equates to a peak SPL of 270.7 decibels (dB) for the booster. For Starship, the peak SPL would remain the same as in the 2024 NMFS consultation for SpaceX Starship Landings in the Indian Ocean (267.7 dB).

Estimated takes requested under this IHA application are summarized in Table 6-1 by species and level of take. The analysis of modeled predicted effects and estimates are described in Section 7 (Anticipated Impact of the Proposed Action).

Table 6-1: Take Estimates for Marine Mammals for 20 Over Pressure Events

Species	Project Area	Level A	Level B
Atlantic Spotted dolphin	Gulf of Mexico Super Heavy landing Area	1	4
Common bottlenose dolphin		2	5
Clymene dolphin		0	1
Pantropical Spotted Dolphin		0	1
Fin whale*	Atlantic Super Heavy landing Area	0	1
Atlantic Spotted dolphin		1	2
Common bottlenose dolphin		1	5
Clymene dolphin		0	1
Pilot whales		0	1
Short beaked common dolphin		5	17
Phocid Seals (Harbor seal)		0	1
Short beaked common dolphin	Northeastern Pacific Starship Landing Area	1	3
Total	**All Project Areas**	**11**	**42**
*ESA-listed species			

7 Anticipated Impact of the Proposed Action

Calculating the potentially affected area within which marine mammals could be affected is one of the required inputs for conducting a quantitative analysis of potential impacts to marine species. Data on the abundance and distribution of marine mammals in the potentially affected area is also required to conduct a quantitative analysis of potential impacts.

According to previous consultations between the U.S. Navy and NMFS, the most appropriate metric for this type of analysis is density (number of animals present per unit area; U.S. Navy 2018), which was discussed above and included in Table 3-1.

NMFS has developed thresholds for estimating the onset of TTS and auditory injury (PTS) based on the auditory sensitivity of marine mammals (NMFS 2018). Auditory sensitivity data are not available for all species, so marine mammals have been organized into hearing groups based on measured or presumed similarities among species. Hearing groups and associated TTS and auditory injury (PTS) thresholds used in the analysis are presented in Table 7-1.

Table 7-1: PTS Onset and TTS Onset Thresholds for Underwater Impulsive Noise (NMFS 2018)

Hearing Group	Auditory Injury (PTS)	TTS
Low-Frequency Cetaceans (LF)	219 dB re 1 µPa	213 dB re 1 µPa
Mid-Frequency Cetaceans (MF)	230 dB re 1 µPa	224 dB re 1 µPa
High-Frequency Cetaceans (HF)	202 dB re 1 µPa	196 dB re 1 µPa
Phocid seal (In-water)	218 de re 1 µPa	212 dB re 1 µPa

7.1.1 Predicted Effects on Marine Mammals

Model results showing the number of marine mammals by species predicted to experience TTS or auditory injury (PTS) in each part of the Project Area are shown in the following tables:

- Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location (Table 7-2)
- Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location (Table 7-3)
- Indian Ocean Starship Landing Area (Table 7-4)
- Northwestern and Hawaii Starship Landing Area (Table 7-5)
- Northeastern Pacific Starship Landing Area (Table 7-6)

There were no density estimates available for species in the eastern South Pacific; therefore, it was not possible to predict takes using the model.

To account for the possibility that all 20 overpressure events of Starship or Super Heavy could occur in one landing area, the results presented below assume that 20 landings would take place in each of the five landing areas. If this were to occur, there would be no effects on any marine mammals located in the other four landing areas. Therefore, the results presented in the tables below for each area is a "worst-case" scenario and assumes the entire Proposed Acton (i.e., all 20 events) occurs in that specific part of the Project Area.

Two sets of predicted auditory effects on marine mammals were estimated in each part of the Project Area (except for the Indian Ocean). The maximum density was used in the model to predict a maximum potential effect for each species. The average density for each species was calculated by averaging all density values within each part of the Project Areas. This was used to predict effects more likely to occur than effects based on the maximum density.

Densities for the Indian Ocean were obtained from U.S. Department of the Navy (2019) and reported as either average annual or average seasonal densities.

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

In the Gulf of Mexico Super Heavy landing area, the model predicted 3 auditory injury (PTS) and 11 TTS effects to four dolphin species using the maximum density for each species for 20 over pressure events occurring in the Gulf of Mexico. No effects were recorded for a single over pressure event and no effects were predicted for any species using the average densities for 20 over pressure events (**Table 7-2**). Densities are typically highest for dolphin species closer to shore along the boundary of the Project Area and quickly decrease with distance from shore. A landing and near surface explosion occurring farther from shore would be unlikely to result in auditory effects to these dolphin species. No ESA-listed species would be exposed to auditory injury or TTS effects in the Gulf of Mexico.

Table 7-2: Predicted Auditory Effects on Marine Mammals in the Gulf of Mexico from 20 Super Heavy Landings

Species	Predicted Effects			
	PTS (Max Density)	TTS (Max Density)	PTS (Ave Density)	TTS (Ave Density)
Sperm Whale	0.010349	0.041200	0.001874	0.007459
Rice's Whale	0.105096	0.418395	0.001519	0.006047
Atlantic Spotted dolphin	0.826884	3.291886	0.024744	0.098508
Common bottlenose dolphin	1.232597	4.907059	0.039087	0.155607
Clymene dolphin	0.155135	0.617604	0.012427	0.049474
Dwarf and Pygmy sperm whales	0.014163	0.056385	0.001945	0.007743
False killer whale	0.070024	0.278772	0.049269	0.196145
Frasers Dolphin	0.027612	0.109924	0.019827	0.078933
Killer Whale	0.000751	0.002992	0.000236	0.000938
Pantropical spotted dolphin	0.219038	0.872005	0.051363	0.204478
Striped Dolphin	0.091479	0.364184	0.008646	0.034419
Spinner dolphin	0.076937	0.306292	0.004849	0.019304
Beaked whales	0.019330	0.076955	0.000871	0.003467
Pilot whales	0.081599	0.324851	0.006598	0.026267
Rough toothed dolphin	0.004934	0.019644	0.003915	0.015584
Risso's dolphin	0.017902	0.071268	0.001555	0.006193
Short-finned Pilot Whale	0.053917	0.214647	0.003596	0.014317
Killer Whale	0.000751	0.002992	0.000236	0.000938
Pygmy killer whale	0.005138	0.020455	0.002659	0.010587
False killer whale	0.070024	0.278772	0.049269	0.196145
Melon-headed whale	0.034295	0.136532	0.008486	0.033783

Note: Cells highlighted green indicate a predicted effect is greater than 1, and values exceeding 0.5 are rounded to 1.

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

In the Atlantic Super Heavy landing area, the model predicted 1 TTS level effect on the ESA-listed fin whale for 20 over pressure events. It takes 14 over pressure events to generate a Fin Whale TTS of .478677, anything below 14 events show no predicted effects to Fin Whales. An analysis of the fin whale density data shows that the maximum densities occur only in March and are located at the northern boundary of the Project Area. The maximum density value is approximately three orders of magnitude greater than the average density and there are no predicted effects to fin whales using the average density. There are also 8 auditory injury effects to three dolphin species and 28 TTS effects to four dolphin species, pilot whales, and harbor seal using the maximum density for each species. No effects were predicted for any species using the average densities (Table 7-2). Densities are typically highest for dolphin species and harbor seals closer to shore along the boundary of the Project Area and quickly decrease with distance from shore. Current distance from shore is no closer than 5NM. A landing and near surface explosion occurring farther from shore would be unlikely to result in auditory effects to these dolphin species. Pilot whale densities are highest farther offshore than the dolphin species; there is only one TTS level exposure predicted for pilot whales (Table 7-2).

Table 7-3: Predicted Auditory Effects on Marine Mammals in the Atlantic from 20 Super Heavy Landings

Species	Predicted Effects			
	PTS (Max Density)	TTS (Max Density)	PTS (Ave Density)	TTS (Ave Density)
Blue Whale	0.000225	0.000894	0.000168	0.000671
Fin Whale	0.171769	0.683824	0.000271	0.001081
North Atlantic Right Whale	0.018151	0.072259	0.000028	0.000112
Sei Whale	0.002986	0.011886	0.001320	0.005254
Sperm Whale	0.023910	0.095187	0.002134	0.008498
Atlantic Spotted dolphin	0.498150	1.983171	0.0172202	0.0685547
Atlantic white sided dolphin	0.009002	0.035836	0.0003799	0.0015125
Common bottlenose dolphin	1.098468	4.373081	0.0145660	0.0579882
Brydes whale	0.000942	0.003748	0.0005990	0.0023847
Clymene dolphin	0.136893	0.544983	0.0119467	0.0475609
Common minke whale	0.046205	0.183945	0.0071040	0.0282815
Dwarf and Pygmy sperm whales	0.049720	0.197939	0.0033642	0.0133930
False Killer Whale	0.002079	0.008276	0.0010319	0.0041082
Frasers Dolphin	0.002193	0.008732	0.0017769	0.0070739
Harbor Porpoise	0.001296	0.005160	0.0000003	0.0000012
Humpback Whale	0.019243	0.076610	0.0003744	0.0014905
Killer Whale	0.000158	0.000630	0.0000186	0.0000740
Melon headed whale	0.009940	0.039570	0.0053738	0.0213934
Northern bottlenose whale	0.000357	0.001421	0.0000004	0.0000018
Pantropical spotted dolphin	0.094874	0.377701	0.0152723	0.0608000
Pygmy killer whale	0.001353	0.005384	0.0007390	0.0029420
Striped Dolphin	0.050346	0.200431	0.0083261	0.0331467
White beaked dolphin	0.000076	0.000303	0.0000015	0.0000059
Spinner dolphin	0.018748	0.074635	0.0098717	0.0393001
Beaked whales	0.019121	0.076121	0.0017144	0.0068253

Pilot whales	0.193633	0.770867	0.0064109	0.0255223
Rough toothed dolphin	0.004246	0.016905	0.0024363	0.0096992
Risso's dolphin	0.054793	0.218137	0.0012000	0.0047771
Short beaked common dolphin	4.070575	16.205253	0.0026185	0.0104244
Phocid Seals (Harbor seal)	0.182544	0.726722	0.0001178	0.0004691

Note: Cells highlighted green indicate a predicted effect is greater than 1, and values exceeding 0.5 are rounded to 1.

Indian Ocean Starship Landing Area

No auditory effects are predicted for marine mammals in the Indian Ocean based on average density estimates from the Navy's SURTASS EIS/OEIS (Table 7-4) (U.S. Department of the Navy, 2019).

Table 7-4: Predicted Auditory Effects on Marine Mammals in the Indian Ocean from 20 Starship Landings

Species	Predicted Effects	
	PTS (Ave Annual)	TTS (Ave Annual)
Blue Whale	0.000014	0.000055
Fin Whale	0.004034	0.016058
Sei Whale	Unavailable	Unavailable
Sperm Whale	0.000017	0.001364
Antarctic Minke Whale	0.000046	0.000185
Bryde's Whale	0.001484	0.005906
Dwarf Sperm Whale	0.000017	0.000066
False Killer Whale	0.000074	0.000293
Fraser's Dolphin	0.000541	0.002155
Humpback Whale	0.000325	0.001292
Killer Whale	0.000368	0.001466
Melon-Headed Whale	0.002493	0.009926
Minke Whale	0.059160	0.235519
Pantropical Spotted Dolphin	0.002685	0.010688
Pygmy Killer Whale	0.000372	0.001481
Pygmy Sperm Whale	0.000015	0.000059
Omura's Whale	0.001484	0.005906

Risso's Dolphin	0.026225	0.104404
Short-Finned Pilot Whale	0.010002	0.039820
Striped Dolphin	0.043704	0.173987
Spinner Dolphin	0.002062	0.008210
Rough-Toothed Dolphin	0.000217	0.000865
Common Bottlenose Dolphin	0.013321	0.053030
Southern Bottlenose Whale	0.000305	0.001213
Longman's Beaked Whale	0.001707	0.006797
Blainville's Beaked Whale	0.000344	0.001369
Cuvier's Beaked Whale	0.001674	0.006664
Source: (U.S. Department of the Navy, 2019). Note: Cells highlighted green indicate a predicted effect is greater than 1, and values exceeding 0.5 are rounded to 1.		

Northwestern and Hawaii Starship Landing Area

No auditory effects are predicted for marine mammals in the Northwestern and Hawaii Landing Area using either the maximum or the average density estimates for 20 over pressurization events. (**Table 7-5**).

Table 7-5: Predicted Auditory Effects on Marine Mammals in the Northwestern and Hawaii Landing Area from 20 Starship Landings

Species	Predicted Effects			
	PTS (Max Density)	TTS (Max Density)	PTS (Ave Density)	TTS (Ave Density)
Blue Whale	0.000278	0.001107	0.000039	0.000154
Fin Whale	0.000371	0.001477	0.000371	0.001477
MHI Insular False Killer Whale	0.000628	0.002501	0.000299	0.001191
Sei Whale	0.000742	0.002953	0.000742	0.002953
Sperm Whale	0.002848	0.011339	0.000401	0.001597
Hawaiian Monk Seal	0.000233	0.000929	0.000193	0.000767

Blainville's beaked whale	0.000169	0.000674	0.000169	0.000674
Bryde's whale	0.005100	0.020303	0.000663	0.002639
Common bottlenose dolphin	0.045071	0.179432	0.000285	0.001136
Common minke whale	0.000835	0.003322	0.000835	0.003322
Cuvier's beaked whale	0.001175	0.004678	0.000633	0.002520
Dwarf sperm whale	0.005635	0.022432	0.000786	0.003129
Fraser's dolphin	0.006161	0.024529	0.006161	0.024529
Humpback whale month March	0.119020	0.473826	0.008985	0.035771
Killer whale	0.000026	0.000103	0.000026	0.000103
Longman's beaked whale	0.000383	0.001525	0.000383	0.001525
Melon-headed whale	0.006117	0.024353	0.006094	0.024262
Pantropical spotted dolphin	0.108405	0.431566	0.015061	0.059958
Pygmy killer whale	0.001554	0.006187	0.001554	0.006187
Pygmy sperm whale	0.006331	0.025203	0.006331	0.025203
Risso's dolphin	0.004928	0.019617	0.000152	0.000604
Rough-toothed dolphin	0.043546	0.173358	0.002311	0.009200
Short-finned pilot whale	0.016677	0.066394	0.002266	0.009021
Spinner dolphin	0.076518	0.304625	0.012651	0.050366
Striped dolphin	0.016795	0.066862	0.002919	0.011622

Note: Cells highlighted green indicate a predicted effect is greater than 1, and values exceeding 0.5 are rounded to 1.

Northeastern Pacific Starship Landing Area

In the Northeastern Pacific, 1 auditory injury (PTS) and 3 TTS effects are predicted for Short Beaked Common Dolphin for 20 over pressure events in the Northeastern Pacific Landing Area. No auditory effects were predicted for any species using the average densities (**Table 7-6**).

Table 7-6: Predicted Auditory Effects on Marine Mammals in the Northeastern Pacific from 20 Starship Landings

Species	Predicted Effects			
	PTS (Max Density)	TTS (Max Density)	PTS (Ave Density)	TTS (Ave Density)
Blue Whale	0.02093	0.08334	0.00004	0.00015
False killer whale	0.00089	0.00355	0.00065	0.00260
Fin Whale	0.01807	0.07193	0.00058	0.00233
Humpback Whale	0.02995	0.11924	0.00059	0.00236
Killer Whale	0.00005	0.00019	0.00003	0.00010
Sei Whale	0.00046	0.00185	0.00046	0.00185
Sperm Whale	0.00141	0.00561	0.00050	0.00200
Guadalupe fur seal	0.01460	0.05812	0.00361	0.01438
Bryde's whale	0.00869	0.03459	0.00004	0.00015
Common Minke whale	0.00315	0.01255	0.00196	0.00781
Mesoplodon spp.*	0.00343	0.01366	0.00068	0.00270
Cuvier's beaked whale	0.00296	0.01177	0.00115	0.00457
Dwarf sperm whale	0.00149	0.00594	0.00020	0.00078
Pgymy sperm whale	0.00149	0.00594	0.00633	0.02520
Pygmy killer whale	0.00027	0.00106	0.00020	0.00078
Risso's dolphin	0.00740	0.02946	0.00025	0.00098
Short-finned pilot whale	0.00046	0.00185	0.00003	0.00011
Common Bottlenose dolphin	0.03027	0.12050	0.00089	0.00356
Pantropical spotted dolphin	0.12264	0.48824	0.03306	0.13160
Rough-toothed dolphin	0.00442	0.01759	0.00163	0.00649
Spinner dolphin	0.07797	0.31042	0.01350	0.05375
Striped dolphin	0.04814	0.19163	0.00619	0.02464
Short Beaked Common Dolphin	0.54990	2.18919	0.02532	0.10082

Note: Cells highlighted green indicate a predicted effect is greater than 1, and values exceeding 0.5 are rounded to 1.

8 Anticipated Impacts on Subsistence Use

Potential impacts resulting from the Proposed Action would be limited to individuals of marine mammal species located in areas that have no subsistence requirements. Therefore, no impacts on the availability of species or stocks for subsistence use are considered.

9 Anticipated Impacts on Habitat

The Proposed Action would be infrequent and geographically dispersed and therefore not result in in-water acoustic sound that would cause significant injury or mortality to prey species to the extent that the availability of prey would be reduced or otherwise impacted. The Proposed Action would not create barriers to movement of marine mammals or prey. Behavioral disturbance caused by in-air acoustic impacts may result in varying levels of harassment, from behavioral disruption to TTS or PTS in some individual prey species. Marine mammals may temporarily move away from or avoid the exposure area but there are not expected to be any long-term impacts on habitat.

10 Anticipated Effect of Habitat Impacts on Marine Mammals

Since the acoustic impacts associated with the Starship-Super Heavy landings are of short duration, infrequent, and widely geographically distributed, any resulting behavioral responses in marine mammals are expected to be temporary and a onetime occurrence for any individual animal. Therefore, the Proposed Action is unlikely to result in long-term or permanent avoidance of areas where landings take place or loss of habitat.

11 Mitigation Measures

SpaceX contractors and subject matter experts, in preparation of this consultation, completed a literature review between August 2023 and April 2024 that showed locations within the Action Area that may aggregate ESA-listed species and prey items for ESA-listed species, offer other refugia for ESA-listed species, or otherwise provide conservation benefit. Landing areas within the Action Area will be prioritized at locations outside of avoidance areas described below. Conservation measures are incorporated into SpaceX's proposed action for the purposes of avoiding and minimizing potential adverse effects. These measures include:

11.1 Indian Ocean Mitigation Measures

- SpaceX has revised the Indian Ocean Action Area to restrict any landings within 200NM of any land area. Areas within 200NM of land are not planned to be used for landings, and are therefore excluded from the Indian Ocean Action Area.
- SpaceX will, to the maximum extent practicable, avoid areas determined to be sensitive to disturbance or highly productive and presumed to have an increased probability of supporting higher densities of marine life. These areas are categorized as Avoidance Level 1 Areas, and landing sites would be selected to avoid these areas. Other physiographic

features with the potential to support sensitive habitat are categorized as Avoidance Level 2 Areas and would also be avoided, if possible, but are not considered as high of a priority to avoid due to a lower expectation of aggregating ESA-listed species (CM-MAP 1):

- Avoidance Level 1 Area. Areas determined to have higher potential for conservation value that are located within the Action Area:
    - Important Marine Mammal Areas (IMMAs). IMMAs are defined as discrete portions of habitat, important to marine mammal species, that have the potential to be delineated and managed for conservation. IMMAs consist of areas that may merit place-based protection and/or monitoring. The IMMA concept was developed by the International Union for Conservation of Nature (IUCN) Joint Species Survival Commission (SSC) and World Commission on Protected Area (WCPA) Marine Mammal Protected Areas Task Force. The Action Area overlaps with two Areas of Interest (AOI)—the Exmouth and Wallaby Plateau Offshore Western Australia AOI and the Subtropical Convergence Zone AOI (CM-MAP 2).
    - Ecologically or Biologically Significant Area (EBSA). An EBSA is an area of the ocean that has special importance in terms of its ecological and biological characteristics: for example, by providing essential habitats, food sources or breeding grounds for particular species (CM-MAP 3).
- Avoidance Level 2 area. Locations that include physiographic features (e.g., plateaus, ridges, spreading zones, known seamounts and ocean vents) outside of Avoidance Level 1 Areas (CM-MAP 4 and CM-MAP 5).

11.2 Gulf of Mexico, Atlantic Ocean and Pacific Ocean Mitigation Measures

- Launch activities and reentry activities will occur in the proposed action area at least 5NM offshore the coast of the United States or islands with the exception of 3NM from Boca Chica TX for RTLS missions. The only operations component that will occur near shore (0-3NM) will be watercraft transiting to and from a port when recovering spacecraft or launch vehicle components, or possibly for surveillance.
- No launch operator will site a landing area in coral reef areas.
- No activities will occur in or affect a National Marine Sanctuary unless the appropriate authorization has been obtained from the Sanctuary.
- Landing operations will not occur in the aquatic zone extending 20NM (37 km) seaward from the baseline or basepoint of each major rookery and major haul-out of the Western DPS Steller sea lion located west of 144° W.
- Reentry trajectories will be planned to avoid rice's whale core habitat.
- Each launch operator will provide a dedicated observer(s) (e.g., biologist or person other than the watercraft operator that can recognize ESA-listed and MMPA-protected species or use the appropriate fish finder technology) that is responsible for monitoring for ESA-listed and MMPA-protected species with the aid of binoculars during all in-water activities, including transiting marine waters for surveillance or to retrieve boosters, spacecraft, other launch-related equipment or debris.

11.3 General Mitigation Measures Applicable to Support Vessel Operations

- SpaceX 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 (45 m) from sea turtles and a minimum distance of 300 ft (90 m) 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.

12 Mitigation Measures to Protect Subsistence Uses

Potential impacts resulting from the Proposed Action would be limited to individuals of marine mammal species located in areas that have no subsistence requirements. Therefore, mitigation measures to protect subsistence users are not applicable.

13 Monitoring and Reporting

Given the remoteness of the operations and safety concerns of having personnel in close proximity to the landing site monitoring and reporting can be a challenge. Implementation of the monitoring measures outlined below would allow SpaceX to better quantify the characteristics of the various stressors analyzed here and document impacts on marine mammals as a result of the Proposed Action. Implementation of all measures would be overseen by qualified SpaceX personnel or contractor staff. The following measures would be implemented to monitor potential impacts on offshore marine mammals and the offshore marine environment:

- Each launch operator will immediately report any collision(s), injuries or mortalities to, and any strandings of ESA-listed or MMPA-protected species to the appropriate NMFS contact. For operations in the Gulf of Mexico and Atlantic Ocean: 727-824-5312 or via email to takereport.nmfsser@noaa.gov, and a hotline 1-877-WHALE HELP (942-5343).
- In the Gulf of Mexico and Atlantic Ocean waters near Florida, each launch operator will report any smalltooth sawfish sightings to 941-255-7403 or via email Sawfish@MyFWC.com.
- Each launch operator will report any giant manta ray sightings via email to manta.ray@noaa.gov.

13.1 Marine Mammal Monitoring

In the Atlantic Ocean, each launch operator will report any injured, dead, or entangled North Atlantic right whales to the U.S. Coast Guard via VHF Channel 16.

13.2 Reporting

SpaceX will submit a report to the FAA satisfying special reporting requirements 30 days after each Starship-Super Heavy landing event when an anomaly has occurred.

SpaceX will also submit an annual report on all monitoring conducted under the IHA. A draft of the annual report will be submitted within 90 calendar days of the expiration of the IHA, or within 45 calendar days of the renewal of the IHA (if applicable). A final annual report would be prepared and submitted within 30 days following resolution of comments on the draft report from NMFS. The annual report would summarize the information from all Starship-Super Heavy launches and include:

1. Launch Mission Name
2. Date
3. Site Location
4. Payload
5. FAA License or Permit Number
6. Brief detail of operations in the marine environment
7. GPS coordinates of landing area of launch vehicle stages
8. Whether the stage was recovered
9. Support Vessels and transit route or Aircraft used in area
10. Environmental Protection Measures Utilized
11. Effects to Listed Species
12. Sighting Logs of Marine Species to include species (if possible to identify) with date, time, location, number of animals, distance and bearing from the vessel, direction of travel, and other relevant information.
13. Did the vehicles experience an anomaly?

Reporting injured or dead marine mammals:

1. In the unanticipated event that the Proposed Action clearly causes the take of a marine mammal in a manner prohibited by this IHA, such as non-auditory injury, serious injury, or mortality, SpaceX would halt future landings in that part of the Project Area and report the incident to NMFS Office of Protected Resources and the appropriate NMFS Regional Stranding Coordinator. The report would include the following information:
    a. Time and date the injured or stranded animal were observed
    b. Location of the observation in proximity to the landing area
    c. Status of all Starship-Super Heavy landing activities in the 48 hours preceding the incident

d. Description of all marine mammal observations in the 48 hours preceding the incident

e. Environmental conditions (e.g., wind speed and direction, Beaufort Sea State, cloud cover, and visibility)

f. Species identification or description of the animal(s) involved

g. Fate of the animal(s)

h. Photographs or video footage of the animal(s)

Activities would not resume in the part of the Project Area until NMFS is able to review the circumstances of the prohibited take. NMFS would work with SpaceX to determine what measures are necessary to minimize the likelihood of further prohibited take and ensure MMPA compliance. SpaceX may not resume their activities in that action area until notified by NMFS via letter, email, or telephone.

2. In the event that SpaceX discovers an injured or dead marine mammal, and the lead observer determines that the cause of the injury or death is unknown and the death is relatively recent (e.g., in less than a moderate state of decomposition), SpaceX would immediately report the incident to NMFS Office of Protected Resources and the appropriate NMFS Regional Stranding Coordinator. Activities may continue while NMFS reviews the circumstances of the incident and makes a final determination on the cause of the reported injury or death. NMFS would work with SpaceX to determine whether additional mitigation measures or modifications to the activities are appropriate.

3. In the event that SpaceX discovers an injured or dead marine mammal, and the lead observer determines that the injury or death is not associated with or related to the activities authorized in the IHA (e.g., previously wounded animal, carcass with moderate to advanced decomposition, scavenger damage), SpaceX would report the incident to NMFS Office of Protected Resources and the appropriate NMFS Regional Stranding Coordinator within 24 hours of the discovery. SpaceX would provide photographs or video footage or other documentation of the stranded animal sighting to NMFS. The cause of injury or death may be subject to review and a final determination by NMFS. Proposed landing activities would continue uninterrupted.

14 Suggested Means of Coordination

SpaceX would share biologically relevant data related to the potential stressors identified herein, including data collected on their over pressure events in the field and observed impacts to marine mammal species as described in section 13 of this application. SpaceX is interested in interacting with key stakeholders outside of the rocket industry with in air explosion expertise. SpaceX hopes to maintain close interaction and coordination with NMFS regarding early stage applied mathematical processes used to determine the effects of rocket explosions on marine mammals.

15 List of Preparers

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B.7.2 NMFS Determination on Incidental Harassment Authorization Application

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From: Benjamin Laws - NOAA Federal <benjamin.laws@noaa.gov>
Sent: Tuesday, December 17, 2024 11:35 AM
To: Kim Tice <Kim.Tice@spacex.com>
Subject: MMPA Incidental Harassment Authorization NMFS Response

Hi Kim,

The National Marine Fisheries Service (NMFS) Office of Protected Resources (OPR) Permits and Conservation Division (PR1) reviewed SpaceX's Incidental Harassment Authorization (IHA) application concerning Starship-Super Heavy Launch Vehicle and Reentry Operations, submitted May 16, 2024. We appreciate the thoroughness of the application and of the associated technical acoustic analysis.

After careful review of the application, and concurrent discussion with colleagues in the OPR Endangered Species Act Interagency Cooperation Division to ensure consistency in analysis and interpretation related to the planned activity (as appropriate), PR1 has determined that the proposed activities are not likely to result in the incidental take of marine mammals under NMFS' jurisdiction (i.e., cetaceans and pinnipeds other than walrus). *See* the statutory definition of "take" under the Marine Mammal Protection Act (MMPA) at 16 U.S.C. § 1362(13). As discussed in the application, the only potential for take incidental to the planned program of launch and reentry activities would be through harassment. The proposed activities are not likely to result in take in the form of harassment because they are not likely to present either the potential to injure or the potential to disturb marine mammals by causing disruption of behavioral patterns. *See* the MMPA definition of "harassment" at 16 U.S.C. § 1362(18). As noted in the application, SpaceX's analysis is highly conservative, both in terms of assumptions related to the footprint of effect that may result from in-water impulsive noise events (if they occur) and to the marine mammal density values (i.e., maximum density values) applied in the exposure analysis. This highly conservative analysis results in very few estimated exposures of marine mammals exceeding harassment criteria.

As established in the foregoing, no incidental take (as defined under the MMPA) is expected to result from the planned activities. Therefore, no MMPA authorization is required. *See* the regulatory definition of incidental harassment at 50 C.F.R. § 216.203. Accordingly, given that no incidental take is anticipated to occur, we have concluded that issuance of an IHA under the MMPA in response to the application is not warranted.

In the event of unanticipated incidental take of a marine mammal, SpaceX should contact our office immediately to provide notification of the incident and to work through the necessary steps to ensure MMPA compliance moving forward, which could include submitting a request for an incidental take authorization. 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.

Thank you and please do not hesitate to reach out with any questions or concerns.

Thanks,

Ben

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Ben Laws
Incidental Take Program Supervisor
Office of Protected Resources
NOAA Fisheries | U.S. Department of Commerce
(301) 427-8425