APPENDIX A

Agency Consultation

U.S. Department of Transportation
Federal Aviation Administration

Office of Commercial Space Transportation

800 Independence Ave., SW.
Washington, DC 20591

May 24, 2024

Consulting Biologist
Endangered Species Act Interagency Cooperation Division
Office of Protected Resources
National Marine Fisheries Service
Silver Spring, MD 20910

Subject: Biological Assessment of SpaceX Starship-Super Heavy Launch Vehicle and Reentry Operations to Support Endangered Species Act Section 7 Consultation with the National Marine Fisheries Service

Dear Consulting Biologist,

Attached is a Biological Assessment (BA) for SpaceX Starship-Super Heavy reentry operations with the landings in the Pacific, Indian and Atlantic Oceans, in accordance with the FAA's obligations under Section 7(a)(2) of the Endangered Species Act (ESA). SpaceX's proposed operations included launches originating from Boca Chica, TX as well as the Kennedy Space Center and Cape Canaveral Space Force Station in Florida.

Table 1 represents the FAA's overall effects determinations for ESA-listed species analyzed in this BA.

Table 1: Effect Determinations Under the Action

Species Name	*DPS*	*ESA Status*	*Species Effects Determination*	*Critical Habitat Effects Determination*[1]
Fishes				
Atlantic sturgeon *Acipenser oxyrinchus oxyrinchus*	Carolina DPS	Endangered	NLAA	-
	South Atlantic DPS	Endangered	NLAA	-
Giant manta ray *Manta birostris*	-	Threatened	NLAA	-
Gulf sturgeon *Acipenser oxyrinchus desotoi*	-	Threatened	NLAA	-
Nassau grouper *Epinephelus striatus*	-	Threatened	NLAA	-
Oceanic whitetip shark *Carcharhinus longimanus*	-	Threatened	NLAA	-
Scalloped hammerhead shark *Sphyrna lewini*	-	Threatened	NLAA	-
Sea Turtles				
Green sea turtle / *Chelonia mydas*	North Atlantic Ocean DPS	Threatened	NLAA	NLAA
	East Pacific DPS	Threatened	NLAA	
	Central North Pacific DPS	Threatened	NLAA	
	East Indian-West Pacific DPS	Threatened (Foreign)	NLAA	-
	North Indian DPS	Threatened (Foreign)	NLAA	-
	Southwest Indian Ocean DPS	Threatened (Foreign)	NLAA	-
Olive ridley sea turtle *Lepiodochelys olivacea*	-	Endangered	NLAA	-
Kemp's ridley sea turtle	-	Endangered	NLAA	-

Species Name	*DPS*	*ESA Status*	*Species Effects Determination*	*Critical Habitat Effects Determination*[1]
Hawksbill sea turtle *Eretmochelys imbricata*	-	Endangered	NLAA	-
Leatherback sea turtle *Demochelys coriacea*	-	Endangered	NLAA	-
Loggerhead sea turtle *Caretta caretta*	Northwest Atlantic Ocean DPS	Threatened	NLAA	NLAA
	North Pacific Ocean DPS	Endangered	NLAA	
	South Pacific Ocean DPS	Endangered (Foreign)	NLAA	-
	North Indian Ocean DPS	Endangered (Foreign)	NLAA	-
	Southwest Indian Ocean DPS	Threatened (Foreign)	NLAA	-
	Southeast Indo-Pacific DPS	Threatened (Foreign)	NLAA	-
Marine Mammals				
Blue whale/pygmy blue whale *Balaenoptera musculus*	-	Endangered	NLAA	-
False killer whale *Pseudorca crassidens*	MHI Insular DPS	Endangered	NLAA	-
Fin whale *Balaenoptera physalus*	-	Endangered	NLAA	-
Humpback whale *Megaptera novaeangliae*	Mexico DPS	Threatened	NLAA	-
	Central America DPS	Endangered	NLAA	-
North Atlantic right whale *Eubalaena glacialis*	-	Endangered	NLAA	NLAA
Rice's whale *Balaenoptera ricei*	-	Endangered	NLAA	-
Sei whale *Balaenoptera borealis*	-	Endangered	NLAA	-

Species Name	***DPS***	***ESA Status***	***Species Effects Determination***	***Critical Habitat Effects Determination[1]***
Sperm whale *Physeter macrocephalus*	-	Endangered	NLAA	-
Guadalupe fur seal *Arctocephalus townsendii*	-	Threatened	NLAA	-
Hawaiian monk seal *Neomonachus schauinslandi*	-	Endangered	NLAA	-

Notes: DPS=Distinct Population Segment, ESA=Endangered Species Act, NLAA=Not Likely Adversely Affect

1. "-" in the Critical Habitat column indicates that the species does not have critical habitat designated in the Action Area.

Thank you for your assistance in this matter. Please contact Amy Hanson, Environmental Specialist, at Amy.Hanson@faa.gov or (847) 243-7609 to discuss any questions or concerns.

Sincerely,

STACEY MOLINICH ZEE

Digitally signed by STACEY MOLINICH ZEE
Date: 2024.05.24 12:37:12 -04'00'

Stacey M. Zee

Manager, Operations Support Branch

Attachment:

Biological Assessment of SpaceX Starship-Super Heavy Launch Vehicle and Reentry Operations to Support Endangered Species Act Section 7 Consultation with the National Marine Fisheries Service

Biological Assessment of SpaceX Starship-Super Heavy Launch Vehicle and Reentry Operations to Support Endangered Species Act Section 7 Consultation with the National Marine Fisheries Service

24 May 2024

Prepared for

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ACRONYMS AND ABBREVIATIONS

° S	degrees South
AGL	above ground level
AOI	Area of Interest
BA	Biological Assessment
BIA	Biologically Important Area
C	Celsius
CBD	Convention on Biological Diversity
CCSFS	Cape Canaveral Space Force Station
CDFW	California Department of Fish and Wildlife
C.F.R.	Code of Federal Regulations
DAF	Department of the Air Force
DoD	Department of Defense
DPS	Distinct Population Segment
E	east
EBSA	Ecologically or Biologically Significant Area
ESA	Endangered Species Act
ESU	Evolutionarily Significant Units
FAA	Federal Aviation Administration
ft	foot or feet
ft^2	square feet
FE	federally listed endangered
FR	Federal Register
FT	federally listed threatened
IMMA	Important Marine Mammal Area
IOTC	Indian Ocean Tuna Commission
IUCN	International Union for Conservation of Nature
km	kilometer(s)
km^2	square kilometers
KSC	Kennedy Space Center
LOC	letter of concurrence
LOX	liquid oxygen
m	meter(s)
mi.	mile(s)
MMPA	Marine Mammal Protection Act
NCI	norther Channel Islands
nm	nautical mile(s)
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
PEA	Programmatic Environmental Assessment
PTS	Permanent Threshold Shift
psf	pounds per square foot
SAR	Stock Assessment Report
SLD 30	Space Launch Delta 30
SLC	Space Landing or Launch Complex
SMI	San Miguel Island
SpaceX	Space Exploration Technologies Corporation
TNT	Trinitrotoluene
TTS	Temporary Threshold Shift
UME	Unusual Mortality Event
U.S.	United States
U.S.C.	United States Code
USFWS	United States Fish and Wildlife Service
USSF	United States Space Force
VSFB	Vandenberg Space Force Base
W	west

1 Introduction

The purpose of this Biological Assessment (BA) is to evaluate potential impacts on species listed under the Endangered Species Act (ESA) under the authority of the National Marine Fisheries Service (NMFS) resulting from the Federal Aviation Administration (FAA) Office of Commercial Space Transportation's Proposed Action. Issuance and modification of a license is considered a major federal action under the National Environmental Policy Act of 1969 and requires an environmental review in order to grant authority to Space Exploration Technologies Corporation (SpaceX) for Starship-Super Heavy launch and reentry operations.

SpaceX is proposing to increase the number of 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 would be 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 currently lands the Super Heavy booster in the Gulf of Mexico and the Starship in the Pacific Ocean west of Hawaii and the Indian Ocean. SpaceX is proposing to expand the potential landing sites of the booster and ship.

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 at the surface of the water
    2B. Soft water landing and tip over and explode on impact at 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 each vehicle resulting in debris falling into the water and 20 explosive events at the surface of the water for each vehicle from October 2024-October 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.

1.1.1 Background and Consultation History

In 2022, the FAA prepared a Programmatic Environmental Assessment (PEA) that described the affected environment and environmental impacts of Starship-Super Heavy operations at the Boca Chica Launch Site for the *SpaceX Starship/Super Heavy Launch Vehicle Program at the SpaceX Boca Chica Launch Site in Cameron County, Texas* (Federal Aviation Administration, 2022). NMFS issued a single programmatic letter of concurrence (2022 LOC) to the FAA for launch and reentry vehicle operations in the marine

environment, which included Starship-Super Heavy launch vehicle operations at Space Exploration Technologies Corp.'s (SpaceX) Boca Chica Launch Site (National Marine Fisheries Service, 2022c).

On 4 April 2023, the FAA transmitted a BA to NMFS for a project specific consultation for SpaceX landings in the Pacific Ocean, in accordance with the FAA's obligations under Section 7(a)(2) of the ESA. That consultation package supplemented the 2022 programmatic consultation and described the affected environment and environmental impacts of Starship-Super Heavy operations at the Boca Chica Launch Site. SpaceX's proposed operations included the first three flights originating from Boca Chica, as well as site-specific analysis for Starship landings in in the Pacific Ocean as well as Super Heavy intact landing in the Gulf of Mexico. NMFS concurred with FAA's determination that the Action may affect, but not likely adversely affect, ESA-listed species for SpaceX Super Heavy landings in the Gulf of Mexico and Starship landings in the Pacific (Federal Aviation Administration, 2022; National Marine Fisheries Service, 2023e).

On 2 February 2024, the FAA transmitted a letter to NMFS providing information to supplement the previous consultation with similar proposed activities in the Indian Ocean. On 14 March 2024, NMFS issued a letter of concurrence (2024 LOC) for 10 flights originating from the Boca Chica Launch Site to the FAA for launch and reentry vehicle operations in the marine environment, which included Starship operations in the Indian Ocean. NMFS concurred with FAA's determination that the Action may affect, but not likely adversely affect, ESA-listed species (National Marine Fisheries Service, 2024b).

The Action Area (described in Section 2.1) includes areas within and outside of the territorial waters of the United States (U.S.) and contains critical habitat for ESA-listed species. Section 2.2 describes the Action. Consistent with the NMFS requirements for ESA Section 7 analyses, the spatial and temporal overlap of activities with the presence of listed species is assessed in this BA. The definitions used in this BA for effects determinations under Section 7 of the ESA are based on the U.S. Fish and Wildlife Service (USFWS) and NMFS Endangered Species Consultation Handbook (U.S. Fish and Wildlife Service & National Marine Fisheries Service, 1998).

2 Description of the Action and the Action Area

2.1.1 Proposed Action

Super Heavy (First Stage) Launches 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 nominal 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. During descent, when the first 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. 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 and break up on impact resulting in an explosive event at the surface of the water or (2) soft water landing and tip over and sink or explode on impact with the surface of the water.

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 and break up on impact resulting in an explosive event at the surface of the water or (2) soft water landing and tip over and explode on impact with the surface of the water. The impact would disperse settled remaining propellants and drive structural failure of the vehicle, which would allow the remaining LOX and methane to mix, resulting in an explosive event at the surface of the ocean.

2.1.2 Action Area

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 Action Area includes four proposed landing areas for Starship and two landing areas for Super Heavy. The Starship could be expended in the Northwest Pacific Starship Landing Area (**Error! Reference source not found.Error! Reference source not found.**, pink area), Northeast Pacific Landing Area (**Error! Reference source not found.**, green area), Southeast Pacific Starship Landing Area (**Error! Reference source not found.Error! Reference source not found.**), or Indian Ocean Starship Landing Area (**Error! Reference source not found.**). For each mission, Super Heavy could be expended in in the Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location (**Error! Reference source not found.**) or the North Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location (**Error! Reference source not found.**), 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.

It is anticipated that the overpressure events associated with the Proposed Action would begin in October 2024 and end in October 2025.

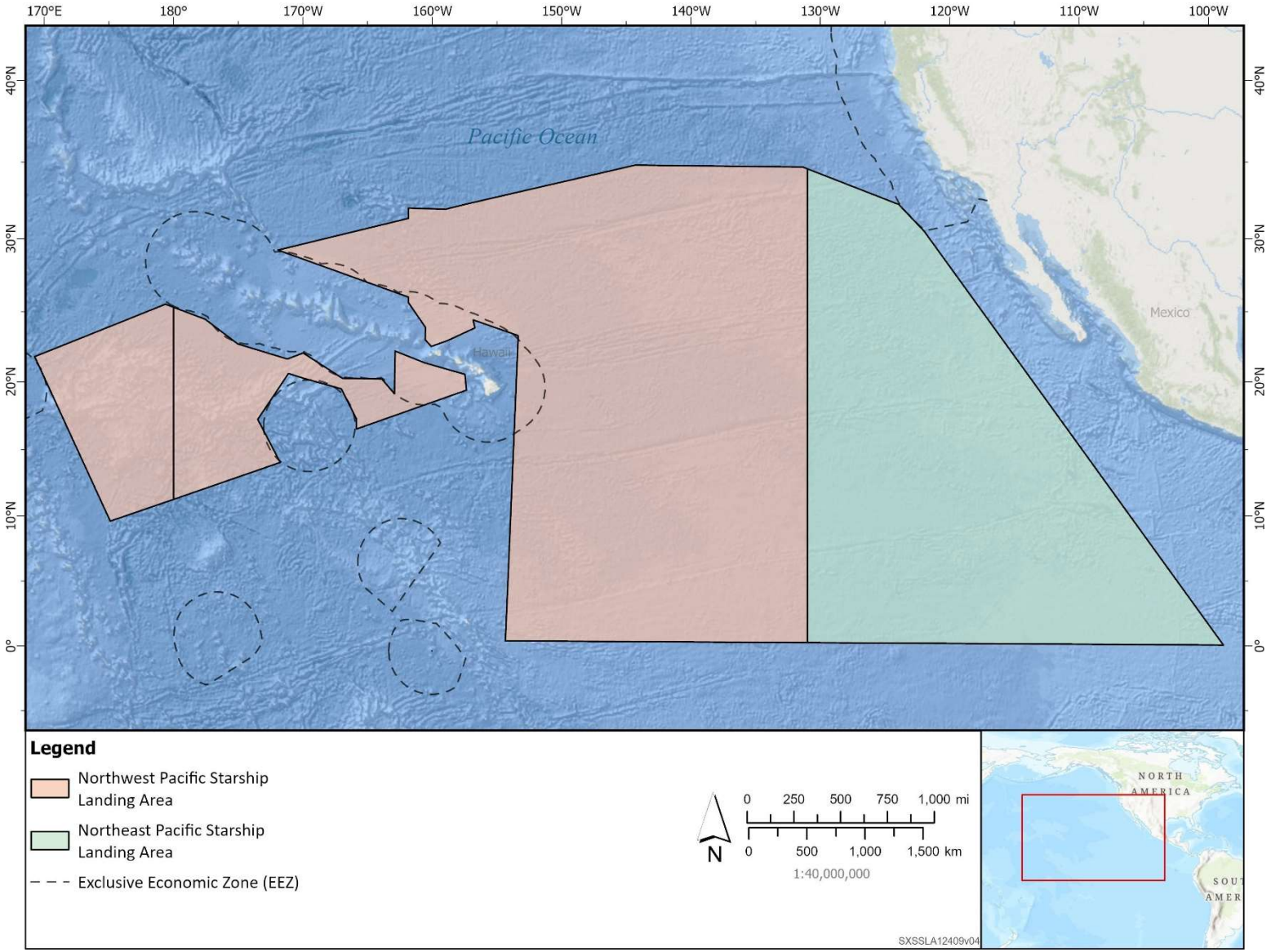


Figure 1: Northwest Pacific and Northeast Pacific Starship Landing Areas

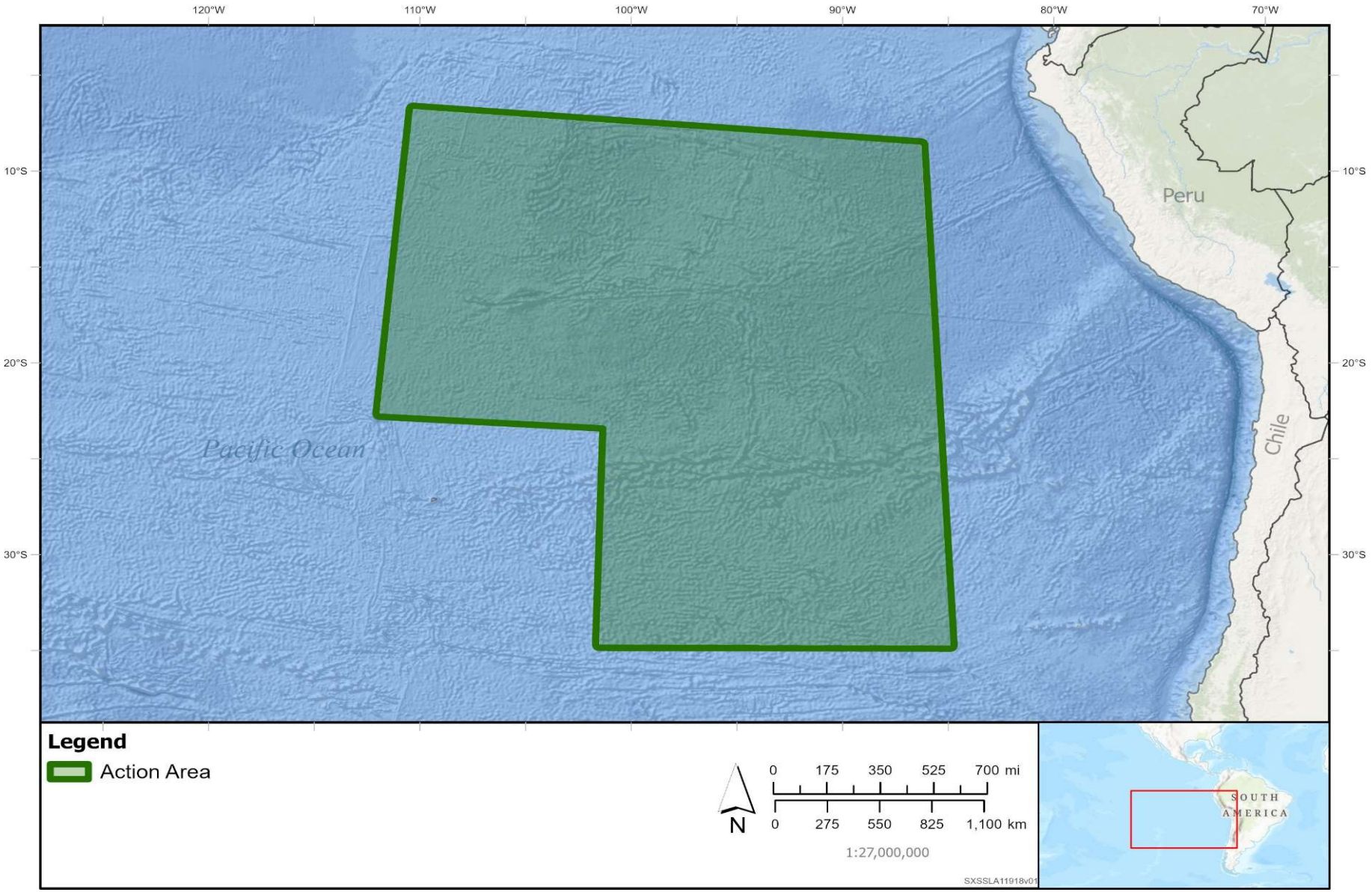


Figure 2: Southeast Pacific Starship Landing Area

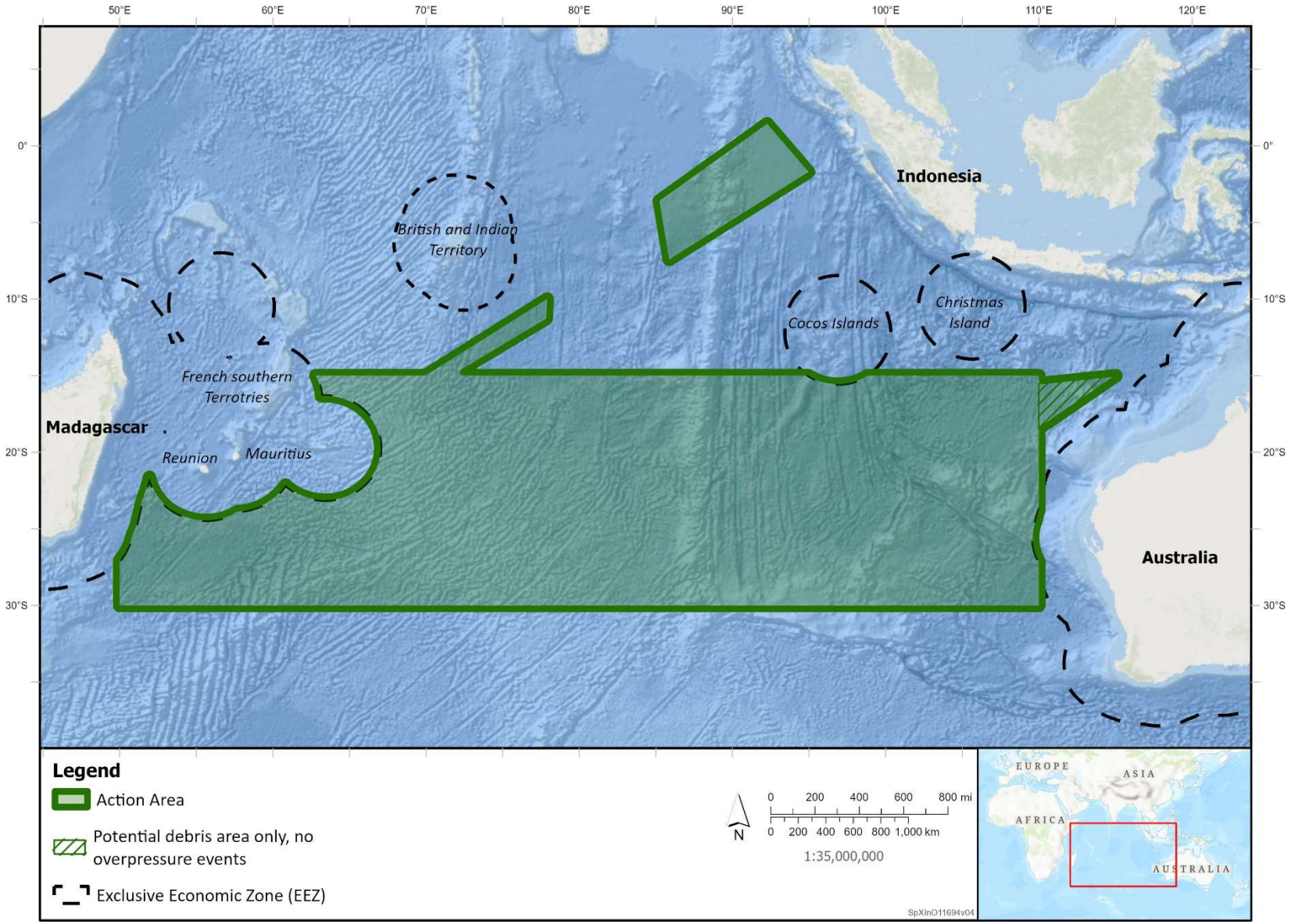


Figure 1: Indian Ocean Starship Landing Area

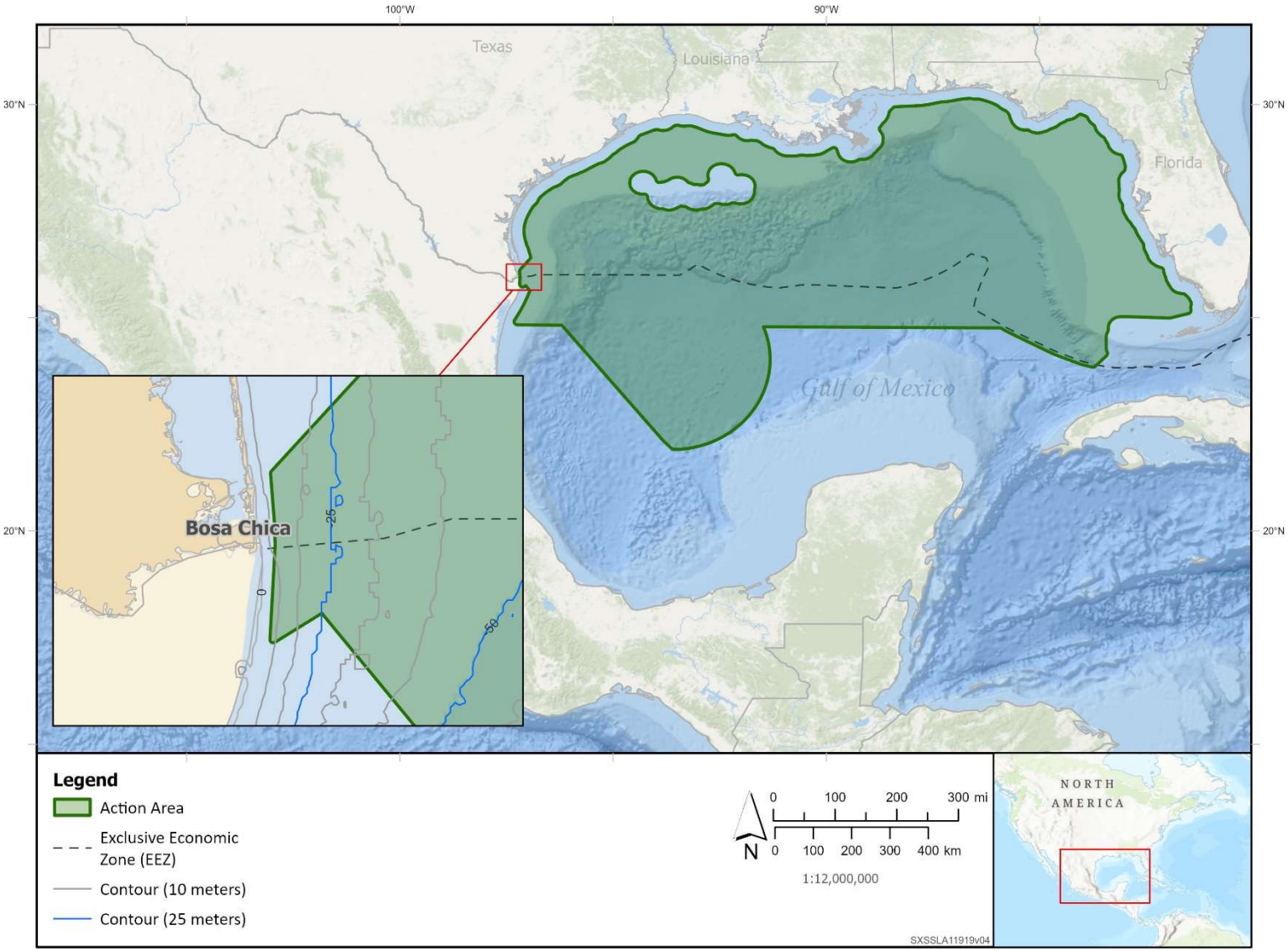


Figure 4: Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

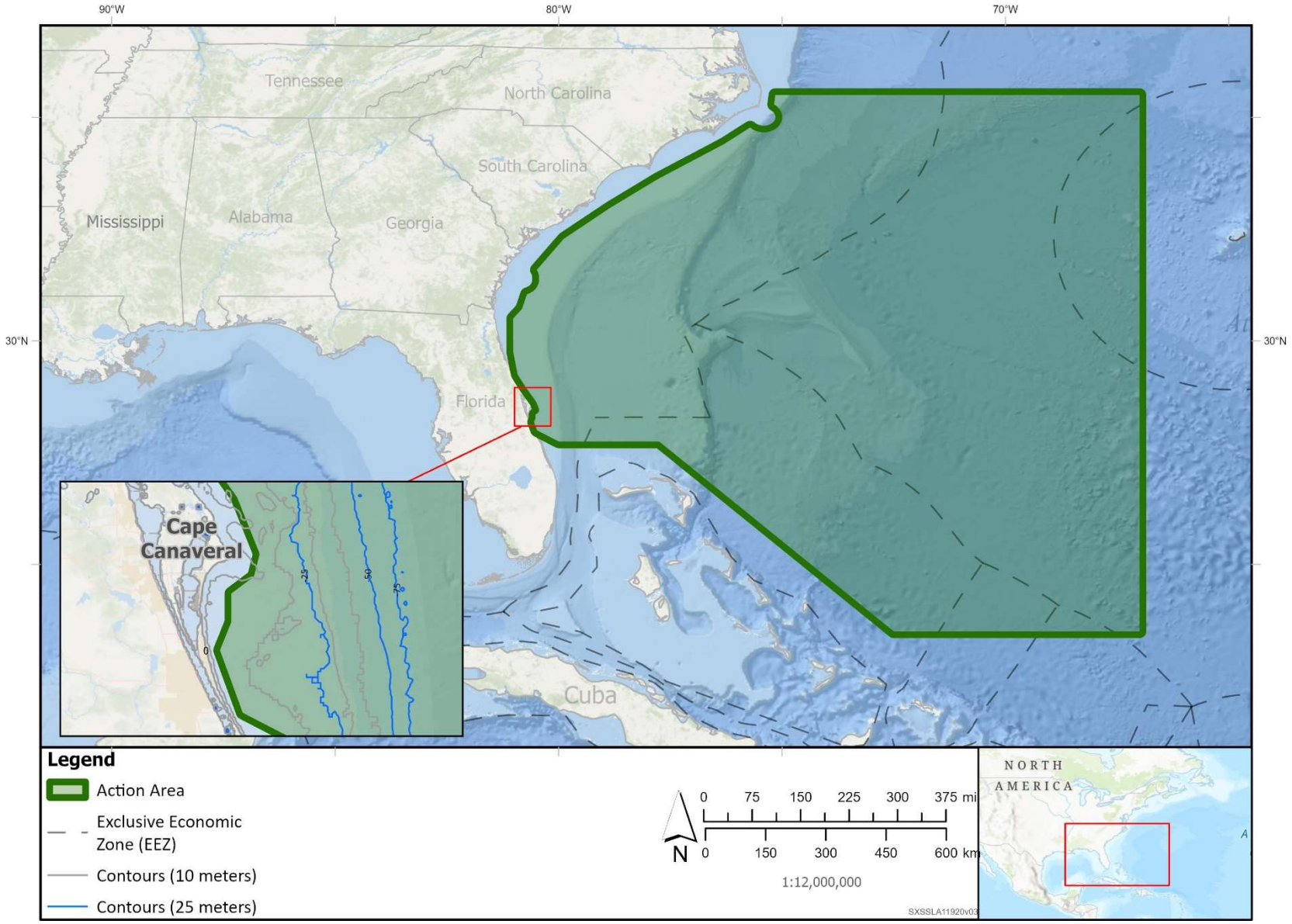


Figure 5: Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

2.1.3 Conservation Measures

SpaceX will adopt applicable conservation measures from previous consultation documents in the portions of the Action Area within the Gulf of Mexico, Atlantic, Pacific, and Indian Oceans (see Section 2.3.1). The Southeast Pacific Starship Landing Area is a new portion of the Action Area not previously analyzed. Relative to other landing areas, marine resources (including ESA-listed species occurrence and seasonality) within the landing area proposed within the Indian Ocean are less known. Accordingly, SpaceX proposed avoidance areas for the Indian Ocean portion of the Action Area.

2.1.4 Conservation Measures within the Gulf of Mexico, Atlantic Ocean, and Pacific Ocean

General Measures Applicable to Launches and Reentry Trajectory Planning

- Launch activities and reentry activities will occur in the proposed action area at least 5 NM offshore the coast of the United States or islands. The only operations component that will occur near shore 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 20 NM (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) 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.
- The FAA would open an action-specific consultation if SpaceX's trajectory tracks to the Atlantic Super Heavy Landing Area during the month of March and in that portion of the Action Area where fin whales might be expected to occur.
- Additional conservation measures for the new portion of the action area will be determined through consultation with NMFS.

General Measures Applicable to Operations of Support Vessels

- 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.

- SpaceX will immediately report any collision(s), injuries, or mortalities to ESA-listed species to the appropriate NMFS contact.
- Additional conservation measures for the new portion of the action area will be determined through consultation with NMFS.

2.1.5 Conservation Measures within the Indian Ocean portion of the Action Area

SpaceX contractors and subject matter experts, in preparation of this consultation, completed a literature review in August 2023 that identified ESA-listed species with potential occurrence in the Action Area and locations within the Action Area that may (1) aggregate ESA-listed species and prey for ESA-listed species, (2) offer other refugia for ESA-listed species, or (3) otherwise provide conservation benefit. These areas are shown on Figure 2. Potential Indian Ocean landing areas within the Action Area will be prioritized to avoid these locations, referred to as avoidance areas and further defined below.

Conservation measures are incorporated into SpaceX's proposed action for the purposes of avoiding and minimizing potential adverse effects (see Figure 6). These measures include:

- SpaceX has revised the Action Area to restrict any landings within 200 nm of any land area. Areas within 200 nm are not planned to be used for landings and are therefore excluded from the 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:
    - **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 (MMPATF). 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.
        - **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.
    - 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.

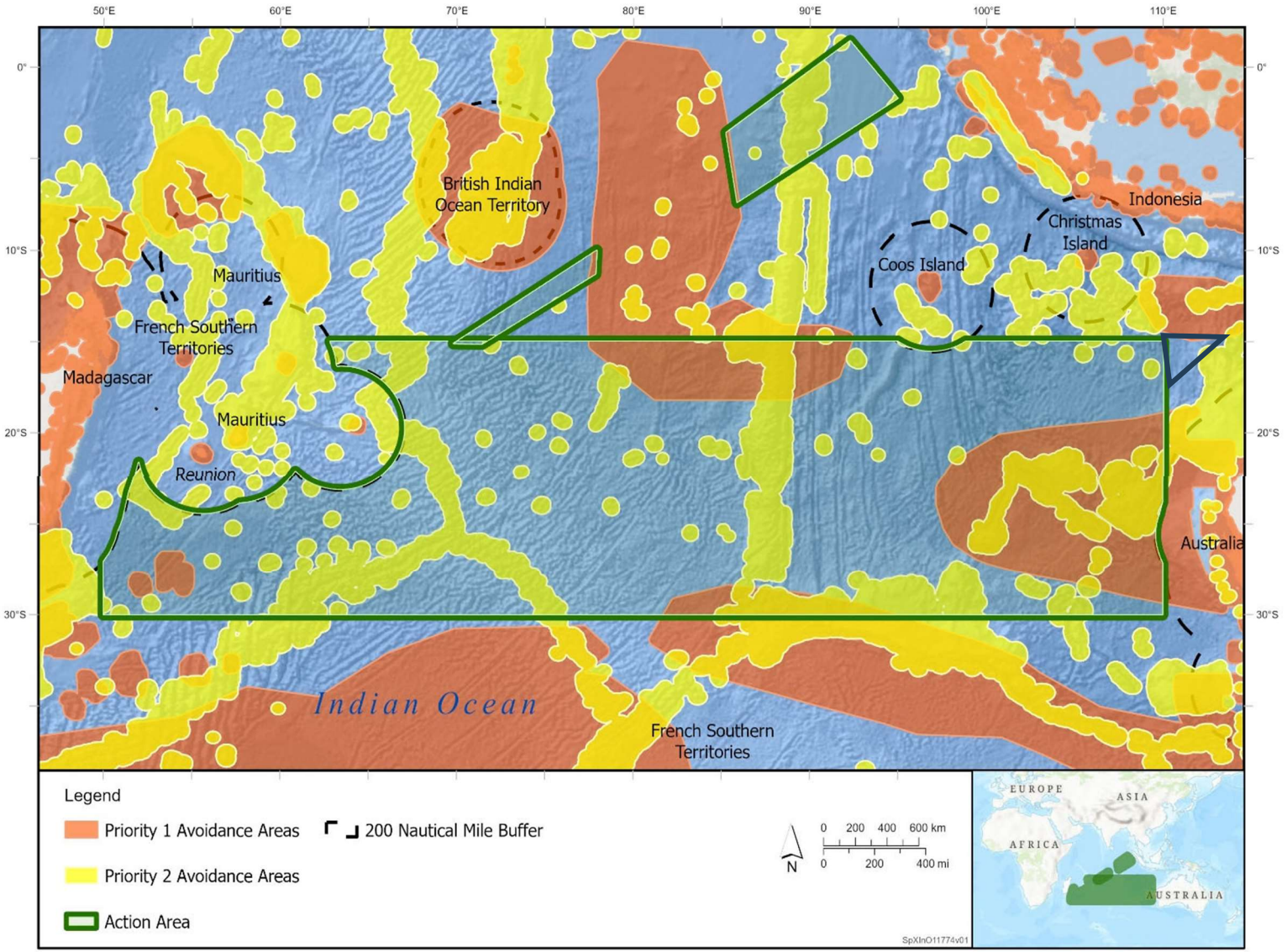


Figure 2: Priority 1 and Priority 2 Indian Ocean Avoidance Areas

3 Description of the Species

The list of ESA-listed endangered and threatened species that may be affected by the Action were developed by reviewing NMFS endangered species web sites, scientific literature, and available reports, and consulting with species experts. Table 3-1 lists the ESA-listed species under NMFS jurisdiction that may be affected by the Action. Table 3-2 lists designated critical habitat within each Action Area.

3.1.1 Species Density Estimates

Species densities (i.e., number of animals per unit area) are needed to quantitatively estimate the number of potential exposures to ESA-listed marine mammals that result from the Action. Data on species abundances and distributions are derived from systematic marine species surveys and are needed to estimate species densities with an acceptable level of uncertainty. Only marine mammal density estimates are used in this BA; however, SpaceX's model can be used for other species' guilds (i.e., sea turtles, fishes) as more data becomes available in the literature.

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 Action Area 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., offshore areas of the Indian Ocean). 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. A. Becker et al., 2022; Elizabeth A. Becker et al., 2022; 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 (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, a mean, or average density estimate was also calculated for each species and used in the analysis to present a more representative analysis of potential effects. The data sources and methods used to derive average and maximum density estimates are described below for each portion of the Action Area.

3.1.2 Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

Density data for the Atlantic Action 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 Action Area, the spatially-explicit density estimates were averaged within the boundaries of the Action 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 Action Area). In addition to the overall Action Area average, the maximum and minimum single cell density values within the Action 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 Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

Similar to the Atlantic Ocean portion of the Action Area, two separate sources of density data were available for the SpaceX Gulf of Mexico portion of the Action 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 Ocean portion of the Action Area, spatially-explicit density estimates were averaged within the boundaries of the SpaceX Gulf of Mexico portion of the Action 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 portion of the Action Area). In addition to the overall average within the Action Area, the maximum and minimum single cell density values within each portion of the Action Area were identified for each species, regardless of dataset.

3.1.4 Northwest and Hawaii Tropical North Pacific Ocean Starship Landing Area

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 Action 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.

3.1.5 Northeastern Tropical Pacific Ocean Starship Landing Area

Given the large spatial extent of this North Pacific portion of the Action 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, 2020 #1327;Bradford, 2021 #201}(Elizabeth A. Becker et al., 2022; Becker et al., 2021; Forney et al., 2015). In addition, both design- and model-based estimates were available for waters off the Baja Peninsula, Mexico and the greater Eastern Tropical Pacific (E. A. Becker et al., 2022; 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.

3.1.6 Southeast Pacific Starship Landing Area

There are very limited systematic survey data in the South Pacific, particularly for offshore areas that include the SpaceX portion of the Action 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 portion of the Action Area, or the published data did not provide quantitative density data. Examples of some of the published papers that were found as a result of the literature review are provided below. Results suggest that there are no suitable density data available for the SpaceX portion of the Action Area in the South Pacific.

3.1.7 Indian Ocean Starship Landing Area

The Indian Ocean has not been surveyed for the occurrence and distribution of marine mammals in a manner that would support quantifiable density estimation based on distance sampling theory. Therefore, a uniform density for each species was estimated for the Action Area based on RES data models (Kaschner et al., 2006; Sea Mammal Research Unit [SMRU] Ltd., 2012) as presented in the Navy's *Final Supplemental Environmental Impact Statement/Supplemental Overseas Environmental Impact Statement for Surveillance Towed Array Sensor System Low Frequency (SURTASS LFA) Sonar* (U.S. Department of the Navy, 2019).

Table 3-1: ESA-listed Species Occurring or Potentially Occurring in the Action Area

Species Name	*DPS*	*ESA Status*	Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location	Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location	Indian Ocean Starship Landing Area	Northwest and Hawaii Tropical Pacific Starship Landing Area	Southeast Pacific Starship Landing Area	Northeast Pacific Starship Landing Area
Fishes								
Atlantic sturgeon *Acipenser oxyrinchus oxyrinchus*[1]	Carolina DPS	Endangered	**X**	**X**	-	-	-	-
	South Atlantic DPS	Endangered	**X**	**X**	-	-	-	-
Giant manta ray *Manta birostris*	-	Threatened	**X**	**X**	**X**	**X**	**X**	**X**
Gulf sturgeon *Acipenser oxyrinchus desotoi*	-	Threatened	**X**	-	-	-	-	-
Nassau grouper *Epinephelus striatus*	-	Threatened	**X**	-	-	-	-	-
Oceanic whitetip shark *Carcharhinus longimanus*	-	Threatened	**X**	**X**	**X**	**X**	**X**	**X**
Scalloped hammerhead shark *Sphyrna lewini*	Eastern Atlantic DPS	Endangered (Foreign)		**X**	-	-	-	-
	Central and Southwest Atlantic DPS	Threatened	**X**	**X**	-	-	-	-
	Eastern Pacific DPS	Endangered	-	-		**X**	**X**	**X**

Species Name	*DPS*	*ESA Status*	Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location	Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location	Indian Ocean Starship Landing Area	Northwest and Hawaii Tropical Pacific Starship Landing Area	Southeast Pacific Starship Landing Area	Northeast Pacific Starship Landing Area
	Indo-West Pacific DPS	Threatened	-	-	X	-	-	-
Sea Turtles								
Green sea turtle *Chelonia mydas*	North Atlantic Ocean DPS	Threatened	X	X	-	-	-	
	East Pacific DPS	Threatened	-	-	-	-	X	X
	Central North Pacific DPS	Threatened	-	-	-	X	-	-
	East Indian-West Pacific DPS	Threatened (Foreign)	-	-	X	-	-	-
	North Indian DPS	Threatened (Foreign)	-	-	X	-	-	-
	Southwest Indian Ocean DPS	Threatened (Foreign)	-	-	X	-	-	-
Olive ridley sea turtle *Lepiodochelys olivacea*	-	Endangered/ Threatened[2]	-	-	X	X	X	X
Kemp's ridley sea turtle *Lepidochelys kempii*	-	Endangered	X	X	-	-	-	-

Species Name	*DPS*	*ESA Status*	**Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location**	**Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location**	**Indian Ocean Starship Landing Area**	**Northwest and Hawaii Tropical Pacific Starship Landing Area**	**Southeast Pacific Starship Landing Area**	**Northeast Pacific Starship Landing Area**
Hawksbill sea turtle *Eretmochelys imbricata*	-	Endangered	**X**	**X**	**X**	**X**	**X**	**X**
Leatherback sea turtle *Demochelys coriacea*	-	Endangered	**X**	**X**	**X**	**X**	**X**	**X**
Loggerhead sea turtle *Caretta caretta*	Northwest Atlantic Ocean DPS	Threatened	**X**	**X**	**-**	**-**	**-**	**-**
	North Pacific Ocean DPS	Endangered	**-**	**-**	**-**	**X**	**-**	**X**
	South Pacific Ocean DPS	Endangered (Foreign)	**-**	**-**	**-**	**-**	**X**	**-**
	North Indian Ocean DPS	Endangered (Foreign)	**-**	**-**	**X**	**-**	**-**	**-**
	Southwest Indian Ocean DPS	Threatened (Foreign)	**-**	**-**	**X**	**-**	**-**	**-**
	Southeast Indo-Pacific DPS	*Threatened (Foreign)*	**-**	**-**	**X**	**-**	**-**	**-**
Marine Mammals								
Blue whale/pygmy blue whale *Balaenoptera musculus*	-	Endangered	**-**	AVG= 0.000018 MAX= 0.000024	0.0000281[3]	AVG= 0.000008 MAX= 0.00006	**X**	AVG= 0.000077 MAX= 0.002009

Species Name	*DPS*	*ESA Status*	Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location	Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location	Indian Ocean Starship Landing Area	Northwest and Hawaii Tropical Pacific Starship Landing Area	Southeast Pacific Starship Landing Area	Northeast Pacific Starship Landing Area
False killer whale *Pseudorca crassidens*	main Hawaiian Islands Insular DPS	Endangered	-	-	-	**X**	-	-
Fin whale *Balaenoptera physalus*	-	Endangered	-	AVG = 0.018352 MAX = 0.000029	0.000871	AVG, MAX = 0.000080	**X**	AVG = 0.000060 MAX = 0.000080
Humpback whale[1] *Megaptera novaeangliae*	Central America DPS	Endangered	-	-	-	-	**X**	AVG= 0.000146 MAX= 0.001211
	Mexico DPS	Threatened	-	-	-	AVG= 0.001917 MAX= 0.025324	-	AVG= 0.000146 MAX= 0.001211
North Atlantic right whale *Eubalaena glacialis*	-	Endangered	-	AVG= 0.000003 MAX= 0.001939	-	-	-	-
Rice's whale *Balaenoptera ricei*	-	Endangered	AVG= 0.00016 MAX= 0.01123	-	-	-	-	-
Sei whale *Balaenoptera borealis*	-	Endangered	-	AVG= 0.000141 MAX= 0.000319	**X**	AVG, MAX= 0.000160	**X**	AVG= 0.000110 MAX= 0.00160
Sperm whale *Physeter macrocephalus*	-	Endangered	AVG= 0.00252 MAX= 0.01392	AVG= 0.002871 MAX= 0.032160	0.002362	AVG= 0.001498 MAX= 0.002375	**X**	AVG= 0.000461 MAX= 0.003829
Guadalupe Fur Seal *Arctocephalus townsendii*	-	Threatened	-	-	-	-	**X**	AVG, MAX= 0.06283
Hawaiian monk seal *Neomonachus schauinslandi*	-	Endangered	-	-	-	AVG= 0.000031 MAX= 0.000040	-	-

[1] Insufficient data are available to estimate densities at the DPS level; therefore, densities are representative of the species.

Species Name	*DPS*	*ESA Status*	**Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location**	**Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location**	**Indian Ocean Starship Landing Area**	**Northwest and Hawaii Tropical Pacific Starship Landing Area**	**Southeast Pacific Starship Landing Area**	**Northeast Pacific Starship Landing Area**

DPS=Distinct Population Segment, ESA=Endangered Species Act, "X" indicates presence in the landing area, however the densities are unknown.
Notes:
1 Chesapeake Bay, New York Bight, and the Gulf of Maine DPS may also occur in the action area in small numbers (see 3.5.1.2).
2 Olive ridley sea turtles belonging to Mexico's Pacific coast breeding populations are considered endangered by NMFS. All other populations are considered threatened. Accordingly, olive ridleys in the Southeast Pacific Starship Landing Area are endangered and threatened in other portions of the Action Area.
3 Density estimates for the Indian Ocean are not presented as averages and max values.

Table 3-2: Species with Designated or Proposed Critical Habitat in the Action Area

Species Name	***DPS***	***Critical Habitat Designation***	**Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location**	**Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location**	**Indian Ocean Starship Landing Area**	**Hawaii and NW Pacific Starship Landing Area**	**Southeast Pacific Starship Landing Area**	**Northeast Pacific Starship Landing Area**
Green sea turtle *Chelonia mydas*	North Atlantic Ocean DPS	88 FR 46572	**X**	**X**	**-**	**-**	**-**	**-**
Loggerhead sea turtle	Northwest Atlantic Ocean DPS	79 FR 39855	**X**	**X**	**-**	**-**	**-**	**-**
North Atlantic right whale *Eubalaena glacialis*	-	81 FR 4838		**X**	-	-	-	-

3.1.5 Fishes

3.5.1 Atlantic Sturgeon (Acipenser oxyrinchus oxyrinchus)

3.5.1.1 Status and Trends

Atlantic sturgeon were once abundant, but overfishing and habitat loss have caused sharp population declines. NMFS issued a moratorium on harvesting in federal waters 1999 (64 FR 9449). However, populations continued to decline, prompting NOAA to list the species as endangered or threatened throughout its range in 2012 (77 FR 5880; 77 FR 5914). Atlantic sturgeon population is comprised of five DPS: the Carolina, South Atlantic, Chesapeake Bay, and New York Bight DPSs, which are listed as endangered, and the Gulf of Maine DPS, which is listed as threatened (77 FR 5880). Atlantic sturgeon in the Action Area would most likely be part of the Carolina DPS and South Atlantic DPS. However, individuals from the Carolina, South Atlantic, Chesapeake Bay, New York Bight, and the Gulf of Maine DPSs also could occur in this region (Kahn et al., 2019).

The Atlantic sturgeon is an anadromous fish, which is born in fresh water, migrates into salt water where they grow and mature, and migrates back into fresh water as adults to spawn. They forage and mature in shallow marine waters (Hager & Mathias, 2018). Adult and juvenile Atlantic sturgeon range widely throughout the marine environment and adults may undertake north-south seasonal migrations (Kahn et al., 2019)

In the mid-1800s, incidental catch of Atlantic sturgeon in the shad and river herring seine fisheries indicated that the species was abundant (Armstrong & Hightower, 2002). By 1870, females were collected for their eggs, which were sold as caviar. By 1890, over 3,350 metric tons were landed from rivers along the Atlantic coast (Smith & Clugston, 1997). Despite a moratorium on commercial fishing for this species since 1998, there has been no indication of recovery. The lack of recovery is attributed to coastal development, pollution, poor water quality, and habitat degradation and loss.

3.5.1.2 Distribution

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

Rothermel et al. (2020) observed that Atlantic sturgeon along the mid-Atlantic coastal shelf tend to stay closer to shore in spring and summer and move to deeper waters in winter. During non-spawning years, adults may remain in marine waters year-round, although they may enter estuarine waters as well (Kahn et al., 2014; Rothermel et al., 2020). The Carolina, South Atlantic, Chesapeake Bay, New York Bight, and the Gulf of Maine DPSs potentially occur within the Atlantic Ocean Super Heavy Landing Area.

3.5.1.3 Critical Habitat

Critical habitat has been designated within several rivers throughout the sturgeon's range (82 FR 39160) but does not overlap the Action Area.

3.5.2 Giant Manta Ray (Manta birostris)

3.5.2.1 Status and Trends

NMFS listed the giant manta ray as threatened in 2018 (83 FR 2916). No stock assessments exist for this species. Harvesting, bycatch, habitat loss and degradation, and disease and predation have caused population declines (National Oceanic and Atmospheric Administration 2016a). Giant manta ray populations have generally declined, except in areas where they are specifically protected, such as the Hawaiian Islands (National Oceanic and Atmospheric Administration, 2023d).

3.5.2.2 Distribution

Giant manta rays are found throughout the world's oceans in tropical, subtropical, and temperate waters. They frequently utilize productive areas with regular upwelling, including oceanic island shores, offshore pinnacles, and seamounts. They utilize sandy bottom habitat, seagrass beds, shallow reefs, and the ocean surface both inshore and offshore. The species may migrate seasonally more than 621 mi. (1,000 km); however, individuals are not likely to cross ocean basins (National Oceanic and Atmospheric Administration, 2023d). Giant manta rays may occur throughout the entire Action Area.

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

Genetic evidence has indicated that giant manta rays are present at the Flower Banks National Marine Sanctuary (FBNMS) in the northwestern Gulf of Mexico (National Oceanic and Atmospheric Administration, 2023e). Species monitoring methods conducted for over 25 years in the FBNMS concluded that approximately 80 percent of observed manta rays were smaller than the size of the species at maturity, indicating that this sanctuary may be an important juvenile manta ray habitat (Stewart et al., 2018).

The Loop Current, which is created by oceanic waters entering the Gulf of Mexico Large Marine Ecosystem from the Yucatan channel and exiting through the Straits of Florida, has upwelling along its edges, as well as in its rings and eddies that are associated with it (Heileman & Rabalais, 2008). These rings, eddies, and upwelling zones are areas where giant manta rays could also be found feeding.

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

Occasional short-lived plankton blooms occur along the Gulf Stream front and in intrusions into the Southeast U.S. Continental Shelf Large Marine Ecosystem, which ranges from south of Cape Hatteras, North Carolina to the straits of Florida (Aquarone, 2009). This draws giant manta rays to feed in this large marine ecosystem during these occasions. Shelf fronts are separated by wintertime cold air outbreaks, river discharge, tidal mixing, and wind-induced coastal upwelling, all of which attract giant manta rays for feeding, and to seagrass floors (National Marine Fisheries Service, 2022a).

Indian Ocean Starship Landing Area

Bycatch of this species by tuna fisheries and similar species fisheries in the region have indicated that giant manta rays are present throughout the Indian Ocean (Martin, 2020). This species has also been observed along all coastlines of Australia, with most individuals sighted around cleaning stations that are adjacent to deeper waters (Armstrong et al., 2020). Satellite tags of giant manta rays off the eastern coast of Africa have also registered movements of this species from Mozambique to South Africa, migrating approximately 1,100 km (National Oceanic and Atmospheric Administration, 2023d).

Hawaii and NW Pacific Starship Landing Area

Giant manta rays are found throughout the Hawaiian Islands, but large aggregations are known to occur along the Kona coast off the Big Island of Hawaii, with hundreds of individuals participating in the aggregation (Defenders of Wildlife, 2015b). These aggregations are likely timed to peak seasonal abundances of prey such as zooplankton.

Southeast Pacific Starship Landing Area

Giant manta rays have been commonly observed throughout this region, with its range recorded as far south as Central Peru (12 °S) (Moreno & Gonzalez-Pestana, 2017). There is also evidence of seasonal aggregations of giant manta rays at Isla de la Plata and Baja Copé Marine Reserve, Ecuador from June through September (Harty et al., 2022). The populations at Isla de Plata and Baja Cope Marine Reserve

are largest known aggregations of this species in the world, with an estimated seasonal abundance of more than 22,000 individuals (Harty et al., 2022). Giant manta rays in these areas off Ecuador are known migrate to northern Peru and the Galapagos Islands (Harty et al., 2022).

Northeast Pacific Starship Landing Area

Sightings of giant manta rays are common in Mexico off the Revillagigedo Islands (offshore) and Bahia de Banderas (nearshore) (Miller & Klimovich, 2016). A study monitoring giant manta rays in nearshore and offshore areas off Mexico founds that there was no movement between locations, and that individuals were foraging in their respective environments instead of moving between the locations (National Oceanic and Atmospheric Administration, 2023d). As a result, the giant mantas in these areas may exist as subpopulations with a high degree of residency.

3.5.2.3 Critical Habitat

Critical habitat has not been designated for this species.

3.5.3 Gulf Sturgeon (Acipenser oxyrinchus desotoi)

3.5.3.1 Status and Trends

The gulf sturgeon was federally listed in 1991 as threatened in the Gulf of Mexico Large Marine Ecosystem in 1991 (56 FR 49653) and is co-managed by NMFS and USFWS.[2] The fishery for the species has been closed since being listed. Bycatch along the Gulf coast was a major source of mortality (U.S. Fish and Wildlife Service, 1995), and efforts to reduce bycatch include gear modifications for nearshore trawl fisheries (Smith & Clugston, 1997). NMFS and USFWS concluded that the Gulf sturgeon population was stable and had achieved recovery objectives (U.S. Fish and Wildlife Service & National Marine Fisheries Service, 2022).

3.5.3.2 Distribution

The Gulf sturgeon is an anadromous species that occurs in bays, estuaries, rivers, and the marine environment from Florida to Louisiana in the Gulf of Mexico.

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

Adult gulf sturgeons inhabit nearshore waters in the Gulf of Mexico from October through February (Robydek & Nunley, 2012) and migrate toward natal rivers in spring (Rogillio et al., 2007). After spawning, adults leave rivers and generally remain within 1,000 m of the shoreline (Robydek & Nunley, 2012), often inhabiting estuaries and nearshore bays in water less than 10 m deep (Ross et al., 2009). Some individuals move into deeper offshore waters for short periods during cold weather (Randall & Sulak, 2012; Sulak et al., 2009).

Sub-adult and adult foraging grounds include barrier island inlets and estuaries less than 2 m deep (Rudd et al., 2014; U.S. Fish and Wildlife Service & National Marine Fisheries Service, 2022). Gulf sturgeon winter near beaches of northwestern Florida and southeast of the mouth of St. Andrew Bay (National Marine Fisheries Service, 2010a), while others moved northeast of St. Andrew Bay at depths ranging from 4 to 12 m (12 to 40 ft.) at 0.5 to 2 mi. offshore (National Marine Fisheries Service, 2022b).

Due to the propensity for Gulf sturgeon to remain near the shoreline, this species is unlikely to occur within the Gulf of Mexico Super Heavy Landing Area.

[2] NMFS and USFWS share jurisdiction for ESA-listed gulf sturgeon. USFWS manages recovery of this species in riverine habitats, while NMFS has jurisdiction over this species in estuaries and open waters.

3.5.3.3 Critical Habitat

In 2009 NMFS designated critical habitat for Gulf sturgeon within and adjacent to the states of Louisiana, Mississippi, Alabama, and Florida (82 FR 39160). Critical habitat does not overlap the Action Area.

3.5.4 Nassau Grouper (Epinephelus striatus)

3.5.4.1 Status and Trends

Nassau grouper was once one of the most common species of grouper in the U.S. Commercial and recreational landings of Nassau grouper declined significantly from 1986 to 1991. As a result, NMFS issued moratoriums on take and possession in 1996. By 2000, abundance had continued to decrease by approximately 60 percent over the prior three generations due to intensive fishing on and near spawning aggregation sites (Beets & Hixon, 1994; Cornish & Eklund, 2003; Waterhouse et al., 2020). These declines prompted the Nassau grouper to be listed as threatened under the ESA in 2016 (81 FR 42268).

3.5.4.2 Distribution

Nassau groupers occur in tropical and subtropical waters in the Caribbean and western North Atlantic, including south Florida, U.S. Virgin Islands, Puerto Rico, Bermuda, the Bahamas, the Greater Antilles, the Lesser Antilles, and central America (National Marine Fisheries Service, 2022d; Waterhouse et al., 2020). Generally, Nassau grouper occur at shallow reefs, but can be found in depths to approximately 426 ft. The majority of the species range is outside of the Action Area; however, Nassau grouper was reported the Gulf of Mexico at Flower Gardens Bank (Bester, 2012). Due to minimal overlap in this species range with the Gulf of Mexico Super Heavy Landing Area (Figure 2-1), Nassau grouper are extremely rare within the Action Area.

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

The only confirmed observation of the Nassau grouper in the Gulf of Mexico at Flower Gardens Bank was recorded in September 2006 during a research cruise (Ehrhardt & Deleveaux, 2007; Waterhouse et al., 2020). It was reported at approximately 27°N and 93°W on the East Flower Bank at a depth of 36 m. There were three other sightings of this species at the Flower Gardens Bank prior to 2006, although these observations were considered unconfirmed (Foley et al., 2007).

3.5.4.3 Critical Habitat

In 2022, NMFS proposed critical habitat for Nassau Grouper off the coasts of southeastern Florida, Puerto Rico, Navassa, and the United States Virgin Islands (87 FR 62930). The proposed critical habitat does not overlap the Action Area.

3.5.5 Oceanic Whitetip Shark (Carcharhinus longimanus)

3.5.5.1 Status and Trends

NMFS completed a comprehensive status review of the oceanic whitetip shark and based on the best scientific and commercial information available, including the status review report (Young & Carlson, 2020), and listed the species as threatened in 2018 (83 FR 4153). Because the oceanic whitetip shark's range is largely outside of U.S. jurisdiction, and regulations have been enacted to reduce the impacts of all domestic fisheries on this species, one of the major components of conservation strategy focuses on strategic international cooperation. As a pelagic species that occurs mostly offshore, it is managed on the high seas across its global range by four major tuna-focused Regional Fisheries Management Organizations.

Oceanic whitetip sharks have been impacted by pelagic longline and drift net fisheries bycatch, targeted fisheries (for the shark fin trade), and destruction or modification of its habitat and range (Baum et al., 2015; Defenders of Wildlife, 2015). Oceanic whitetip sharks have declined by 80 to 95 percent across the Pacific Ocean since the mid-1990s (National Marine Fisheries, 2023). Legal and illegal fishing activities in the Atlantic have caused significant population declines for the oceanic whitetip shark. It is caught as bycatch in tuna and swordfish longlines in the northwest Atlantic and Gulf of Mexico. In the Indian Ocean, the scope and magnitude of threats are potentially higher due to wider use of pelagic longlines and gillnets, though this is uncertain. Fishing effort, harvest, and shark landings are also higher in the Indian Ocean than any other ocean (Young & Carlson, 2020). Habitat degradation has occurred due to pollutants in the environment that bioaccumulate and biomagnify to high levels in their bodies due to their high position in the food chain, long life, and large size (Defenders of Wildlife, 2015).

3.5.5.2 Distribution

Oceanic whitetip sharks are found worldwide in warm tropical and subtropical waters between the 30° North and 35° South latitude, typically near the surface of the water column (Young et al., 2016). Oceanic whitetip sharks are expected to occur throughout the entire Action Area.

This species has a clear preference for open ocean waters, with abundance decreasing in proximity to continental shelves. Allen and Cross (2006) categorized oceanic whitetip sharks as holoepipelagic and individuals would be found mostly far from shore. Preferring warm waters near or over 20 degrees Centigrade (68 degrees Fahrenheit), and offshore areas, the oceanic whitetip shark is known to undertake seasonal movements to higher latitudes in the summer (National Marine Fisheries Service, 2023b) and may regularly survey extreme environments (deep depths, low temperatures) as a foraging strategy (Young & Carlson, 2020).

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

Oceanic whitetip sharks are a species that prefers warmer waters and is more likely to occur during the summer months in the Gulf of Mexico (Tolotti et al., 2017). This species would likely occur near the surface of offshore deep open ocean waters. U.S. pelagic longline surveys in the mid-1950s and U.S. pelagic longline observer data in the Gulf of Mexico during the late-1990s estimated a decline of the species in the Gulf over the 40-year time period. However, due to temporal changes in fishing gear and practices over the time period, the study may have exaggerated or underestimated the magnitude of population decline (National Marine Fisheries Service, 2023b).

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

In the Southeast U.S. Continental Shelf Large Marine Ecosystem, oceanic whitetip sharks would be more likely to occur far offshore in the open sea in waters that are 200 m deep near the surface of the water column, although some have been recorded to occur at depths of 152 m (National Marine Fisheries Service, 2023b). This species may also migrate southward of Cape Hatteras, North Carolina as the water temperatures in the region drop (Backus et al., 1956).

Indian Ocean Starship Landing Area

Oceanic whitetip sharks have been observed throughout the Indian Ocean, often as a low-prevalence bycatch of fisheries in the region. Spanish and French swordfish longline fisheries have recorded bycatches of oceanic whitetip sharks in the Southwest Indian Ocean. This species was present in approximately 16 percent of their tuna catches, indicating the presence of this species in the region (Ramos-Cartelle et al., 2012). Oceanic whitetips are most frequently recorded in the northern Hemisphere of the Indian Ocean and in warmer regions North of 25°S (Ramos-Cartelle et al., 2012).

Hawaii and NW Pacific Starship Landing Area

Oceanic whitetips occur throughout the Central Pacific, including the Hawaiian Islands. Catch data from the Hawaii-based longline fishery from 1995 through 2000 and 2004 through 2006 indicated that the oceanic whitetip shark was a common species incidentally caught in both the nearshore and offshore fishing sectors (National Marine Fisheries Service, 2023b). The catch data also reflected a decline in the number of whitetip sharks caught from 2004 through 2006, which was unable to be explained (National Marine Fisheries Service, 2023b).

Southeast Pacific Starship Landing Area

In the eastern Pacific, the oceanic whitetip shark range extends from southern California (including the Gulf of California) to Panama, Ecuador, and northern Peru (Bester, 1999). Bycatch data from 1993 through 2004 has recorded the presence of this species throughout the Eastern Tropical Pacific, specifically in waters off northern Peru and Ecuador with highest concentrations at approximately 110°W through 140°W (Queiroz et al., 2019).

Northeast Pacific Starship Landing Area

In the eastern Pacific, the whitetip shark range extends from southern California (including the Gulf of California) to Panama, Ecuador, and northern Peru (Bester, 1999). Although the range extends to southern California, this species is likely more abundant further south (National Marine Fisheries Service, 2023b). Records of pregnant female individuals in the region are often recorded between 20°N to the equator (National Oceanic & Atmospheric Association, 2017). Longline and purse seine fisheries in the Eastern Pacific have also reported that whitetip sharks have been commonly caught as bycatch in the region. Records from 1993 through 2009 found that this species was the second most abundant shark caught as bycatch by the tropical tuna purse seine fishery (Young & Carlson, 2020).

3.5.5.3 Critical Habitat

Critical habitat has not been designated for this species.

3.5.6 Scalloped Hammerhead Shark (Sphyrna lewini)

3.6.6.1 Status and Trends

In 2011, NMFS determined scalloped hammerhead sharks to be overfished based on a stock assessment of scalloped hammerhead sharks in U.S. waters (National Marine Fisheries Service, 2020b). As a result, NMFS issued moratoriums on take and possession in 2011. In 2014, NMFS listed the Central and Southwest Atlantic and Indo-West Pacific DPSs of the scalloped hammerhead population as threatened and the Eastern Pacific DPS as endangered under the ESA (79 FR 52576). These DPSs are expected to occur in the Action Area. The Central Pacific, Northwest Atlantic, and Gulf of Mexico DPSs of scalloped hammerhead sharks have not been listed under the ESA.

3.5.6.2 Distribution

The scalloped hammerhead shark is a coastal and semi-oceanic species distributed in temperate to tropical waters across the globe. Scalloped hammerhead sharks inhabit the surface to depths of 275 m (Duncan & Holland, 2006) and prefer coastal waters with temperatures between 23°C and 26°C (National Marine Fisheries Service, 2020b) with animals generally remaining close to shore during the day and moving into deeper waters to feed at night (Bester, 1999; National Marine Fisheries Service, 2020b). Daly-Engel et al. (2012) found that females remain close to coastal habitats, while males disperse across larger open ocean areas.

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

The Gulf of Mexico Super Heavy Landing Area slightly overlaps the range of scalloped hammerheads belonging to both the Central and Southwest Atlantic DPS. Scalloped hammerhead sharks have been observed throughout the Gulf of Mexico, particular in nearshore areas and estuarine habitats. Off the eastern coast of Florida, they have been recorded both inshore and offshore by recreational fisheries between 1981 through 1983 (National Marine Fisheries Service, 2020b). Pelagic sharks, which includes the scalloped hammerhead, were largest component of incidental catches in the area during this time (National Marine Fisheries Service, 2020b).

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

The Atlantic Heavy Landing Area overlaps the Central and Southwest Atlantic DPS of scalloped hammerhead sharks. In the western Atlantic, their range extends from New Jersey to areas south of the Action Area, including the Caribbean Sea (National Marine Fisheries Service, 2020b) with seasonal migration along the eastern United States. Juveniles rear in coastal nursery areas (Duncan & Holland, 2006) with all ages occurring in the Gulf Stream, but rarely inhabits the open ocean (Kohler & Turner, 2001).

Indian Ocean Starship Landing Area

The Indio-West Pacific DPS of scalloped hammerhead sharks overlaps the Indian Ocean Starship Landing Area. Populations of this species in the Indian Ocean in proximity to this portion of the Action Area includes waters off South Africa, Indonesia, and Australia. They have also been reported off the coast of Madagascar and are considered common in the area (National Marine Fisheries Service, 2020b). A study analyzing the distribution and movement of this species off the east coast of South Africa found that the largest number of scalloped hammerhead sharks caught and tagged in the region was during the summer, indicating that this species may be most abundant during the summertime (National Marine Fisheries Service, 2020b).

Southeast Pacific Starship Landing Area

The Eastern Pacific DPS occurs within the Southeast Pacific Starship Landing Area. Aggregations of scalloped hammerhead sharks have been particularly observed in waters off the Galapagos Islands. Ketchum, Hearn, Klimley, Espinoza, et al. (2014); Ketchum, Hearn, Klimley, Penaherrera, et al. (2014) found scalloped hammerheads formed daytime schools at specific locations in the Galapagos Islands, but dispersed at night, spending more time at the northern islands during part of the warm season (December–February) compared to the cool.

Northeast Pacific Starship Landing Area

The Eastern Pacific DPS occurs within the Northeast Pacific Starship Landing Area. Adult schools in the region are most common in offshore areas over seamounts and near islands such as the Revillagigedo Islands and within the Gulf of California (National Oceanic and Atmospheric Administration, 2014). Juvenile aggregations are most commonly observed in nearshore areas such as the coastal waters off Oaxaca, Mexico (National Oceanic and Atmospheric Administration, 2014). In the Gulf of California, is observed spending daytime hours in proximity to seamounts and islands and moving to offshore areas at night (National Oceanic and Atmospheric Administration, 2014).

3.5.6.3.Critical Habitat

Critical habitat has not been designated for this species.

3.1.6 Sea Turtles

General Background

Sea turtles are highly migratory, long-lived reptiles that occur throughout the open-ocean and coastal regions of the Action Area. Generally, sea turtles are distributed throughout tropical to subtropical latitudes (i.e., in warmer waters closer to the equator), with some species extending poleward into temperate seasonal foraging areas. In general, sea turtles spend most of their time at sea, with the notable exception of mature females returning to land, primarily beaches, to nest. The habitat preferred by sea turtles and their distribution at sea varies by species and life stage (i.e., hatchling, juvenile, adult).

3.6.1 Green Sea Turtle (Chelonia mydas)

3.6.1.1 Status and Trends

The green turtle (*Chelonia mydas*) was listed under the ESA on July 28, 1978 (43 FR 32800). Breeding populations of the green turtle in Florida and along the Pacific Coast of Mexico were listed as endangered; all other populations were listed as threatened. The major factors contributing to its status included human encroachment and associated activities on nesting beaches; commercial harvest of eggs, subadults, and adults; predation; lack of comprehensive and consistent protective regulations; and incidental take in fisheries.

In 2016, NMFS and USFWS reclassified the species into 11 DPS (see the NMFS and USFWS Final Rule published on April 6, 2016). The geographic areas that include these distinct population segments are: (1) North Atlantic Ocean (Threatened), (2) Mediterranean (Endangered), (3) South Atlantic (Threatened), (4) Southwest Indian Ocean (Threatened—Foreign), (5) North Indian Ocean (Threatened—Foreign), (6) East Indian–West Pacific Ocean (Threatened—Foreign), (7) Central West Pacific Ocean (Endangered), (8) Southwest Pacific (Threatened—Foreign), (9) Central South Pacific (Endangered), (10) Central North Pacific (Threatened), and (11) East Pacific Ocean (Threatened).

3.6.1.2 Distribution

The green sea turtle is found in tropical and subtropical coastal and open ocean waters, between 30° North and 30° South.

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

Only the North Atlantic DPS (which is listed as threatened) is within the Gulf of Mexico portion of the Action Area. It should be noted, however, that North Atlantic green sea turtle populations have minimal mixing (gene flow) with the South Atlantic regions and no mixing with the Mediterranean region, and juvenile turtles from the North Atlantic may occasionally use South Atlantic or Mediterranean foraging grounds (Seminoff et al., 2015).

Four regions within the North Atlantic DPS support nesting concentrations: Costa Rica (Tortuguero), Mexico (Campeche, Yucatán, and Quintana Roo), the United States (Florida), and Cuba. The highest concentration of nesting is in Tortuguero, and in Mexico, where nesting occurs primarily along the Yucatán Peninsula. Most green sea turtle nesting occurs along the Atlantic coast of eastern central Florida, with smaller concentrations along the Gulf Coast and Florida Keys. In Cuba, nesting primarily occurs on the extreme western tip of the country and on islands off the southern shore of Cuba. Nesting also occurs in the Bahamas, Belize, Cayman Islands, Dominican Republic, Haiti, Honduras, Jamaica, Nicaragua, Panama, Puerto Rico, Turks and Caicos Islands, and United States (North Carolina, South Carolina, Georgia, Texas, and Virginia).

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

Only the North Atlantic DPS (which was listed as threatened) is within this portion of the Action Area. As with green sea turtles within the Gulf of Mexico, members of the North Atlantic green sea turtle DPS have minimal mixing (gene flow) with the South Atlantic regions, and juvenile turtles from the North Atlantic may occasionally use South Atlantic or Mediterranean foraging grounds (Seminoff et al., 2015).

Because the distribution of the North Atlantic DPS covers both the Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location and the Atlantic Ocean Mexico Super Heavy Landing Area and Nominal Landing Location, see the distribution information above for relevant distributions of green sea turtles within this portion of the Action Area.

Indian Ocean Starship Landing Area

The Indian Ocean portion of the Action Area supports three DPS's of green sea turtles—the North Indian Ocean DPS, Southwest Indian Ocean DPS, and the East Indian-West Pacific DPS. These three DPS are listed as threatened-foreign. Within the Indian Ocean, nesting beaches are known to occur within the Seychelles Islands, French Island holdings (Comoros Islands, Esparces Islands, locations along the Indian Coast, Pakistani coast, locations on the Arabian Peninsula (Yemen, Oman, Saudi Arabia), and locations along the Malaysian coast and Indonesian outer islands (Kelley et al., 2022). Ameri et al. (2022) noted coastal development and erosion, bycatch, pollution, direct exploitations, vessel strikes in nearshore foraging and resting habitats, predation (on eggs and hatchlings), and climate change as primary threats for green sea turtles within the Action Area.

For open ocean movements, tagging of green sea turtles since the 1970s provides the most complete understanding of distributions within the Indian Ocean. Long-term tagging and recapture records maintained for green turtles in Oman, under the Ministry of Regional Municipalities and Environment/Nature Conservation, has provided information on green turtle movements (Mobaraki et al. 2019). Some turtles in the area migrate long distances from distant feeding grounds to nesting beaches, while others are quite sedentary. Tagging studies have revealed that some turtles nesting on Ras al Hadd and Masirah can be found as far away as Somalia, Ethiopia, Yemen, Saudi Arabia, and the upper Arabian Gulf, and Pakistan (Ross, 1987; Salm, 1991). No tagging has been carried out on feeding grounds (Al-Saady et al., 2005). A green turtle tagged in Oman was found in the Maldives (Al-Saady et al., 2005). Evidence from tag returns indicates that some green turtles in Tanzania are probably resident, and others are highly migratory moving to and from nesting and feeding grounds within the southwest Indian Ocean in Kenya, Seychelles, Comoros, Mayotte, Europa Island and South Africa (Muir, 2005). Tagged green turtles observed in eastern Australia have been located elsewhere in Australia (Northern Territory, Queensland, and New South Wales) and at other neighboring countries, including Papua New Guinea, Indonesia (Java and the Anu Islands), Vanuatu, Solomon Islands, New Caledonia, and Fiji (Seminoff et al., 2015), indicating that this DPS may not be associated with pelagic Indian Ocean environments.

Hawaii and NW Pacific Starship Landing Area

The Hawaii Starship Landing Area supports the Central North Pacific DPS (threatened) of green sea turtle. The green sea turtle is the most common sea turtle species in this portion of the Action Area, occurring in the coastal waters of the main Hawaiian Islands throughout the year and commonly migrating seasonally to the Northwestern Hawaiian Islands to reproduce (Balazs & Chaloupka, 2006; Lotufo et al., 2013; Seminoff et al., 2015). Green sea turtles are found in inshore waters around all of the main Hawaiian Islands and Nihoa Island, where reefs, their preferred habitats for feeding and resting, are most abundant. They are also common in an oceanic zone surrounding the Hawaiian Islands. This area is frequently inhabited by adults migrating to the Northwestern Hawaiian Islands to reproduce during the summer and by ocean-dwelling individuals that have yet to settle into coastal feeding grounds of the main Hawaiian

Islands (Lotufo et al., 2013). Farther offshore, green sea turtles occur in much lower numbers and densities (Seminoff et al., 2015).

Southeast Pacific Starship Landing Area

The Southeast Pacific Starship Landing Area supports the East Pacific DPS (threatened) and the Central South Pacific DPS (endangered) of the green sea turtle. The East Pacific DPS extends from the California/Oregon border southward along the Pacific coast of the Americas to central Chile. The two largest nesting aggregations are found in Michoacán, Mexico and in the Galapagos Islands, Ecuador. Secondary nesting areas are found throughout the Pacific Coast of Costa Rica and Clarion and Socorro Islands in the Revillagigedos Archipelago, Mexico. Low level nesting occurs in Colombia, Ecuador, Guatemala, and Peru (Seminoff et al., 2015).

The Central South Pacific DPS extends north from northern New Zealand to Fiji, Tuvalu, and Kiribati and east to include French Polynesia. Green turtles departing nesting grounds in this DPS travel throughout the South Pacific Ocean. Post-nesting green turtles tagged in the early 1990s from Rose Atoll returned to foraging grounds in Fiji and French Polynesia (Craig et al., 2004). Green turtle population trends in the Central South Pacific DPS are poorly understood, with not even a single nesting site having five contiguous years of standardized monitoring that span entire nesting seasons and lacking information on foraging and migration corridors (Seminoff et al., 2015).

Northeast Pacific Starship Landing Area

There are very few reports of turtles from southern Pacific Ocean populations occurring in the northern Pacific Ocean (Limpus et al., 2009; Seminoff et al., 2015). This portion of the Action Area is not anticipated to support green sea turtles, as the Northeast Pacific Starship Landing Area is beyond the northern limits of both the East Pacific DPS and the Central North Pacific DPS.

3.6.1.3 Critical Habitat

On July 23, 2023, NMFS and USFWS proposed to designate new areas of critical habitat and modify existing critical habitat for threatened and endangered distinct population segments of the green sea turtle, in areas under U.S. jurisdiction (88 FR 46572). NMFS proposed to designate marine critical habitat in nearshore waters (from the mean high-water line to 20 meters depth) off the coasts of Florida, Texas, North Carolina, Puerto Rico, U.S. Virgin Islands, California, Hawai'i, Guam, Commonwealth of Northern Mariana Islands, American Samoa, and the Pacific Remote Island Areas. It also includes nearshore waters (from the mean high-water line to 10 kilometers offshore) between San Diego Bay and Mexico. The proposed rule includes the volume of water to 20 meters depth to protect access to nesting beaches, migratory corridors and important feeding and resting areas. USFWS's proposed critical habitat includes land where green sea turtles bask, nest, incubate, hatch and travel to the sea. Proposed critical habitat overlaps with the Gulf of Mexico portion of the Action Area (Figure 7) and the Atlantic Ocean portion of the Action Area (Figure 8).

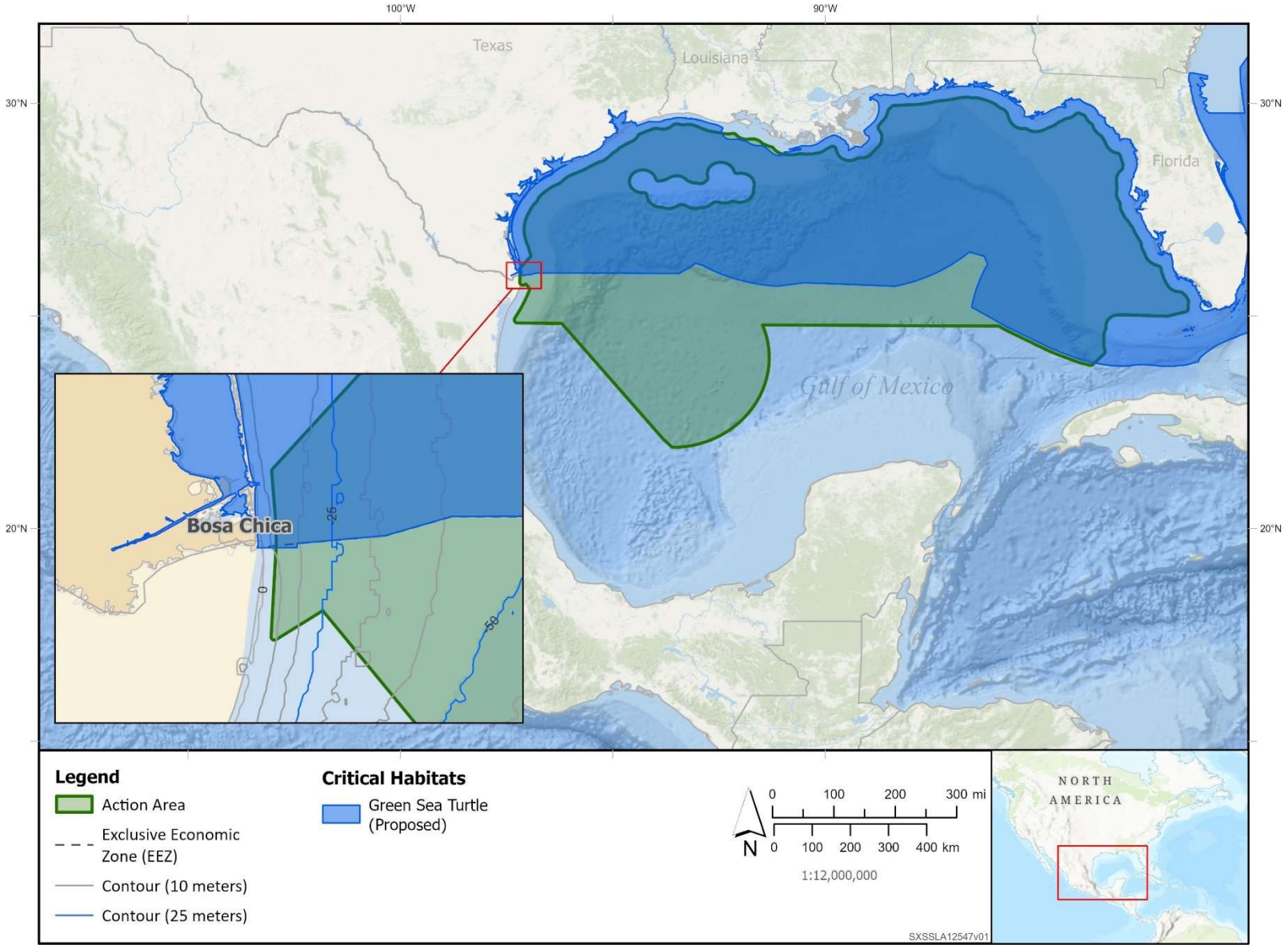


Figure 3: Proposed Green Sea Turtle Critical Habitat within the Gulf of Mexico

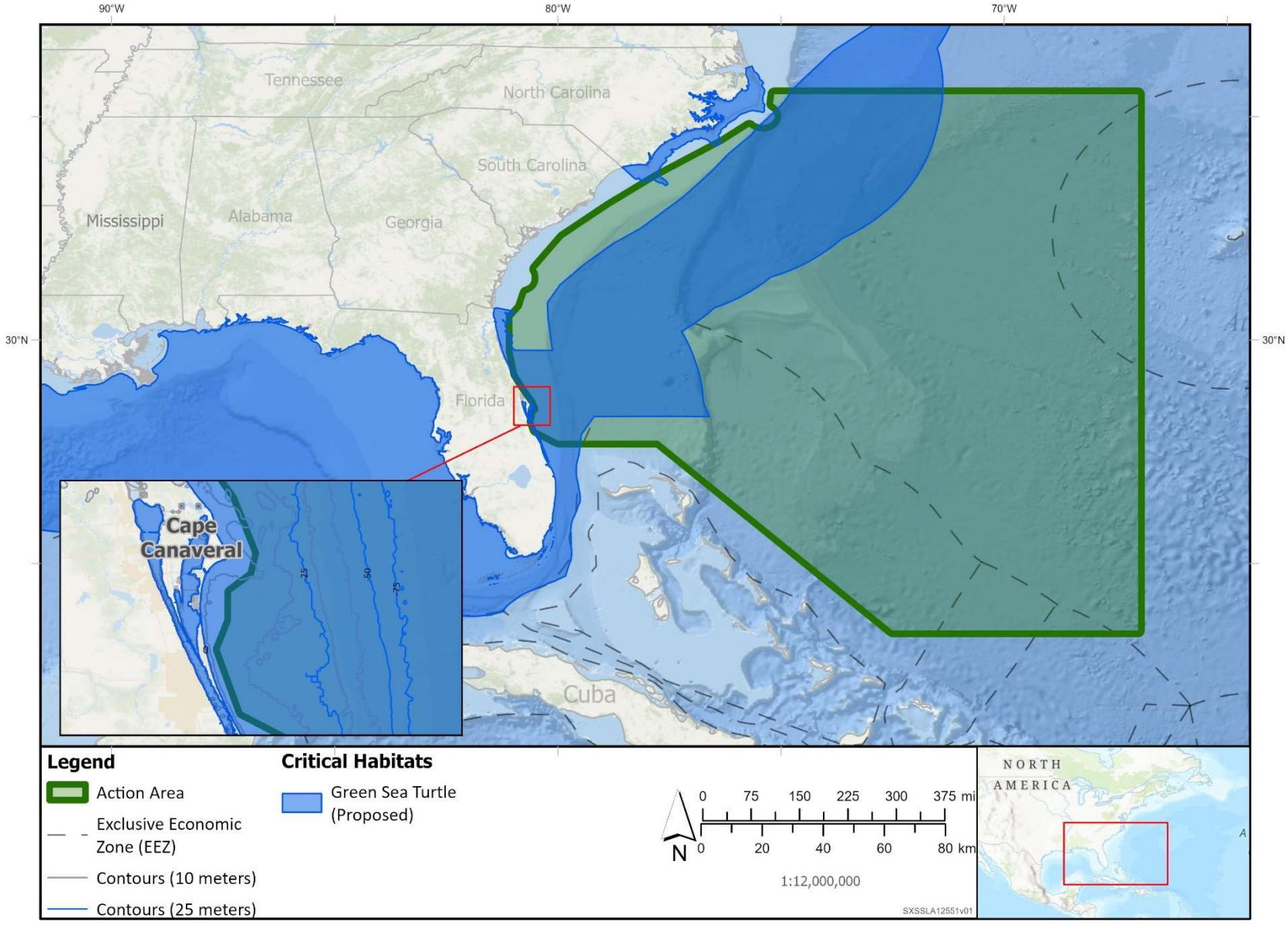


Figure 4: Proposed Green Sea Turtle Critical Habitat within the Atlantic Ocean

3.6.2 Loggerhead Turtle (Caretta caretta)—North Indian Ocean DPS, Southwest Indian Ocean DPS, Southeast Indo-Pacific DPS, South Pacific Ocean DPS, North Pacific Ocean DPS

3.6.2.1 Status and Trends

In 2009, a status review conducted for the loggerhead (the first turtle species subjected to a complete stock analysis) identified nine distinct population segments within the global population (Conant et al., 2009).

In a September 2011 rulemaking, the NMFS and USFWS listed five of these distinct population segments as endangered and kept four as threatened under the ESA, effective as of October 24, 2011 (76 Federal Register 58868)—(1) North Pacific Ocean (endangered), (2) South Pacific Ocean (endangered-foreign), (3) North Indian Ocean (endangered-foreign), (4) Northeast Atlantic Ocean (endangered), (5) Mediterranean Sea (threatened-foreign), (6) Southeast Indo-Pacific Ocean, Southwest Indian Ocean (threatened-foreign),(7) Northwest Atlantic Ocean (threatened), and (8) South Atlantic Ocean (threatened-foreign). Global distributions of the loggerhead have been divided into 10 regional management units (RMU).

3.6.2.2 Distribution

Loggerhead turtles are found worldwide mainly in subtropical and temperate regions of the Atlantic, Pacific, and Indian Oceans, and in the Mediterranean Sea (Conant et al. 2009). Based on satellite telemetry loggerheads migrate along a north-south trans-equatorial axis in the Indian Ocean. Loggerheads follow the currents of their respective north and south oceanic gyres between feeding, breeding, and developmental habitats. Loggerhead turtles occur in habitats ranging from coastal estuaries to waters far beyond the continental shelf (Chapman & Seminoff, 2016; Dodd, 1988). Loggerheads typically nest on beaches close to reef formations and in close proximity to warm currents (Dodd, 1988), preferring beaches facing the ocean or along narrow bays (Reece et al., 2013) (79 Federal Register 39856). Nesting generally occurs from April through September in the northern hemisphere, with a peak in June and July (Dodd, 1988; Weishampel et al., 2006; Williams-Walls et al., 1983). The largest nesting aggregation in the Pacific Ocean occurs in southern Japan, where fewer than 1,000 females breed annually (Kamezaki et al., 2003). Despite historic long-term declines from Japan nesting beaches (50 to 90 percent), nesting populations in Japan have gradually increased since 2000 (National Marine Fisheries Service & U.S. Fish and Wildlife Service, 2007).

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

The Northwest Atlantic Ocean DPS is the only one that occurs entirely within this portion of the Action Area; however, loggerheads from other DPS may rarely occur. For example, mixing likely occurs, rarely, with South Atlantic loggerheads enabling a limited amount of gene flow between these two distinct population segments (National Marine Fisheries Service, 2010a; Tucker et al., 2014). Bovery and Wyneken (2015) analyzed seasonal variation in sea turtle density and abundance off southeastern Florida and found that loggerheads were the most frequently sighted species, with increased sightings in spring. Turtles were often found in coastal waters that were west of the Florida Current (approximately 20 km offshore).

Oil spills can affect sea turtles at all life stages (NOAA 2016), as demonstrated by the Deepwater Horizon oil spill in the Gulf of Mexico, which contaminated vital foraging, migratory, and breeding habitats at the surface, in the water column, and on the ocean bottom (McDonald et al. 2017; Mitchelmore et al. 2017; Wallace et al. 2017). The Natural Resources Damage Assessment conducted following the spill estimated that approximately 2,100 to 10,000 small juveniles and 2,200 to 3,600 large juvenile and adult turtles were

killed by the spill; an additional 34,000 loggerhead hatchlings were estimated to have been killed by oil spill response activities (Deepwater Horizon Natural Resource Damage Assessment Trustees 2016).

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

The Northwest Atlantic Ocean DPS is the only one that occurs entirely within this portion of the Action Area; however, loggerheads from other DPS may rarely occur. For example, mixing likely occurs, rarely, with South Atlantic loggerheads enabling a limited amount of gene flow between these two distinct population segments (National Marine Fisheries Service, 2010a; Tucker et al., 2014). Within the Mid-Atlantic Bight, some adults and large juveniles forage on benthic prey in the neritic habitats from New York to Virginia in the summer, and within the shelf waters from Florida to North Carolina in the winter (National Marine Fisheries Service & U.S. Fish and Wildlife Service, 2023).

Abundances in these waters were highest in the spring relative to summer and fall, with no presence in winter (Burt et al., 2014). Core Sound and Pamlico Sound, North Carolina, on the border between the Northeast and Southeast U.S. Continental Shelf Large Marine Ecosystems, represent important developmental habitat for juvenile loggerheads (Epperly, Braun, & Chester, 1995). Although these habitats are also used by greens and Kemp's ridleys, loggerheads are the most abundant sea turtle species within the summer developmental habitats of North Carolina (Bureau of Ocean Energy Management, 2021; Epperly, Braun, & Chester, 1995; Epperly, Braun, Chester, et al., 1995; Epperly, Braun, & Veishlow, 1995). In a sampling study from 2004 to 2007, juveniles were the most abundant age group among loggerheads found in the Charleston, South Carolina, shipping channel between May and August (Arendt et al., 2012). Immature loggerhead sea turtles may occupy coastal feeding grounds for 20 years before their first reproductive migration (Bjorndal et al., 2001; Putman et al., 2015).

Subadult and adult loggerhead turtles tend to inhabit deeper offshore feeding areas along the western Atlantic coast, from mid-Florida to New Jersey (Hopkins-Murphy et al., 2003; Roberts et al., 2005). As late juveniles and adults, loggerhead sea turtles most often occur on the continental shelf and along the shelf break of the U.S. Atlantic and Gulf coasts, as well as in coastal estuaries and bays (Putman et al., 2015). Hawkes et al. (2006) found that adult females forage predominantly in shallow coastal waters along the U.S. Atlantic coast less than 100 m deep, likely exploiting bottom-dwelling prey.

Indian Ocean Starship Landing Area

Within the Indian Ocean Starship Landing Area, three DPS are expected to occur—Southwest Indian Ocean DPS, Southeast Indo-Pacific DPS, and the North Indian Ocean DPS. All three DPS are listed as threatened-foreign. Based on satellite telemetry, loggerheads migrate along a north-south trans-equatorial axis in the Indian Ocean. Loggerheads follow the currents of their respective north and south oceanic gyres between feeding, breeding, and developmental habitats (Conant et al., 2009). Loggerheads present in the Indian Ocean nest along beaches of Oman (Masirah Island), of the South African coast, Mozambique, Madagascar, as well western Australia beaches (from Steep Point in the south to the Muiron Islands in the north) (Lohe and Possardt, 2021). The primary threat to loggerhead sea turtles in the Indian Ocean is commercial fisheries bycatch, followed by impacts associated with climate change, coastal development, predation, and poaching of eggs from nests (National Marine Fisheries Service & U.S. Fish and Wildlife Service, 2023).

The Northwest Indian Ocean RMU surrounds the islands of Masirah (Oman) and Socotra (Yemen), where several tens of thousands of females nest. The Southeast Indian Ocean RMU, around Western Australia, which has about 2,500 nesting females annually. The Southwest Indian Ocean RMU supports rookeries are shared between South Africa and Mozambique, with fewer than 1,000 annual nesters. The Northeast

Indian Ocean RMU, in the Bay of Bengal, is ranked as the world's smallest rookery, with likely fewer than 50 annual nesters.

Hawaii and NW Pacific Starship Landing Area

Loggerhead sea turtles (North Pacific Ocean DPS) that occur within the Hawaii Starship Landing Area are migrating through from foraging grounds in the eastern north Pacific from nesting grounds in the western Pacific. More information is included under the discussion for the Northeast Pacific Starship Landing Area (below).

Southeast Pacific Starship Landing Area

Nesting occurs primarily in eastern Australia and New Caledonia, primarily by members of the South Pacific Ocean DPS. Juveniles and sub-adults migrate to forage off South America, and are known to occur in pelagic waters as far south as the coast of Chile, and are concentrated off of southern Peru and northern Chile (Donoso and Dutton 2010; Mangel et al. 2011). Data on size and temporal and spatial distribution of post-hatchlings in the South Pacific suggest that these loggerheads are associated with the South Pacific gyre and that the east Australian current and Tasman Front play a role in their movement across the South Pacific Ocean (Boyle et al. 2009).

Seven rookeries in eastern Australia serve as long-term index sites for the entire DPS: Woongarra Coast and Heron Island have annual census information from the late 1960s to 2014; Wreck Island, Lady Musgrave Island, Northwest Island, and Wreck Rock beaches have census data from 1970s to 2014; and Tyron Island has census counts from 1977 and 1996 (Limpus et al. 2013). Mon Repos on the Woongarra coast, near Bundaberg, is currently the most significant nesting beach for the DPS (National Oceanic and Atmospheric Administration, 2024b).

Northeast Pacific Starship Landing Area

Most of the loggerheads observed in the eastern North Pacific Ocean are believed to come from beaches in Japan where the nesting season is late May to August. Aschettino et al. (2015) found that most loggerheads that use the Southern California Bight are more genetically similar, using stable isotope analysis, to loggerheads in the Central North Pacific, as opposed to loggerheads that nest in Baja. Migratory routes can be coastal or can involve crossing deep ocean waters (Schroeder et al., 2003). The species can be found hundreds of kilometers out to sea, as well as in inshore areas, such as bays, lagoons, salt marshes, creeks, ship channels, and the mouths of large rivers. Coral reefs, rocky areas, and shipwrecks are often used as feeding areas. The nearshore zone provides crucial foraging habitat, as well as habitat during nesting season and overwintering habitat.

Pacific Ocean loggerheads appear to use the entire North Pacific Ocean during development. There is substantial evidence that the North Pacific Ocean stock makes two transoceanic crossings. The first crossing (west to east) is made immediately after they hatch from the nesting beach in Japan, while the second (east to west) is made when they reach either the late juvenile or adult life stage at the foraging grounds in Mexico. Offshore, juvenile loggerheads forage in or migrate through the North Pacific Subtropical Gyre as they move between North American developmental habitats and nesting beaches in Japan. The highest densities of loggerheads can be found just north of Hawaii in the North Pacific Transition Zone (Polovina et al., 2000).

3.6.2.3 Critical Habitat

Designated critical habitat for loggerhead sea turtle is found with within Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location and within the Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location. To characterize different use patterns and concentrations both seasonally and

geographically, NMFS named five different habitat types that comprise the critical habitat designation, which include (1) nearshore reproductive habitat (portions of nearshore waters adjacent to nesting beaches used by females and hatchlings to egress to open-water environments), (2) winter habitats (warm waters south of Cape Hatteras where juveniles and adults tend to concentrate during winter months), (3) breeding habitats (areas with high concentrations of both male and female adults during the breeding season in proximity to Florida migratory corridor and nesting grounds), (4) constricted migratory habitat (migratory corridors restricted in width), and (5) Sargassum habitat (juvenile loggerhead developmental habitats where Sargassum supports adequate prey abundance and cover) (79 FR 39856). Physical and biological features that support the five habitat types summarized above for loggerhead sea turtle conservation include oceanic conditions that would concentrate certain life stage loggerheads together at different locations and in different seasons.

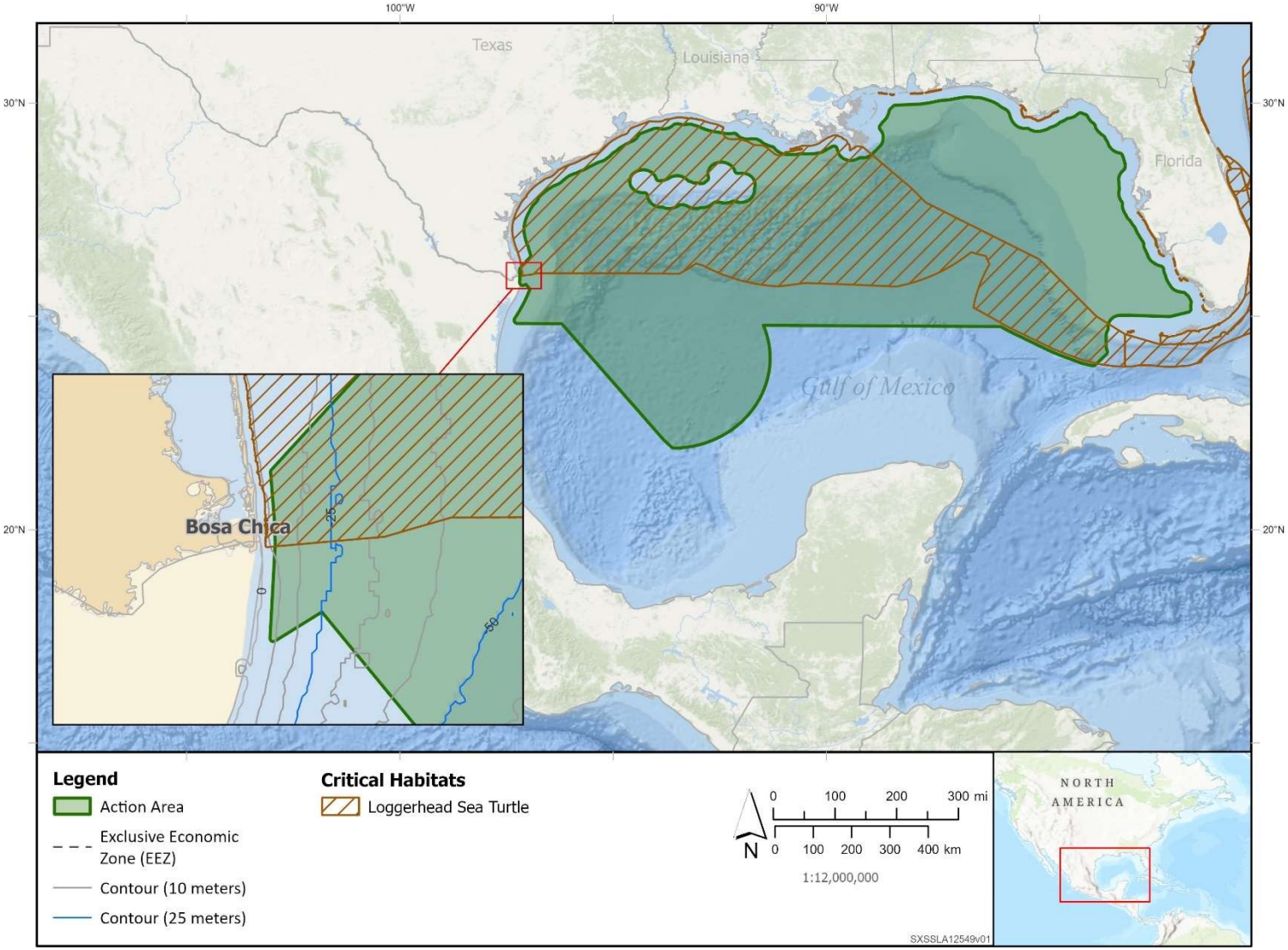


Figure 5: Critical Habitat for the Loggerhead Sea Turtle within the Gulf of Mexico Portion of the Action Area

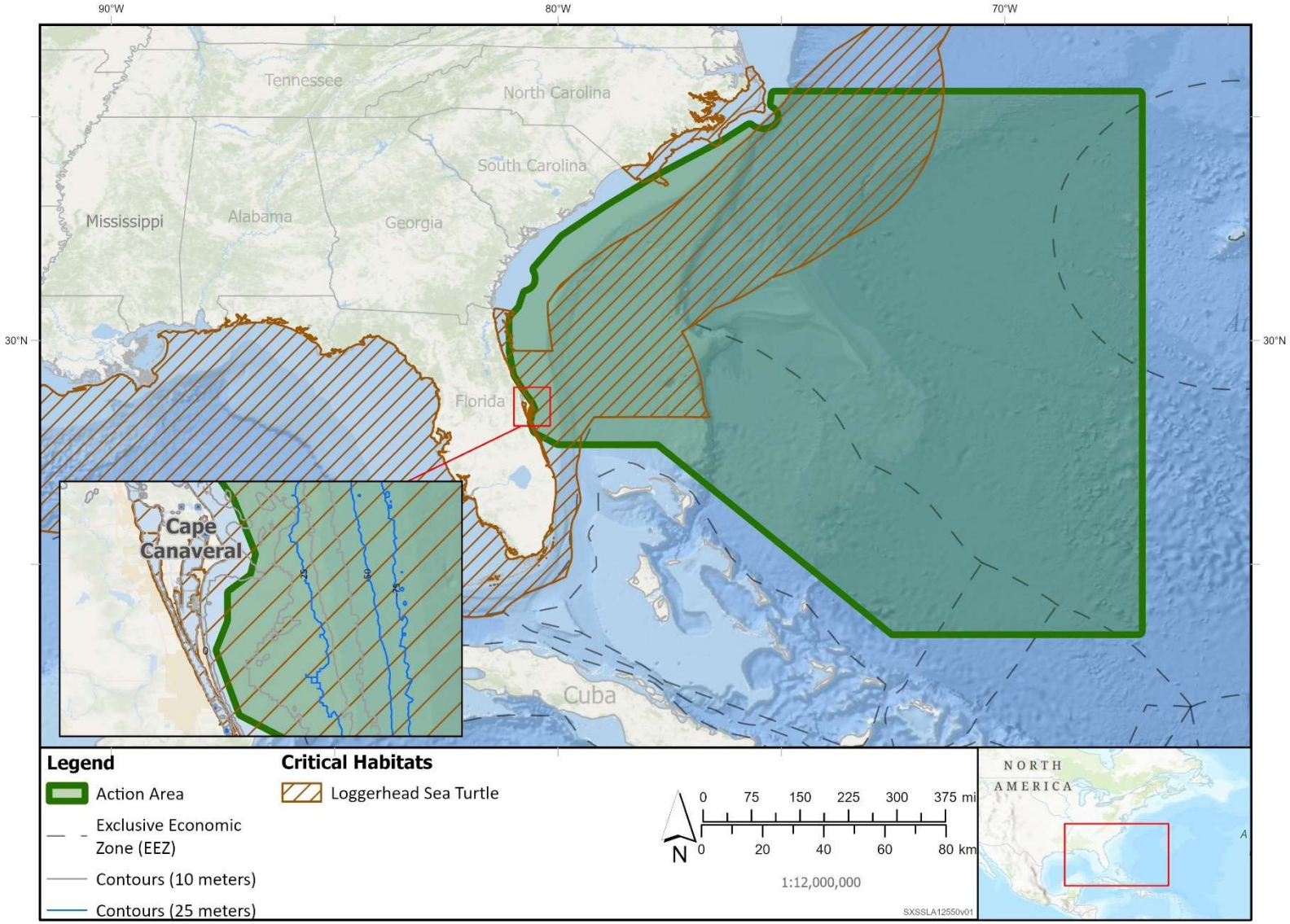


Figure 6: Critical Habitat for the Loggerhead Sea Turtle within the Atlantic Ocean Portion of the Action Area

3.6.3 Olive Ridley Sea Turtle (Lepidochelys olivacea)

3.6.3.1 Status and Trends

Olive ridley sea turtles that nest along the Pacific coast of Mexico are listed as endangered under the ESA in 1978, while all other populations are listed under the ESA as threatened (43 FR 32800). Based on genetic data, the worldwide olive ridley population is composed of four main lineages: east India, Indo-Western Pacific, Atlantic, and eastern Pacific Ocean (National Marine Fisheries Service & U.S. Fish and Wildlife Service, 2014).

3.6.3.2 Distribution

The olive ridley has a circumtropical distribution, occurring in the Atlantic, Pacific, and Indian Oceans (National Marine Fisheries Service & U.S. Fish and Wildlife Service, 2014). In the eastern Pacific, olive ridleys typically occur in tropical and subtropical waters, as far south as Peru and as far north as California, but occasionally have been documented as far north as Alaska. Key arribada beaches include La Flor in Nicaragua, Nancite and Ostinal in Costa Rica, La Marinera and Isla Cañas in Panama, Gahirmatha, Rushikulya, and Devi River in India, and Eilanti in Suriname. Arribada is the common term for large concentrations of nesting activity.

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

Olive ridley sea turtles do not occur in this portion of the Action Area.

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

Olive ridley sea turtles do not occur in this portion of the Action Area.

Indian Ocean Starship Landing Area

Nesting sites for olive ridley turtles are widely dispersed throughout the Indian Ocean. Nesting occurs along the entire coast of the Indian subcontinent from Pakistan in the Arabian Sea to Bangladesh in the Bay of Bengal. Other nesting locations may include Lakshadweep, Andaman and Nicobar Islands (Frazier, 2001), Oman (Rees et al., 2012), and Maldives Islands.

Hawaii and NW Pacific Starship Landing Area

Rare instances of nesting occur in the Hawaiian Islands, with the first olive ridley nest documented in 1985 at Paia, Maui. A second nest was recorded in Hilo, Hawaii, in 2002, and a third olive ridley nest was recorded at Marine Corps Base Hawaii in Kaneohe Bay in 2009 (National Marine Fisheries Service, 2019). Therefore, it is possible for olive ridleys to occur in the nearshore and open ocean portions of the Hawaii Portion of the Action Area.

Southeast Pacific Starship Landing Area

In the eastern Pacific, olive ridleys typically occur in tropical and subtropical waters, as far south as Peru and as far north as California, but occasionally have been documented as far north as Alaska (National Marine Fisheries Service & U.S. Fish and Wildlife Service, 2014).

Northeast Pacific Starship Landing Area

The information presented here to describe olive ridley density is the same as presented above for the Southeast Pacific Starship Landing Area. Specifically, for locations off of Baja, Lopez-Castro and Rocha-Olivares (2005) determined that the southern end of the Baja Peninsula represents the northernmost reproductive area for olive ridley sea turtles.

3.6.3.3 Critical Habitat

Critical habitat has not been designated for the olive ridley turtle.

3.6.4 Kemp's Ridley Sea Turtle

3.6.4.1 Status and Trends

The Kemp's ridley sea turtle is listed as a single population and is classified as endangered under the ESA (35 FR 18319). The most recent status review was released in 2015 by the USFWS and NMFS (National Marine Fisheries Service & U.S. Fish and Wildlife Service, 2015). There is no critical habitat currently designated for this species. In 2010, the USFWS and NMFS received a petition to designate critical habitat on nesting beaches in Texas and along Gulf Coast states. The petition is still under consideration, and no proposed rule on the establishment of critical habitat has been released by either agency.

3.6.4.2 Distribution

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

Kemp's ridley turtle nesting is essentially limited to the beaches of the western Gulf of Mexico, primarily in Tamaulipas, Mexico. Nesting also occurs in Veracruz, and a few historical records exist for Campeche, Mexico. Since 1978, the U.S. National Park Service, in partnership with USFWS, NMFS, Texas Parks and Wildlife Department, and the Instituto Nacional de Pesca (a Mexican federal agency), has led an effort to increase Kemp's ridley turtle nesting at Padre Island National Seashore, south Texas, to form a secondary nesting colony to safeguard against extinction (National Marine Fisheries Service & U.S. Fish and Wildlife Service, 2011).

Habitats frequently used by Kemp's ridley sea turtles in U.S. waters are warm-temperate to subtropical sounds, bays, estuaries, tidal passes, shipping channels, and beachfront waters, where their preferred food, the blue crab, is abundant (Foley et al., 2019; Shaver et al., 2020). The general migration pattern of females begins with travel through relatively shallow migratory corridors toward the nesting beach in the late winter in order to arrive at the nesting beach by early spring. Males and females can loop along the U.S. continental shelf large marine ecosystem in the spring, and back down the southeast U.S. continental shelf in the fall. From nesting beaches in the Gulf of Mexico, the migratory corridor traverses neritic areas of the Mexico and U.S. Gulf coasts with a mean water depth of 26 m approximately 20 kilometers (km) from the coast, occurring in late May through August with a peak in June (Shaver et al., 2020; Shaver et al., 2017). Kemp's ridley turtles that headed north and east traveled as far as the waters off southwest Florida; however, waters off the upper Texas coast through Mississippi, especially off Louisiana, appear to be a "hotspot" as turtles returned to the area to forage over multiple years (National Park Service, 2023; Williams, 2023).

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

Occasional nesting has been reported from Florida, Alabama, Georgia, South Carolina, North Carolina, and Virginia (in 2012 and 2014) (National Marine Fisheries Service & U.S. Fish and Wildlife Service, 2015) with the furthest north nesting occurring in New York where 96 sea turtles were observed on Rockaway Peninsula in Queens, New York (Phorn, 2018). Shaver et al. (2016) has noted that the known nesting range for the Kemp's ridley turtle has expanded since the late 1980s, possibly due to "head start" releases in Florida. Head starting is an accepted conservation intervention involving captive rearing and release of sea turtles, but the range expansion may also be associated with increased nesting numbers (Shaver et al., 2016).

Evidence suggests that post-hatchling and small juvenile Kemp's ridley sea turtles, similar to loggerhead and green sea turtles of the same region, forage and develop in floating *Sargassum* habitats of the North Atlantic Ocean. Juveniles migrate to habitats along the U.S. Atlantic continental shelf from Florida to New England (Morreale & Standora, 1998; Peña, 2006) at around 2 years of age. Migrating juvenile Kemp's ridleys travel along coastal corridors generally shallower than 50 m in bottom depth (National Marine Fisheries Service & U.S. Fish and Wildlife Service, 2011). A study funded by the U.S Navy conducted in Chesapeake Bay indicated that juvenile Kemp's ridley sea turtles utilize the lower to middle Chesapeake Bay in the spring and summer, similar to loggerheads that were also tagged for this study. Kemp's ridley sea turtles preferred to spend more time and forage in shallower waters closer to shore, such as small inlets, embayments, and flats close to the shore in the main stem of the Chesapeake Bay (Barco et al., 2017; Barco et al., 2018; DiMatteo et al., 2022; Naval Facilities Engineering Command Atlantic, 2020). Suitable developmental habitats are seagrass beds and mud bottoms in waters of less than 10 m bottom depth and with sea surface temperatures between 72 degrees Fahrenheit (°F) and 90°F (22 degrees Celsius [°C] and 32°C) (Coyne et al., 2000).

3.6.4.3 Critical Habitat

Critical habitat has not been designated for the Kemp's ridley turtle.

3.6.5 Hawksbill Sea Turtle (Eretmochelys imbricata)

3.6.5.1 Status and Trends

The hawksbill sea turtle is listed as endangered under the ESA in 1978 (35 FR 8491). While the current listing as a single global population remains valid, data may support separating populations at least by ocean basin under the distinct population segment policy (National Marine Fisheries Service & U.S. Fish and Wildlife Service, 2013a; State of the World's Sea Turtles, 2022).

With worldwide numbers likely below 25,000 females nesting annually (Mortimer and Donnelly, 2008), hawksbill turtles are critically endangered, and their populations are declining throughout their range (Avens et al., 2021; Mortimer & Donnelly, 2008).

3.6.5.2 Distribution

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

The hawksbill is the most tropical of the world's sea turtles, with its range in western North Atlantic also extending into subtropical areas of the Gulf of Mexico and Atlantic coasts (Avens et al., 2021). While hawksbills are known to occasionally migrate long distances in the open ocean, they are primarily found in coastal habitats and use nearshore areas more exclusively than other sea turtles.

Hatchlings in the Action Area are believed to occupy open-ocean waters, associating themselves with surface algal mats in the Atlantic Ocean (Parker, 1995; Witherington & Hirama, 2006; Witzell, 1983). Juveniles leave the open-ocean habitat after 1 to 3 years and settle in coastal foraging areas, typically coral reefs but occasionally seagrass beds, algal beds, mangrove bays, and creeks (Avens et al., 2021). Hawksbill distribution in the mainland United States is primarily through stranding records of individual hawksbills washing ashore. From these, hawksbill have regularly been observed along the coasts of Texas and Florida and to a lesser extent along other Gulf of Mexico and Atlantic states (Avens et al., 2021; Gorham et al., 2014). In Florida, hawksbills regularly occur in the nearshore waters off the southeastern coast, in the Florida Keys (including the Marquesas and Dry Tortugas). Juveniles hawksbills have been observed along the jetties near Port Aransas, Texas, and within the coral reefs at the Flower Garden Banks National Marine Sanctuary in the western Gulf of Mexico (Avens et al., 2021).

In the Caribbean Sea and Gulf of Mexico Large Marine Ecosystems, the principal nesting season is from June to November (Hillis, 1990), with only rare nesting activity in Florida, which is restricted to Volusia, Martin, Palm Beach, Broward, Miami-Dade, and Monroe Counties (Avens et al., 2021; Meylan et al., 2006). Throughout their range, hawksbill turtles typically nest in low densities; aggregations of nesting activity that usually include approximately 20 nests, but can exceed a few hundred nests in some locations (National Marine Fisheries Service & U.S. Fish and Wildlife Service, 2013a). These locations with up to 100 nests include Mona Island, Puerto Rico, and Buck Island Reef off St. Croix.

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

The population and distribution of hawksbill sea turtles within this portion of the Action Area is the same as for the Gulf of Mexico. Please see the life history description described above (Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location).

Indian Ocean Starship Landing Area

Nesting occurs along the entire coast of the Indian subcontinent from Pakistan in the Arabian Sea to Bangladesh in the Bay of Bengal, as well as Chagos Islands and the Maldives. Australia hosts the largest hawksbill turtle populations in the world, with an estimated 8,000–9,000 females nesting annually (Limpus, 2009; Miller et al., 1998) and is one of the last remaining hotspots for this critically endangered turtle species (Limpus, 2009).

Hawaii and NW Pacific Starship Landing Area

Hatchlings in the north Pacific may show different habitat and range preferences than hawksbill hatchlings in other regions, where the general progression is hatchling preference in open ocean environments and later juvenile-phase movements to coastal habitats. Van Houtan et al. (2016) suggest that hatchlings within this portion of the Action Area may move to coastal habitats and nearshore foraging grounds more quickly. Within the Hawaii Starship Landing Area, nesting occurs only in the Hawaiian Islands, with known nesting activities only at Hawaii, Maui, and Molokai Islands (Brunson et al., 2022).

Gaos et al. (2021) analyzed 30 years of nesting data within the Hawaiian Islands (between 1998 and 2018) and determined that nesting trends had historic decreases though 2006, with slight annual increases occurring for the remainder of the monitoring period. Van Houtan et al. (2016) also noted increases around the same time as observed by Gaos et al. (2021).

Southeast Pacific Starship Landing Area

Hawksbills in the eastern Pacific Ocean are probably the most endangered sea turtle population in the world (Gaos & Yañez, 2008). A lack of nesting beach surveys for hawksbill sea turtles in the Pacific Ocean and the poorly understood nature of this species' nesting have made it difficult for scientists to assess the population status of hawksbills in the Pacific (Gaos & Yañez, 2008; Seminoff et al., 2003). The largest of these regional populations is in the South Pacific Ocean, where 6,000–8,000 hawksbills nest off the Great Barrier Reef (Limpus, 1992).

Northeast Pacific Starship Landing Area

The population and distribution of hawksbill sea turtles within this portion of the Action Area is the same as for the Southeast Pacific Starship Landing Area. Please see the life history description described above (Southeast Pacific Starship Landing Area).

3.6.5.3 Critical Habitat

Critical habitat has been designated for the hawksbill turtle; however, there is no critical habitat designated in the Action Area.

3.6.6 Leatherback Sea Turtle (Dermochelys coriacea)

3.6.6.1 Status and Trends

The leatherback sea turtle is listed as a single population and is classified as endangered under the ESA (35 FR 8491). Although USFWS and NMFS believe the current listing is valid, preliminary information indicates an analysis and review of the species should be conducted under the DPS policy (National Marine Fisheries Service & U.S. Fish and Wildlife Service, 2013b). In early 2018, NMFS and the USFWS initiated a status review for the globally listed endangered leatherback sea turtles, to determine if DPS existed and if so, given their status, to consider whether the listing (currently "endangered") should be changed for each DPS. The status review was completed in 2020 (National Marine Fisheries Service & U.S. Fish and Wildlife Service, 2020). While seven populations of leatherbacks were found globally distinct due to their genetic discontinuity, spatial differences (i.e., marked separation of the seven populations at nesting beaches), and separation due to physical factors, including land masses, oceanographic features and currents, all populations were found to be at risk of extinction. This is as a result of reduced nesting female abundance, declining nest trends, and numerous, severe threats (National Marine Fisheries Service, 2020). Therefore, the leatherback sea turtle remains globally endangered under the ESA.

3.6.6.2 Distribution

The leatherback sea turtle is distributed worldwide in tropical and temperate waters of the Atlantic, Pacific, and Indian Oceans.

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

Females remain in the general vicinity (within 100 km) of nesting beaches between nestings, with total residence in the nesting and inter-nesting habitat lasting up to four months (National Marine Fisheries Service & U.S. Fish and Wildlife Service, 2020). Horrocks et al. (2016) tagged over 3,100 female leatherbacks in the Caribbean Sea and found that females traveled an average of 160 km between nesting events within the same season. Migrations between nesting seasons were typically to the north towards more temperate latitudes, which support high densities of jellyfish prey in the summer.

In the Atlantic Ocean, equatorial waters appear to be a barrier between breeding populations. In the northwestern Atlantic Ocean, post-nesting female migrations appear to be restricted to north of the equator, but the migration routes vary (National Marine Fisheries Service & U.S. Fish and Wildlife Service, 2020). Leatherbacks made round-trip migrations from where they started through the North Atlantic Ocean heading northwest to fertile foraging areas off the Gulf of Maine, Canada, and Gulf of Mexico; others crossed the ocean to areas off Western Europe and Africa, while others spent time between northern and equatorial waters. These data support earlier studies that found adults and subadults captured in waters off Nova Scotia stayed in waters north of the Equator (M. C. James et al., 2005; M. C. James et al., 2005; James et al., 2006).

Late juvenile and adult leatherback sea turtles are known to range from mid-ocean to the continental shelf and nearshore waters (Barco & Lockhart, 2015; Grant & Ferrell, 1993; Schroeder & Thompson, 1987; Shoop & Kenney, 1992). Although leatherbacks were observed annually in Chesapeake Bay, they were not common and unevenly distributed. Juvenile and adult foraging habitats include both coastal and offshore feeding areas in temperate waters and offshore feeding areas in tropical waters (Dodge et al., 2014). Dodge et al. (2014) tagged adults and subadult leatherback sea turtles off the coast of Massachusetts and found that the turtles showed a strong preference for the Northeast U.S. Continental Shelf waters during the summer, with the concentrated movements off Virginia and North Carolina. Additionally, turtles were recorded occurring near the mouth of the Chesapeake Bay for multiple days during the summer, ranging

from 5 to 15 days. Leatherback sea turtles may prefer a temperate neritic habitat during the summer, due to the availability of their gelatinous pretty sources (e.g., jellyfish) in the summer (Dodge et al., 2014). Leatherbacks have been shown to travel shorter distances at slower rates and increased diving rates in areas of high prey abundance, which is related to seasonal availability of prey (Wallace et al., 2015). Leatherback sea turtles mate in waters adjacent to nesting beaches and along migratory corridors (Cummings et al., 2016; Figgener et al., 2016).

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

Leatherbacks are known to occur in the Gulf of Mexico, but in lower numbers than the Atlantic (Aleksa et al., 2018; Nordstrom et al., 2020). Leatherbacks are considered rare visitors to the Texas coast (Sasso et al., 2021). Aleksa et al. (2018) found that the Gulf of Mexico is an important destination for leatherbacks from the Caribbean coast of Central America with seasonal movements between high-use habitats within the Gulf of Mexico, and that leatherbacks utilize high-use habitats in both the Atlantic and the Gulf of Mexico from the same populations.

Hawaii and NW Pacific Starship Landing Area

Leatherback sea turtles are regularly sighted by fishermen in offshore waters surrounding the Hawaiian Islands, generally beyond the 3,800 ft. depth contour, and especially at the southeastern end of the island chain and off the northern coast of Oahu. Leatherbacks encountered in these waters, including those caught accidentally in fishing operations, may be migrating through waters surrounding the Hawaiian Island from nesting beaches along the western tropical and equatorial Pacific (National Marine Fisheries Service & U. S. Fish and Wildlife Service, 1998). Sightings and reported interactions with the Hawaii longline fishery commonly occur around seamount habitats north of the Northwestern Hawaiian Islands (from 35°N to 45°N and 175°W to 180°W) (Skillman & Balazs, 1992; Skillman & Kleiber, 1998).

Leatherbacks rarely occur in nearshore waters off the Hawaiian Islands. Although leatherback interactions with the longline fishery is common in offshore waters, leatherback-stranding events on Hawaiian beaches are uncommon. Since 1982, only five leatherbacks strandings have been reported in the Hawaiian Islands, indicating limited nearshore presence. Aerial and shipboard surveys in nearshore Hawaiian waters also suggest that nearshore occurrences are extremely rare (National Marine Fisheries Service & U.S. Fish and Wildlife Service, 2013c). Considering these distribution characteristics, leatherbacks would be expected to occur in the Hawaii and Northwest Pacific Action Area as they make their transpacific migrations.

Southeast Pacific Starship Landing Area

Eastern Pacific leatherbacks nest along the Pacific coast of the Americas, primarily in Mexico and Costa Rica, and forage throughout coastal and pelagic habitats of the eastern tropical Pacific, between the months of October and February (Burns et al., 2016; Eckert et al., 2015; Kuschke et al., 2023; Stewart et al., 2016). After leaving nesting beaches in the in Mexico and Costa Rica, Eastern Pacific leatherbacks generally migrate south into the southern hemisphere and forage in waters off Peru and Chile (Benson et al., 2011; National Marine Fisheries Service & U.S. Fish and Wildlife Service, 2013c). Sea turtles from this nesting population foraging farther offshore for jellyfish, their primary prey, may occur in the Southeast Pacific Action Area. Jellyfish aggregations have been associated with large eddies or bathymetric features where persistent upwelling occurs (Bailey et al., 2012).

Northeast Pacific Starship Landing Area

Western Pacific leatherbacks nest in the Indo-Pacific, primarily in Indonesia, Papua New Guinea and the Solomon Islands. A proportion of this population migrates across the Pacific past and offshore of the Hawaiian Islands to feeding areas off the Pacific coast of North America. (National Marine Fisheries

Service, 2016b). The Western Pacific leatherback group is the primary stock that occurs within the Northeast Pacific Action Area. Leatherback sea turtles are regularly seen off the west coast of the United States and Mexico, however, highest densities are found in waters off central California, north of the Action Area, during summer and fall when sea surface temperatures are warmer. Bailey et al. (2012) found that the turtles inhabited waters with temperatures ranging from 11.3 to 31.7°C (mean of 24.7°C). The authors also found that oceanographic features such as mesoscale eddies, convergence zones, and areas of upwelling attracted foraging leatherbacks, because these features are often associated with aggregations of prey (e.g., jellyfish). Hebshi et al. (2008) analyzed telemetry data from 126 leatherbacks identifying migratory patterns and associations with similar oceanographic features such as current boundaries and stationary fronts. The data recorded transoceanic migrations, potentially through the Action Area, from nesting beaches in the western North Pacific to the California Current Ecosystem where leatherbacks are known to forage (Benson et al., 2007; Hebshi et al., 2008; Kobayashi et al., 2008). Leatherback sea turtles leaving nesting beaches in the eastern Pacific Ocean off Mexico and Costa Rica generally migrate south, potentially transiting through the Northeast Pacific Action Area, into the southern hemisphere and forage in waters off Peru and Chile (Benson et al., 2011; National Marine Fisheries Service & U.S. Fish and Wildlife Service, 2013c).

Indian Ocean Starship Landing Area

Leatherbacks range widely throughout the Indian Ocean, although nesting appears restricted to a few scattered areas. In the northeast Indian Ocean and Southeast Asia, leatherbacks nest on the Indian mainland, Andaman and Nicobar Islands, Sri Lanka, western coast of Thailand, Sumatra, and Java, with recent nesting reports from Myanmar (Platt et al., 2021). The only known significant nesting of leatherbacks in the southwest Indian Ocean occurs at the Maputaland rookery in South Africa and Mozambique with a new nesting report from Kenya reported in 2020 and Miramar in 2021 (Wallace et al.)

Like other sea turtles in the Indian Ocean, leatherbacks are threatened by natural habitat degradation, coastal development, pollution, bycatch, climate change, predation by humans and animals, infectious diseases, and illegal trade.

3.6.6.3 Critical Habitat

Critical habitat for leatherback sea turtles does not overlap the Action Area.

3.1.7 Marine Mammals

3.7.1 Blue Whale (Balaenoptera musculus)

3.7.1.1 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 Oceanic and Atmospheric Administration, 2023a, 2024a). 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 Oceanic and Atmospheric Administration, 2023a).

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. The abundance of the Eastern North Pacific stock of blue whales (*B.m. musculus*) was estimated at 1,898 in 2018 (National Marine Fisheries Service,

2020a). The abundance of the Central North Pacific stock was estimated at 133 blue whales (*B.m. musculus*) in 2010 (National Marine Fisheries Service, 2018). The abundance of the Western North Atlantic stock of blue whales (*B.m. musculus*) was estimated at 402 as of 2010, based off observations mainly in the Gulf of St. Lawrence (National Marine Fisheries Service, 2018).

3.7.1.2 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 (National Oceanic and Atmospheric Administration, 2023a). 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., 2007). Densities used in the analysis are presented in Table 3-1.

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

The blue whale 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; Ryan et al., 2022).

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 (International Union for the Conservation of Nature-Marine Mammal Protected Areas Task Force, 2022; Panicker & Stafford, 2021; Thums et al., 2022) 1966). *B.m. indica*, known as the Northern Indian Ocean blue whale, appears to be located year-round between Somalia and Sri Lanka (Branch et al., 2007; Panicker & Stafford, 2021; Sankalpa et al., 2021; Thums et al., 2022).

Hawaii and NW 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 eastern tropical Pacific and the Galapagos Islands (National Oceanic and Atmospheric Administration, 2023a).

Northeast 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,

Barlow, et al., 2009; Calambokidis, Falcone, et al., 2009; 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, Barlow, et al., 2009; Calambokidis et al., 2015; Mate et al., 2015).

3.7.1.3 Critical Habitat

Critical habitat has not been designated for this species.

3.7.2 False Killer Whale (Pseudorca crassidens)

3.7.2.1 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 (MHI) 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). The MHI insular stock (considered resident to the main Hawaiian Islands consisting of Kauai, Oahu, Molokai, Lanai, Kahoolawe, Maui, and Hawaii) is the only stock listed (as an endangered) under the ESA and depleted under the MMPA throughout its range (Carretta et al., 2018b; Carretta, Oleson, Baker, et al., 2017). A recovery plan for the DPS of MHI insular false killer was completed in 2021 (National Marine Fisheries Service, 2021a; National Oceanic and Atmospheric Administration, 2017, 2023c).

3.7.2.2 Distribution

Hawaii and NW Pacific Starship Landing Area

The three false killer whale stocks are regularly found within Hawaiian waters and have been reported in groups of up to 100 over a wide range of depths and distance from shore (Baird et al., 2003; Baird et al., 2013; Bradford et al., 2012, 2017; Bradford et al., 2015; Oleson et al., 2013; Shallenberger, 1981). The range and habitat preferences which are shoreward of the Hawaii Starship Landing Area make it unlikely that any false killer whales from the MHI insular DPS would occur in the Action Area.

The estimated abundance of the MHI insular stock of false killer whales is approximately 170 (National Oceanic and Atmospheric Administration, 2023a). NMFS has evaluated all plausible modeled estimates of the population trend of the MHI Insular stock and found the population has declined since 1989 (Carretta et al., 2018b; Carretta, Oleson, Forney, et al., 2017). MHI insular false killer whales are not expected to occur in the Action Area which is farther from shore than their typical range. False killer whales occurring in the Action Area are most likely from the unlisted Hawaii pelagic stock.

3.7.2.3 Critical Habitat

NMFS has designated critical habitat for the MHI insular false killer whale DPS 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).

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).

None of the critical habitat for the MHI false killer whale DPS is within the Action Area.

3.7.3 Fin Whale (Balaenoptera physalus)

3.7.3.1 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, and the five-year review for this species in 2021 (National Marine Fisheries Service, 2021a).

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. Density estimates for fin whales are shown in Table 3-1.

3.7.3.2 Distribution

The fin whale is found in all the world's oceans and is the second-largest species of whale (Jefferson & Moore, 2020). 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). Densities used in the analysis are presented in Table 3-1.

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

Visual and acoustic surveys between 2014 and 2020 have documented fin whale presence in the mid-Atlantic region (McCullough et al., 2024). Biopsy samples and satellite tagging data have also been collected, including re-sights of several individuals over the continental shelf. Vessel based surveys and satellite tagging efforts in recent years have also shown fin whales frequently occur off the coast of Virginia during winter months; observations included foraging behavior as well as adult and juvenile pairs (McCullough et al., 2024).

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). Visual surveys and passive acoustic monitoring conducted from 2007 to 2011 in Onslow Bay, North Carolina, indicate fin whale occurrence in this area between late fall and early spring (Hodge, 2011). High-frequency recording packages deployed between November 2007 and April 2010 in Onslow Bay detected 20-Hz pulses from fin whales primarily in the winter months, starting in November and continuing through mid-April, suggesting that fin whales are migrating past Onslow Bay during this time (Hodge, 2011). In the western Atlantic, limited data indicate that some fin whales winter from the edge of sea ice (near the Gulf of St. Lawrence) south to the Gulf of Mexico and the West Indies (Clark, 1995).

Indian Ocean Starship Landing Area

Based on recent acoustic studies (Leroy et al., 2021; Sankalpa et al., 2021), 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., 2007; Širović et al., 2004). 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.

Hawaii and NW Pacific Starship Landing Area

There was a total of nine fin whale sightings during systematic line-transect surveys of the Hawaiian Islands EEZ in 2002, 2010, and 2017 (Bradford et al., 2021). The survey data supported the derivation of an abundance estimate of 203 fin whales; however, uncertainty in the estimate is quite high with a 95% confidence interval of 40 to 1,028 whales (Bradford et al., 2021). Based on sighting data and acoustic recordings, fin whales are likely to occur in Hawaiian waters mainly in fall and winter (Barlow et al., 2006; Barlow et al., 2008, Barlow, 2004 #2610; Klinck et al., 2015b). In summer, fin whales are likely absent from the Hawaii Action Area; during three separate line-transect surveys of the Hawaiian Islands EEZ during summer and fall, fin whales were only seen during fall (Barlow, 2006; Bradford et al., 2017), and fin whales were not detected during summer in any year from 2011 to 2017 from passive acoustic recordings on an array of 14 hydrophones at the U.S. Navy Pacific Missile Range Facility off Kauai, Hawaii (Guazzo et al., 2021; Helble et al., 2020).

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).

Northeast Pacific Starship Landing Area

Fin whales have been documented from 60° North (N) to 23° N. As demonstrated by satellite tags and discovery tags[3], 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.

3.7.3.3 Critical Habitat

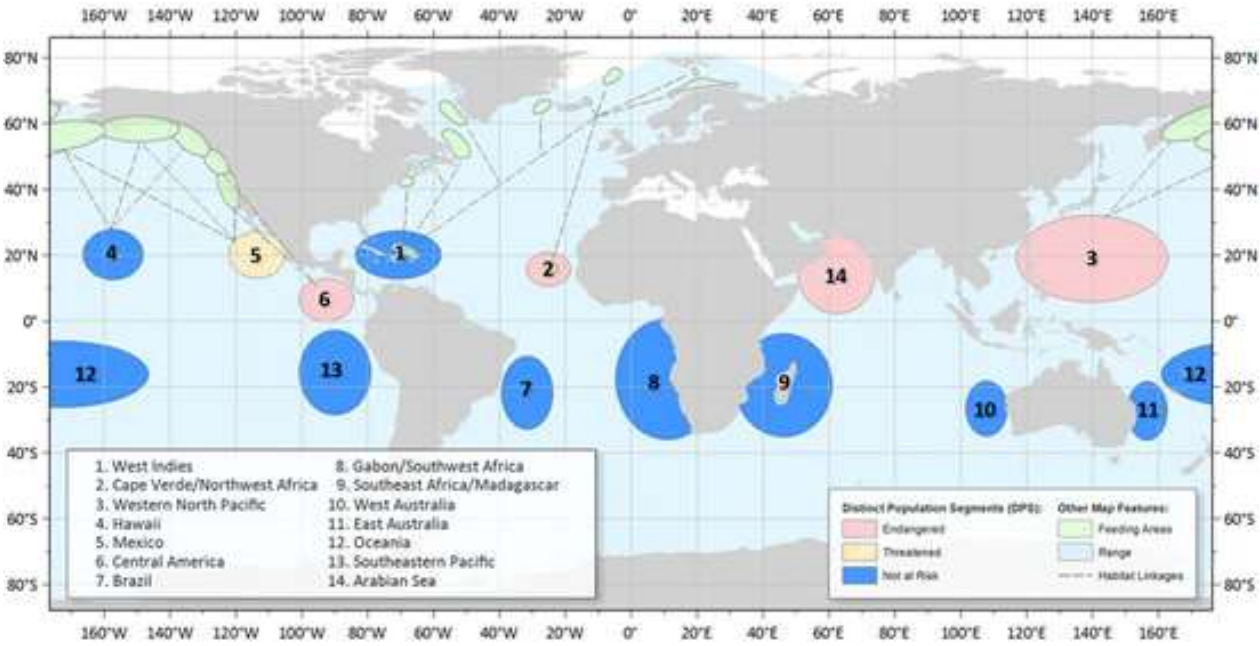
Critical habitat has not been designated for this species.

[3] 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.

3.7.4 Humpback Whale (Megaptera novaeangliae)

3.7.4.1 Status and Trends

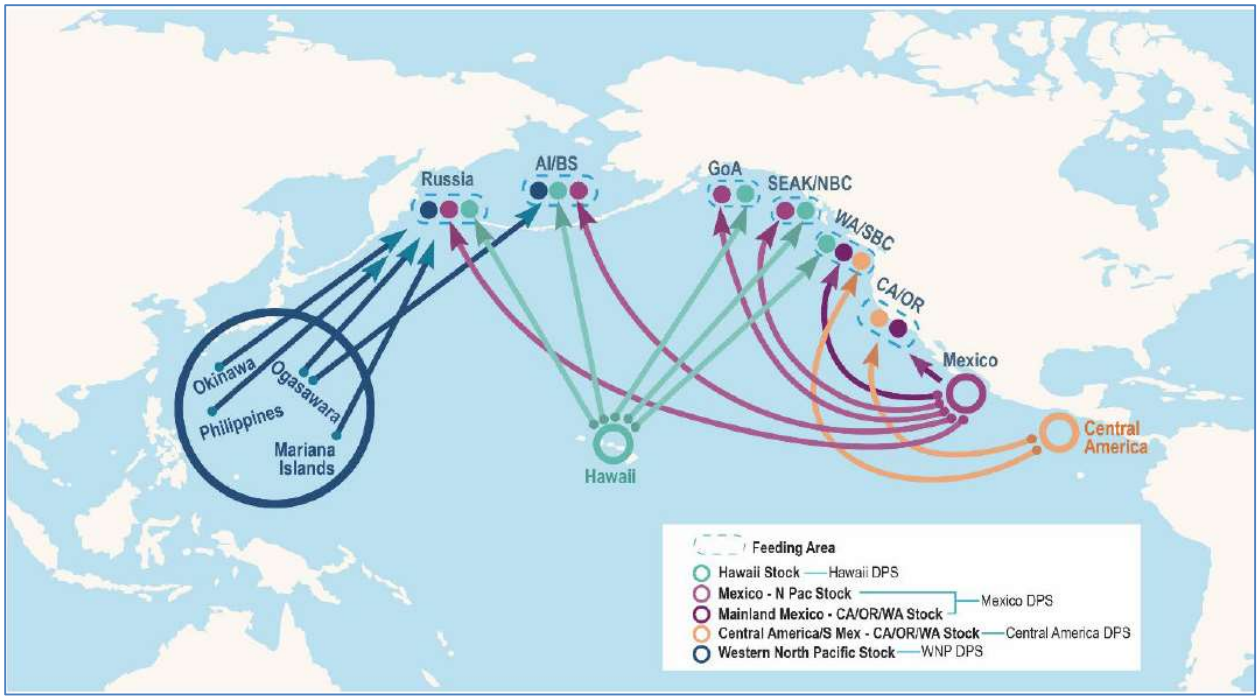
Humpback whales, as a globally distributed species, are divided into 14 DPSs (Figure 7). NMFS revised the listing status under the ESA of each breeding population in the defining the DPSs (81 Federal Register 62259). Humpback whales from the Mexico DPS are listed as threatened and those from the Central America DPS are listed as endangered under the ESA. (National Marine Fisheries Service, 2016a). Other DPSs occur in the Hawaii, Southeast Pacific, Indian Ocean, and Atlantic Action Areas, but none are listed under the ESA (Figure 7).



Source: (National Marine Fisheries Service, 2024a)

Figure 7: Distinct Population Segments of Humpback Whales

Humpback whales from two of the DPSs, the Mexico DPS and the Central America DPS, would occur in the Action Area. More specifically, humpback whales from the Central America DPS would occur seasonally within the Southeast Pacific Action Area and the Hawaii-Mexico Action Area, and humpback whales from the Mexico DPS would have seasonal occurrence during migrations in the Hawaii-Mexico Action Area (Figure 8).



AI/BS = Aleutian Islands/Bering Sea, GoA = Gulf of Alaska, SEAK/NBC = Southeast Alaska/Northern British Columbia, WA/SBC = Washington/Southern British Columbia, CA/OR = California Oregon. Source: (Carretta, 2023)

Figure 8: Humpback Whale Stocks and DPSs Defined in the North Pacific. Whales From the Hawaii, Mexico, and Central America DPSs Occur Seasonally in the Hawaii Action Area.

Together the Central America DPS and part of the Mexico DPS, plus a small number of whales from the non-listed Hawaii DPS, are considered the California, Oregon, and Washington stock of humpback whales and are listed as depleted under the MMPA (Carretta et al., 2018a; Carretta, Oleson, Baker, et al., 2017; Carretta, Oleson, Forney, et al., 2017; National Marine Fisheries Service, 2016a). The California, Oregon, and Washington stock estimate of abundance is 4,973 humpback whales based on survey data from 2015-2018 (National Marine Fisheries Service, 2021b, 2024a; Wild et al., 2023).

A portion of the Mexico DPS of humpback whales is recognized as the North Pacific stock. This stock spends winters near the Revillagigedo Archipelago and in waters off Central Mexico, and summer months in Alaska waters (National Marine Fisheries Service, 2021b; Wild et al., 2023). A partial estimated abundance for this stock was 681 humpback whales based on data from 2004-2006 (National Marine Fisheries Service, 2024a). This estimate is entirely based off the population of humpback whales located near the Revillagigedo Archipelago and does not encompass the rest of the stock located off central Mexico as there is currently no method to distinguish between this stock and the California, Oregon, and Washington stock that are both present in areas off central Mexico (National Marine Fisheries Service, 2021b).

3.7.4.2 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). Densities used in the analysis are presented in Table 3-1.

Hawaii and NW Pacific Starship Landing Area

A portion of humpback whales from the Mexico DPS may transit through this Action Area during spring and fall migrations between summer feeding grounds in the western and central North Pacific and winter breeding grounds off the Baja California Peninsula Mexico.

Southeast Pacific Starship Landing Area

The wintering areas for humpbacks in the Central America DPS include waters from southern Mexico and south along the coast of Central America (Calambokidis et al., 2008). Whales from this population have the potential to occur in the Action Area during the breeding season.

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.

Northeast Pacific Starship Landing Area

Humpbacks from the Mexico DPS and the Central America DPS migrate through the Action Area as the transit between winter breeding areas and summer foraging areas. The wintering areas for humpbacks from the Mexico DPS include the waters off Mexico's Pacific coast, and humpbacks from the Central America DPS overwinter in nearshore waters from southern Mexico south along the coast of Central America (Calambokidis et al., 2008).

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).

3.7.4.5 Critical Habitat

In 2021, NMFS designated critical habitats for Mexico, Western North Pacific, and Central America DPSs along the U.S. West Coast and portions of Alaska (86 FR 21082). Critical habitat does not overlap the Action Area.

3.7.5 North Atlantic Right Whale (Eubalaena glacialis)

3.7.5.1 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 and is estimated at a median abundance of 338 as of November 2020 (Meyer-Gutbrod et al., 2023; National Marine Fisheries Service, 2023a, 2023d).

3.7.5.2 Distribution

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

Right whales have been occasionally recorded in the Gulf of Mexico (LaBrecque et al., 2015b; Ward-Geiger et al., 2011; Waring et al., 2004), but their occurrence there is considered extralimital. Therefore, 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. Densities used in the analysis are presented in Table 3-1.

3.7.5.3 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 conservation of the species (81 FR 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.

3.7.6 Rice's Whale (Balaenoptera ricei)

3.7.6.1 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. There was no statistically significant trend in population size for this species.

The best abundance estimate available for Rice's whale is 51 (coefficient of variation = 0.50). This estimate is from summer 2017 and summer/fall 2018 oceanic surveys covering waters from the 200-m isobath to the seaward extent of the U.S. Exclusive Economic Zone (Garrison et al. 2020). The statistical power to detect a trend in abundance for this stock is poor due to the relatively imprecise abundance estimates and long intervals between surveys. In addition, because these surveys are restricted to U.S. waters, it is not possible to distinguish between changes in population size and Gulf-wide shifts in spatial distribution. The potential for biological removal for the Rice's whale is 0.07 (much less than 1), meaning that loss of a single whale from the population (excluding natural mortalities) would reduce the stock's ability to reach is optimum sustainable population.

3.7.6.2 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; Rosel et al., 2016; Rosel et al., 2021; Širović et al., 2014). While their core distribution primarily lies within continental U.S. waters, research by Soldevilla et al. (2024) provides the first evidence of Rice's whale presence in Mexican waters using autonomous passive acoustic recording devices in the Mexican continental slope from 2020

to 2022. Rice's whales were detected 14.9 percent of days across a period of 680 days throughout the year, with a total of 579 western long-moan calls detected. These new findings suggest Rice's whales have a broader distribution than previously understood and have a transboundary range throughout the Gulf of Mexico beyond U.S. waters (Soldevilla et al., 2024). Densities used in the analysis are presented in Table 3-1.

3.7.6.3 Critical Habitat

On July 24, 2023, NMFS released the Proposed Rule for the designation of critical habitat for the Rice's whale in the Gulf of Mexico in accordance with section 4(b)(2) of the ESA (88 FR 47453). The proposed area covers 28,270.65 square miles along continental shelf and slope waters between 100 m and 400 m isobaths; spanning from the U.S. Exclusive Economic Zone boundary off the southwestern coast of Texas, to the boundary between the South Atlantic Fishery Management Council and the Gulf of Mexico Fishery Management Council off the southeastern coast of Florida (88 Federal Register 47453). This continental shelf and slope region is the critical habitat feature deemed biologically important and essential for Rice's whale conservation due to prey density, favorable oceanographic conditions, and productivity, as well as noise conditions sufficient for communication, navigation, foraging, and threat detection (88 FR 47453). The area proposed for Rice's whale critical habitat overlaps with the Gulf of Mexico portion of the Action Area. A final critical habitat designation has not been assigned for this species at this time.

3.7.7 Sei Whale (Balaenoptera borealis)

3.7.7.1 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, 2024c; National Marine Fisheries Service Office of Protected Resources, 2021).

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.

3.7.7.2 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, 2008; Jefferson et al., 2015). Densities used in the analysis are presented in Table 3-1.

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).

Braham (1991) provided an estimate of 65,000 individuals in the Southern Hemisphere pre-exploitation of the sei whale population, slightly higher than Mizroch et al. (1984b)'s estimated population of 63,100 sei whales. In the Southern Hemisphere, more recent population estimates range between 9,800 and 12,000 sei whales (Mizroch et al., 1984; Perry et al., 1999). The International Whaling Commission reported an estimate of 9,718 sei whales based on results of surveys between 1978 and 1988 (National Marine Fisheries Service Office of Protected Resources, 2021).

Hawaii and NW Pacific Starship Landing Area

Sei whales have only been detected in the Hawaiian Islands on a few occasions. The first verified sei whale sighting made nearshore of the main Hawaiian Islands occurred in 2007 (Smultea et al., 2007; Smultea et al., 2010) and included the first subadults seen in the main Hawaiian Islands. 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). In December 2014, a passive acoustic recording device onboard an unmanned glider located to the south of Oahu detected very short, low-frequency downsweep vocalizations identified as potential sei whale calls and occurring occasionally during a period of approximately 2 weeks (Klinck et al., 2015a).

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.

Northeast 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.

3.7.7.3 Critical Habitat

There is no designated critical habitat for this species.

3.7.8 Sperm Whale (Physeter macrocephalus)

3.7.8.1 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, 2015c), and sperm whales in the Indian Ocean Action Area have not been assigned to a stock (Carretta et al., 2019c). Except for waters off the U.S. West Coast, NMFS recognizes two stocks of sperm whales, one in the central Pacific (in Hawaiian waters) and one in the North Pacific (in Alaskan waters) (Carretta et al., 2019c; Muto et al., 2019). 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, 2015, 2024d).

Whitehead (2002) estimated current sperm whale abundance to be approximately 300,000– 450,000 worldwide. Although his estimates are based on extrapolating surveyed areas to unsurveyed areas, without a systematic survey design, these are probably the best available and most current estimates of global sperm whale abundance. Assuming that the population is growing at about 1.1 percent/year (in Whitehead 2002), Whitehead also estimated that the global population is at about 32 percent of historical numbers.

3.7.8.2 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, 1989; Whitehead, 2002). Sperm whales show a strong preference for deep waters (Rice, 1989; Whitehead, 2003). Their distribution is typically associated with waters over the continental shelf break, continental slope, and into deeper mid-ocean regions. However, in some areas, adult males are reported to consistently frequent waters with depths less than 100 m and as shallow as 40 m (Jefferson et al., 2008a; Jefferson et al., 2015; Romero et al., 2001). 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). Sperm whale migration is not well understood and is not as seasonally based as that observed in mysticete whales. Densities used in the analysis are presented in Table 3-1.

Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location

The sperm whale is the most common large cetacean in the northern Gulf of Mexico (Palka & Johnson, 2007). 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). Most sperm whale groups were found within regions of enhanced sea surface chlorophyll abundance (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). 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., 1994). Sperm whales aggregate at the mouth of the Mississippi River and along the continental slope in or near cyclonic, cold-core eddies (counterclockwise water movements in the northern hemisphere with a cold center) or anticyclone eddies (clockwise water movements in the northern hemisphere) that may aggregate prey (Davis et al., 2007) Habitat models for sperm whale occurrence indicate a high probability of suitable habitat along the shelf break off the Mississippi delta, Desoto Canyon, and western Florida (Best et al., 2012).

Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location

The nature of linkages of the U.S. habitat with those to the south, north, and offshore is unknown, but sperm whales that occur in the eastern U.S. EEZ in the Atlantic Ocean likely represent only a fraction of the total stock. Historical whaling records compiled by Schmidly (1981) suggested an offshore distribution off the southeast United States, over the Blake Plateau, and into deep ocean waters. Distribution along the East Coast of the United States is centered along the shelf break and over the slope. In winter, sperm whales are concentrated east and northeast of Cape Hatteras, North Carolina. In spring, the center of distribution shifts northward to east off Delaware and Virginia and is widespread throughout the central

portion of the mid-Atlantic Bight and the southern portion of Georges Bank off New England. In summer, the distribution is similar but now also includes the area east and north of Georges Bank and into the Northeast Channel region, as well as the continental shelf (inshore of the 100-m isobath) south of New England. In fall, sperm whale occurrence south of New England on the continental shelf is at its highest level, and there remains a continental shelf break occurrence in the mid-Atlantic Bight. Similar inshore (less than 200 m) observations were made on the southwestern and eastern Scotian Shelf, particularly in the region of "the Gully" (Whitehead & Weilgart, 1991).

Aerial surveys conducted offshore of Cape Hatteras, North Carolina, from 2011 through 2017 suggest sperm whales commonly occur in the area, primarily in the spring and summer months (McLellan et al., 2014).

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). Researchers confirmed occurrence of sperm whale vocalizations in Onslow Bay on a recorder deployed at water depths of 230 m and 366 m, along with regular nocturnal occurrence of sperm whale clicks near the shelf break, suggesting that foraging activities were occurring at that time (Hodge et al., 2013)). This diel pattern contrasts with what was recorded offshore of Cape Hatteras (Stanistreet et al., 2013). Habitat models also support findings of sperm whale occurrence in the U.S. Economic Exclusion Zone waters offshore of Onslow Bay (Best et al., 2012). Visual surveys in Onslow Bay and analysis of remotely sensed oceanographic data were used to determine the effects of dynamic oceanography. The findings from this study indicate that the presence of Gulf Stream frontal eddies and the location of the Gulf Stream Front influenced sperm whale vocalization rates, among other species (Thorne et al., 2012).

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 (Sankalpa et al., 2021). 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 (National Marine Fisheries Service, 2006).

Hawaii and NW Pacific 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., 2003; 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 (Casamayor et al., 2022; 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).

Northeast 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, Oleson, Baker, et al., 2017; Rice, 1989; Whitehead, 2003; Whitehead et al., 2008).

3.7.8.3 Critical Habitat

Critical habitat has not been designated for this species.

3.7.9 Guadalupe Fur Seal (Arctocephalus townsendi)

3.7.9.1 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, Oleson, Baker, et al., 2017; Pablo-Rodríguez et al., 2016).

An unpublished abundance of 43,360 Guadalupe fur seals based on pup counts was estimated by Norris (2022) as the mean of two separately derived abundance estimates of 37,940 and 48,780 fur seals. Indications are that the population is increasing.

3.7.9.2 Distribution

During the summer breeding season, adult Guadalupe fur seals return to waters off the Baja California Peninsula Mexico and Guadalupe Island to breed and pup. Following the breeding season, the fur seals distribute at sea along the coast of North America from Mexico as far as the Pacific Northwest and British Columbia, Canada (Norris & Elorriaga-Verplancken, 2020).

Densities used in the analysis are presented in Table 3-1.

Northeast 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 Action Area, in the vicinity and north of Guadalupe Island (Hanni et al., 1997; Jefferson et al., 2015; Norris, 2017; Norris & Elorriaga-Verplancken, 2020).

3.7.9.3 Critical Habitat

Critical habitat has not been designated for this species.

3.7.10 Hawaiian Monk Seal (Neomonachus schauinslandi)

3.7.10.1 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. 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).

Based on the most recent counts and modeling results, the range-wide abundance encompassing the smaller Main Hawaiian Island population and the larger Northwestern Hawaiian Islands population is estimated at 1,437 monk seals (Carretta et al., 2022).

3.7.10.2 Distribution

In the main Hawaiian Islands, monk seals are generally solitary and have no established rookeries. Hawaiian monk seals do, however, routinely haul out for molting and pupping in locations throughout Hawaii. When foraging, monk seals spend most of their time in nearshore, shallow marine habitats, but can rapidly cover large areas in search of food and may travel hundreds of miles in a few days (D'Amico, 2013; Littnan, 2011; Stewart et al., 2006; Wilson et al., 2012). Densities used in the analysis are presented in Table 3-1.

Hawaii and NW Pacific Starship Landing Area

Hawaiian monk seals are generally only present in nearshore waters of the main Hawaiian Islands and Northwestern Hawaiian Islands, preferring water depths less than 200 m. The monk seals are benthic foragers and foraging dives are typically less than 50 m (Robinson et al., 2022). However, monk seals will travel over deep offshore waters to seamounts and remote atolls to forage and haul out. 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, 2010b)).

3.7.10.3 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).

All of the critical habitat designated for this species is outside of the Action Area.

4 Effects of the Action

This chapter evaluates how, and to what degree, the activities described under the Action potentially impact ESA-listed species known to occur within the Action Area. The stressors vary in intensity, frequency, duration, and location within the Action Area. The stressors considered in this BA include the following:

- Acoustic (in-air overpressure events resulting from sonic booms and explosions).
- Impact by fallen objects (debris falling from a re-entry or in-air explosion of Starship).
- Ship strike (support ships presenting potential strike risks)
- Harassment by aircraft overflights (support aircraft and visual disturbance).
- Exposure to hazardous materials.

Previous consultations between the FAA and NMFS analyzed the potential for ingestion of parachutes and other decelerator-associated materials (such as latex). Entanglement was also a stressor analyzed as potentially harmful for ESA-listed species for other materials associated with parachutes (nylon cordage and parachute canopy materials). Because this proposed action does not include the use of these materials (Starship and Super Heavy will descend under thrust power and not using parachutes). Therefore, ingestion and entanglement are not analyzed as potential stressors in this programmatic BA.

4.1.1 Acoustic Stressors

4.1.1 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 (National Marine Fisheries Service, 2022c), 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). Due to the low magnitude of the sonic booms (no greater than 2 pounds per square foot [psf] for Starship), the substantial attenuation of the sonic booms at the air/water interface, and the exponential attenuation with water depth, sonic booms would not result in impacts on marine species beneath the surface.

For Super Heavy, over-pressurization at the ocean's surface could be up to 12 psf. Boom intensity, in terms of psf, is greatest under the flight path and progressively weakens with horizontal distance away from the flight track. Overpressure from sonic booms is 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 (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 were using a threshold for harassment of marine mammals and sea turtles by impulsive noise of 12 pound per square inch which equates to 1728 psf peak pressure. The researchers pointed out that, to produce the 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.

Cetaceans and pinnipeds (when at sea) 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 or ESA-listed species.

4.1.2 Near-Surface Explosions / Overpressure Events

Overpressure events from explosions generated during certain expended landings of the ship impact may affect marine species within the Action Area. Individuals, if in close proximity to the landing location and subsequent explosion, could be at risk of mortality, physical injury, auditory injury (also referred to as permanent threshold shift [PTS]), temporary threshold shift (TTS), or behavioral changes that would be considered take. NMFS has developed threshold criteria for the onset of TTS and PTS based on the auditory sensitivity of marine mammal hearing groups (Table 2; NMFS 2018).

Table 2: PTS onset and TTS onset thresholds for underwater impulsive noise (NMFS 2018).

Hearing Group	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

The FAA independently evaluated and approved an analysis methodology developed by SpaceX that relies on the robust application of scientific principles; an 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 March 2024 NMFS LOC for Proposed Licensing of SpaceX Starship-Super Heavy Operations in the Indian Ocean. This analysis was used to estimate the affected area from the explosive event over which NMFS thresholds could be exceeded for MMPA species, if present.

Overpressure events from booster explosions generated during impact may affect ESA-listed species within the Action Area. Individuals, if in close proximity to the booster landing location and subsequent explosion, could be at risk of mortality, physical injury, PTS, TTS, or behavioral changes that would be considered take. The booster analyses will follow the same methodology developed for the ship within the Indian Ocean action area. Since the booster is used to push the ship into space, the remaining propellant within the booster is less than the ship.

In-water impulsive noise events would result from an explosion of Starship/Super Heavy upon impact with the sea surface. A marine animal in close proximity to the Starship/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 explosive event over which NMFS thresholds could be exceeded for marine mammals, if present.

Starship Near-Surface Explosions

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, comparable to the conditions of the intact impact at terminal velocity of the Starship header tanks against the ocean surface. For the main tanks, an explosive weight of 6,330 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. 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).

Super Heavy Near-Surface Explosions

The impact of an in-air explosive yield from a fuel explosion of the Super Heavy close to the water surface is identical to the methodology outlined in the March 2024 NMFS LOC for Proposed Licensing of SpaceX Starship-Super Heavy Operations in the Indian Ocean and includes: (1) the transfer tube location is situated in the middle of the booster (9m diameter tank), (2) the booster has headers and 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. The main differences are: (1) the header is imbedded in the main tank of the booster and (2) since the booster engines are the heaviest part of the booster, the booster would impact the ocean engines down. This will put the transfer tubes 3.0m from the water surface, instead of the 4.5m for the ship. The booster explosion is considered an impulsive source as defined by NMFS because it produces a sound that is transient, brief (less than 1 second), broadband, and consists of a high peak sound pressure with rapid rise time and rapid decay.

The Trinitrotoluene (TNT) yield for the booster is 3330 kg (as compared to 4973.68 for the ship), because booster propellant is needed to push the ship into orbit. Since the in-air explosion sends half of the remaining TNT into air, the final TNT yield entering the water would be 6660kg/2=3330kg. Using the Kingery Bulmash calculator to determine the incident pressure in air yields 17207.90kPa at an explosive distance of 3.0m. Transitioning this to surface pressure in water yields 34398.6kPa and equates to a peak SPL of 270.7dB.

Model Results

Only ESA-listed marine mammals were included in the modeling.[4] Model results for each component of the Programmatic Action Area are summarized in the following tables:

- Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location, Table 4
- Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location, Table 5
- Indian Ocean Starship Landing Area, Table 6
- Northwest and Hawaii Tropical Pacific Starship Landing Area 7
- Northeast Pacific Starship Landing Area, Table 8

[4] SpaceX prepared an Incidental Harassment Authorization (IHA) request and submitted to NMFS in May 2024, pursuant to the MMPA. The model results presented in SpaceX's IHA includes model results for all species protected under MMPA where density information was available.

- Southeast Pacific Starship Landing Area, Table 9.

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 landings of Starship/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 Action (i.e., all 20 landings) occurs in that specific part of the Project Area.

Two sets of predicted auditory effects on ESA-listed 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 ESA-listed marine mammal species calculated by averaging all density values within each part of the Project Area was used to predict effects with a higher likelihood of occurring than effects based on the maximum density.

The modeling yielded one predicted TTS exposure, in the Atlantic Super Heavy landing area, on the ESA-listed fin whale. 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. This was the only modeled take among all modeled ESA-listed species within the Action Area components.

Table 4-1: Super Heavy Gulf of Mexico MMPA SPL Results

Blast Inputs			Coefficients	
Propellant Remaining (kg)	74000		Transmission Loss	0.0326
Yield Factor (%)	9		Impedance Seawater	1558528
TNT Yield	3330.0		Impedance Air	414.5
Pressure @ 1 meter (kPa)	17207.90	*3.0m from Kingery Bulmash Calculator*		
Water Peak Source Sound Level				
Surface Pressure in Water (kPa)	34398.6			
Peak SPL dB (re 1 uPa)	270.7			
# of Flights	20.0		**INPUTS**	**CALCS**

RESULTS

ESA SPL

Species Data			NMFS Thresholds (dB re 1uPa)		Harassment Area (km^2)		Max. Density Species Harassment		Ave. Density Species Harassment Result		
ESA Species	**Type**	**Max. Density (per km^2)**	**PTS**	**TTS**	**PTS**	**TTS**	**PTSmax**	**TTSmax**	**Ave. Density (per km^2)**	**PTSave**	**TTSave**
Sperm Whale	MF	0.01392	230	224	0.04	0.15	0.010349	0.041200	0.00252	0.001874	0.00
Rice's Whale	LF	0.01123	219	213	0.47	1.86	0.105096	0.418395	0.00016	0.001519	0.00

Table 4-2: Super Heavy Atlantic Ocean MMPA SPL Result

Blast Inputs			Coefficients	
Propellant Remaining (kg)	74000		Transmission Loss	0.0326
Yield Factor (%)	9		Impedance Seawater	1558528
TNT Yield	3330.0		Impedance Air	414.5
Pressure @ 1 meter (kPa)	17207.90	*3.0m from Kingery Bulmash Calculator*		
Water Peak Source Sound Level				
Surface Pressure in Water (kPa)	34398.6			
Peak SPL dB (re 1 uPa)	270.7			
# of Flights	20.0		**INPUTS**	**CALCS**

RESULTS

ESA SPL

Species Data			NMFS Thresholds (dB re 1 uPa)		Harassment Area (km)		Max. Density Species Harassment		Ave. Density Species Harassm		
ESA Species Data	**Type**	**Max. Density (per km^2)**	**PTS**	**TTS**	**PTS**	**TTS**	**PTSmax**	**TTSmax**	**Ave. Density (per km^2)**	**PTSave**	**TTSave**
Blue Whale	LF cetacean	0.000024	219	213	0.47	1.86	0.000225	0.000894	0.000018	0.000168	0.000671
Fin Whale	LF cetacean	0.018352	219	213	0.47	1.86	0.171769	0.683824	0.000029	0.000271	0.001081
North Atlantic Right Whale	LF Cetacean	0.001939	219	213	0.47	1.86	0.018151	0.072259	0.000003	0.000028	0.000112
Sei Whale	LF cetacean	0.000319	219	213	0.47	1.86	0.002986	0.011886	0.000141	0.001320	
Sperm Whale	MF cetacean	0.032160	230	224	0.04	0.15	0.023910	0.095187	0.002871	0.002134	

Table 4-3: Starship Indian Ocean MMPA SPL Results

Surface Pressure in Water (kPa)	24210.18							
Peak SPL dB (re 1 uPa)	267.7							
# of Flights	20.0			INPUTS	CALCS	RESULTS		
					ESA SPL			
Species	**Type**	**Density (per km^2)**	**PTS**	**TTS**	**PTS**	**TTS**	**PTS**	**TTS**
Blue Whale	LF cetacean	0.0000030	219	213	0.23	0.92	0.000014	0.000055
Fin Whale	LF cetacean	0.0008700	219	213	0.23	0.92	0.004034	0.016058
Sei Whale	LF cetacean	Unavailable	219	213	0.02	0.07	Unavailable	Unavailable
Sperm Whale	MF cetacean	0.00093	230	224	0.02	0.07	0.000017	0.001364
Green Turtle	Turtle	Unavailable	204	189	Unavailable	Unavailable	Unavailable	Unavailable
Hawksbill Turtle	Turtle	Unavailable	204	189	Unavailable	Unavailable	Unavailable	Unavailable
Leatherback Turtle	Turtle	Unavailable	204	189	Unavailable	Unavailable	Unavailable	Unavailable
Loggerhead Turtle	Turtle	Unavailable	204	189	Unavailable	Unavailable	Unavailable	Unavailable
Olive Ridley Turtle	Turtle	Unavailable	204	189	Unavailable	Unavailable	Unavailable	Unavailable
Species	**Type**	**Density (per km^2)**	**Onset of Physical Injury (dB re 1 uPa)**		**Injury Area (km^2)**		**Species Injury Results**	
Oceanic Whitetip Shark	Fish	Unavailable	187		Unavailable		Unavailable	Unavailable
Scalloped Hammerhead Shark	Fish	Unavailable	187		Unavailable		Unavailable	Unavailable

Table 4-4: Northeast Pacific Starship MMPA SPL Results

Blast Inputs												
TNT Yield (kg)	4973.68											
Surface Pressure in air (kPa)	12111.15	*Enter 4.5m Incident Pressure from https://unsaferguard.org/un-saferguard/kingery-bulmash*										
Surface Pressure in Water (kPa)	24210											
Peak SPL dB (re 1 uPa)	267.7											
# of Flights	20.0		INPUTS	CALCS	RESULTS							
ESA Species				ESA SPL								
Species Data (Pacific)			**NMFS Thresholds (dB re 1 uPa)**		**Harassment Area (km^2)**		**Species Harassment Results at Maximum**		**Species Harassment Results Avera**			
Species	**Type**	**Max. Density(per km^2)**	**PTS**	**TTS**	**PTS**	**TTS**	**PTSmax**	**TTSmax**	**Ave. Density(per km2)**	**PTSave**	**TTSave**	
Blue Whale	LF cetacean	0.004515	219	213	0.23	0.92	0.020933	0.083336	0.0000083	0.000038		
False killer whale	MF cetacean	0.00242	230	224	0.02	0.07	0.000891	0.003548	0.001774	0.000653		
Fin Whale	LF cetacean	0.003897	219	213	0.23	0.92	0.018068	0.071929	0.000126	0.000584		
Humpback Whale	LF cetacean	0.00646	219	213	0.23	0.92	0.029951	0.119236	0.000128	0.000593		
Killer Whale	MF cetacean	0.00013	230	224	0.02	0.07	0.000048	0.000191	0.000071	0.000026		
Sei Whale	LF cetacean	0.0001	219	213	0.23	0.92	0.000464	0.001846	0.0001	0.000464		
Sperm Whale	MF cetacean	0.003829	230	224	0.02	0.07	0.001410	0.005614	0.001361	0.000501		
Guadalupe fur seal	Otariid in-water	0.06283	232	226	0.01	0.05	0.014600	0.058122	0.015549	0.003613		

Table 4-5: Hawaii and NW Pacific Starship MMPA SPL Results

TNT Yield (kg)	4973.68										
Surface Pressure in air (kPa)	12111.15	*Enter 4.5m Incident Pressure from https://unsaferguard.org/un-saferguard/kingery-bulmash*									
Surface Pressure in Water (kPa)	24210										
Peak SPL dB (re 1 uPa)	267.7										
# of Flights	20.0										
				ESA SPL							
Species Data (Hawaiian Islands)			NMFS Thresholds (dB re 1 uPa)		Harassment Area (km^2)		Species Harassment Results Max. Densities		Species Harassment Results Ave.		
ESA Species Data	Type	Max. Density (per km^2)	PTS	TTS	PTS	TTS	PTSmax	TTSmax	Ave. Density (per km^2)	PTSave	TTSave
Blue Whale	LF cetacean	0.000060	219	213	0.23	0.92	0.000278	0.001107	0.000008	0.000039	
Fin Whale	LF cetacean	0.000080	219	213	0.23	0.92	0.000371	0.001477	0.000080	0.000371	
False Killer Whale	MF cetacean	0.001706	230	224	0.02	0.07	0.000628	0.002501	0.000812	0.000299	
Sei Whale	LF cetacean	0.000160	219	213	0.23	0.92	0.000742	0.002953	0.000160	0.000742	
Sperm Whale	MF cetacean	0.007734	230	224	0.02	0.07	0.002848	0.011339	0.001089	0.000401	
Hawaiian Monk Seal	Phocid Pinniped	0.00004	218	212	0.29	1.16	0.000233	0.000929	0.000033	0.000193	

Qualitative Methods

For some species, quantitative methods for estimating potential impacts (as described in Section 4.1.3.1, Approach to Analysis) were not used because density data for the species in a specific action area were not available. Accordingly, qualitative methods for determining potential effects were used. This analysis included estimating the location of impact in relation to a particular species, and the assessing the likelihood of interaction with the stressor at a threshold that would likely induce adverse effects. Exclusion areas (areas such as the Flower Banks complex where no trajectories would terminate) formed part of this assessment. As stated in Section 2.4 (Conservation Measures), FAA can assign trajectories that avoid sensitive areas identified within each Action Area component.

4.1.3 Potential Effects to ESA-Listed Species from Acoustic Stressors

In-air noise caused by sonic boom re-entry may affect ESA-listed fish, sea turtles, and marine mammals within each portion of the Action Area. ESA-listed species exposed to noise generated by a sonic boom would likely exhibit brief behavioral changes and resume normal behavior exhibited prior to the overpressure event. Because of the limited time ESA-listed species would be expected to be at or near the water's surface (oceanic whitetip shark is expected to be submerged 100 percent of the time, while ESA-listed marine mammals and sea turtles are expected to be submerged 90 percent of the time), the high altitude where the descending Starship or Super Heavy vehicle would generate a sonic boom, the known properties of sound deflection at the surface of water, and the rapid attenuation of the reduced sound that could be perceived under water, the FAA concludes that sonic boom noise is discountable (adverse effects are extremely unlikely to occur) and insignificant (adverse effects are unmeasurable or undetectable).

Overpressure events from Starship explosions generated during impact may affect ESA-listed fish, sea turtles, and marine mammals within the Action Area. ESA-listed species, if in close proximity to the Starship or Super Heavy landing location and subsequent explosion, could be at risk of mortality, physical injury, or behavioral changes that would be considered adverse effects. Based on the modeling results of near-surface explosions described above and in the 2022 PEA, however, the probability of an ESA-species included in the modeling is sufficiently low to determine that potential adverse effects are discountable (extremely unlikely to occur). Other ESA-listed species not included in the modeling (oceanic whitetip shark, sei whale because of an extremely low likelihood of spatial overlap with the Action Area, and sea turtles) have anticipated densities in the Action Area's pelagic habitats as to make exposure to overpressure events from Starship explosions discountable (extremely unlikely to occur).

The action proponent has reached the following conclusions based on the modeling described in Section 4.1.3.2 (Modeling Results) and qualitative assessments of species not included in the modeling:

- Within the Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location, acoustic stressors would not likely adversely affect Atlantic sturgeon Carolina DPS, Giant manta ray, Gulf sturgeon, Nassau grouper, oceanic whitetip shark, scalloped hammerhead shark, green sea turtle North Atlantic DPS, Kemp's ridley sea turtle, hawksbill sea turtle, leatherback sea turtle, loggerhead sea turtle Northwest Atlantic Ocean DPS, Rice's whale, or sperm whale.
- Within the Atlantic Ocean Super Heavy Landing Area and Nominal Landing Location, acoustic stressors would not likely adversely affect Atlantic sturgeon Carolina DPS, Giant manta ray, Nassau grouper, oceanic whitetip shark, scalloped hammerhead shark, green sea turtle North Atlantic DPS, Kemp's ridley sea turtle, hawksbill sea turtle, leatherback sea turtle, loggerhead sea turtle Northwest Atlantic Ocean DPS, blue whale, fin whale, North Atlantic right whale, sei whale, or sperm whale. As noted previously and shown on Table 4, modeling yielded one predicted TTS exposure, in the Atlantic Super Heavy landing area, for the ESA-listed fin whale. With occurrence

only expected within this portion of the Action Area in the month of March, and with other landing locations available throughout the year, any adverse effects on the fin whale within the Atlantic Super Heavy landing area would likely be discountable (unlikely to occur). If SpaceX cannot land anywhere else, an individual consultation would be initiated for the fin whale.

- Within the Indian Ocean Starship Landing Area, acoustic stressors would not likely adversely affect Giant manta ray, oceanic whitetip shark, scalloped hammerhead shark, green sea turtle East Indian-West Pacific DPS and North Indian DPS, olive ridley sea turtle, hawksbill sea turtle, leatherback sea turtle, loggerhead sea turtle North Indian Ocean DPS or Southwest Indian Ocean DPS or Southeast Indo-Pacific DPS, blue whale, fin wale, sei whale, or sperm whale.
- Within the Northeast Pacific Starship Landing Area, acoustic stressors would not likely adversely affect, Giant manta ray, oceanic whitetip shark, scalloped hammerhead shark, green sea turtle East Pacific DPS and Central North Pacific DPS, olive ridley sea turtle, hawksbill sea turtle, leatherback sea turtle, loggerhead sea turtle North Pacific Ocean DPS, blue whale, false killer whale, fin wale, humpback whale Mexico DPS or Central America DPS, sei whale, sperm whale, Guadalupe fur seal, or Hawaiian monk seal.
- Within the Hawaii NW Pacific Starship Landing Area, acoustic stressors would not likely adversely affect Giant manta ray, oceanic whitetip shark, scalloped hammerhead shark, green sea turtle Central North Pacific DPS, olive ridley sea turtle, hawksbill sea turtle, leatherback sea turtle, loggerhead sea turtle North Pacific Ocean DPS, blue whale, false killer whale, fin wale, humpback whale Mexico DPS, sei whale, sperm whale, or Hawaiian monk seal.
- Within the Southeast Pacific Starship Landing Area, acoustic stressors would not likely adversely affect Giant manta ray, oceanic whitetip shark, scalloped hammerhead shark, green sea turtle East Pacific DPS, olive ridley sea turtle, hawksbill sea turtle, leatherback sea turtle, loggerhead sea turtle South Pacific Ocean DPS, blue whale, false killer whale, fin wale, humpback whale Central America DPS, sei whale, sperm whale.

4.1.2 Impact by Fallen Objects

A near-surface booster or ship explosion or a high-altitude breakup of the booster or ship 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 booster or ship near surface explosion or high-altitude disintegration struck an animal near the water's surface, the animal could be injured or killed. Therefore, debris strike from an expended booster or ship may affect ESA-listed fish, sea turtles, and marine mammals within the Action Area. Direct strikes by debris would be extremely unlikely because of the relatively small size of the components as compared to the open ocean areas and dispersion of animals. Given that relatively few ship or booster ocean descents and landings would occur over very small portions of the Action Areas, and the fact that marine wildlife spends the majority of their time submerged as opposed to on the surface, it is extremely unlikely an ESA-listed species would be impacted. The relative availability of these animals at the ocean surface, spatially and temporally, combined with the low frequency of the Action, reduce the likelihood of impacts. Additionally, there are no known interactions with any of these species after decades of similar rocket launches and reentries. Further, the projected landing areas for both Super Heavy and Starship are well offshore where density of marine species decreases compared to coastal environments and upwelling areas (FAA 2017). As stated in Section 2.4 (Conservation Measures), FAA can assign trajectories that avoid sensitive areas identified within each Action Area component. Accordingly, adverse interactions with expended debris are discountable (unlikely to occur).

4.1.3 Ship Strike

Ships and other watercraft vessels may be used to recover launch vehicle stage when first and second stage mission requirements do not require complete expenditure of first and second stage components. Depending on the landing location, vessels may also be used for surveillance to ensure that designated hazard areas are clear of non-participating crafts. These watercraft operations have potential to result in a ship strike of ESA-listed fishes, sea turtles, and marine mammals that spend time at or near the surface of the water. ESA-listed marine mammals and sea turtles can spend time at the surface, but most of their time is spent submerged. Giant manta ray, oceanic whitetip and scalloped hammerhead sharks can also spend time at or near the ocean surface and be subject to potential ship strikes, but they also dive to great depths. All vessels would be required to comply with the Conservation Measures (see Section 2.3) for vessel operations.

All watercraft would have a dedicated observer on board, adhere to maintaining minimum safety distances between ESA-listed species and vessels, and reduce speed as required. During the portion of time that ESA-listed marine mammals, sea turtles, and some fish species may spend near the ocean surface, ship strikes are considered extremely unlikely to occur and therefore discountable, due to the use of dedicated observation personnel and safety procedures for avoidance. Based on previous operation reports provided as part of ESA section 7 consultations for similar operations, there have not been reported vessel collisions with ESA listed marine species.

Rice's whale requires additional consideration due to its very low population size (likely < 50) and its ecology. The Rice's whale dives deep during the day to forage but at night tends to stay just below the surface, increasing the chance of the animal being struck at night. The Vessel operations measures in the PDCs for this programmatic consultation include the condition that recovery and vessel transit will not occur at night in the Rice's whale core distribution area. The PDCs for this programmatic consultation stipulate only one splashdown, a reentry and recovery of the Dragon capsule, may occur in Rice's whale core habitat distribution area per year. These restrictions will ensure the effects of vessel strike due to recovery vessel operations are discountable.

The Proposed Action does not differ substantially with stressors for ship strike analyzed previously by NMFS. Accordingly, vessels used in support operations may affect, but not likely adversely affect, ESA-listed species.

4.1.4 Harassment by Aircraft Overflights

Noise from aircraft overflight may enter the water, but as stated in relation to sonic booms, very little of that sound is transmitted into water. Sound intensity produced at high altitudes is reduced when it reaches the water's surface. At lower altitudes, the perceived noise will be louder, but it will decrease rapidly as the aircraft moves away. Individual ESA-listed species that occur at or very near the surface at the time of an overflight could be exposed to some level of elevated sound. There could also be a visual stimulus from overflight that could potentially lead to a change in behavior. Both noise and visual stimulus impacts would be temporary and only occur if an individual is surfacing or very close to the surface and an aircraft happens to be flying over at the same time.

Studies in the Gulf of Mexico found that most sperm whales dive when overflown by fixed wing aircraft (Wursig et al. 1998). Richter et al. (2006) documented only minor behavioral effects (i.e., both longer surface time and time to first vocalization) of whale-watching aircraft on New Zealand sperm whales. However, details on flight altitude were not provided. Smultea et al. (2008) studied sperm whales in Hawaii, documenting that diving responses to fixed winged overflights occurred at approximately 820 ft above ground level (AGL). Patenaude et al. (2002) observed bowhead whales, which are not a species

considered in this consultation but serve as an example for mysticetes, during spring migration in Alaska and recorded short-term responses to fixed-wing aircraft activity. Few (approximately 2%) of the observed bowheads reacted to overflights (between 200 and 1,500 AGL), with the most common behavioral responses being abrupt dives, short surfacing episodes, breaching, and tail slaps (Patenaude et al. 2002). Most of these responses occurred when the aircraft was below altitudes of 600 ft (Patenaude et al. 2002), which is below the altitude expected to be flown by fixed wing aircraft during project-related surveillance for the activities considered in this consultation.

Species-specific studies on the reaction of sea turtles to fixed wing aircraft overflight are lacking. Based on sea turtle sensory biology (Bartol and Musick 2003), sound from low-flying aircraft could likely be heard by a sea turtle at or near the ocean surface. Sea turtles might be able to detect low-flying aircraft via visual cues such as the aircraft's shadow, similar to the findings of Hazel et al. (2007) regarding watercraft, potentially eliciting a brief reaction such as a dive or lateral movement. However, considering that sea turtles spend a significant portion of their time below the sea surface (Lutcavage and Lutz, 1997) and the low frequency and short duration of surveillance flights, the probability of exposing an individual to an acoustically or visually induced stressor from aircraft momentarily flying overhead would be very low. The same is relevant for other ESA-listed species in the action area, considering their limited time near the surface and brief aircraft overflight.

As stated in the Environmental Protection Measures, spotter aircraft will maintain a minimum of 1,000-ft over ESA-listed or MMPA-protected species and 1,500 ft over North Atlantic right whales. Additionally, aircraft will avoid flying in circles if marine mammals or sea turtles are spotted to avoid any type of harassing behavior. The chances of an individual ESA-listed species being exposed to the proposed aircraft overflights are extremely low. Given the limited and temporary behavioral responses documented in available research, it is expected that potential effects on ESA-listed species, should they even occur, would be insignificant. We conclude that effects from aircraft overflight to ESA-listed marine mammals, sea turtles, and fish in the action area because of activities covered under this programmatic may affect,but are not likely to adversely affect these animals.

4.1.5 Exposure to Hazardous Materials

Hypergolic fuels (e.g., NTO and MMH) may be on the spacecraft during a splashdown. A spacecraft's propellant storage is designed to retain residual propellant, so any propellant remaining in the spacecraft is not expected to be released into the ocean. In an event the propellant tank actually ruptures on impact, the propellant would evaporate or be quickly diluted.

In the event of a failed launch operation, launch operators will follow the emergency response and cleanup procedures outlined in their Hazardous Material Emergency Response Plan (or similar plan). Procedures may include containing the spill using disposable containment materials and cleaning the area with absorbents or other materials to reduce the magnitude and duration of any impacts. In most launch failure scenarios, at least a portion of the propellant will be consumed by the launch/failure, and any remaining propellant will evaporate within hours or be diluted by seawater and degrade over time (timeframes are variable based on environmental conditions, but generally hours to days). Launch vehicles and spacecraft are designed to retain propellants and even if there is a rare launch failure (> 93% success rate over 30 years), propellants will evaporate and be diluted within hours. The chance for ESA-listed marine species to be exposed to the residual propellants from a Starship or Super Heavy decent is extremely low and therefore discountable. Therefore, hazardous material exposure to ESA-listed marine mammals, sea turtles, and fishes in the action area may affect, but are not likely to adversely affect these animals.

5 Determination of Effects

Table 5-1 represents the FAA's overall effects determinations for ESA-listed species analyzed in this BA.

Table 5-1: Effect Determinations Under the Action

Species Name	*DPS*	*ESA Status*	*Species Effects Determination*	*Critical Habitat Effects Determination*[1]
Fishes				
Atlantic sturgeon *Acipenser oxyrinchus oxyrinchus*	Carolina DPS	Endangered	NLAA	-
	South Atlantic DPS	Endangered	NLAA	-
Giant manta ray *Manta birostris*	-	Threatened	NLAA	-
Gulf sturgeon *Acipenser oxyrinchus desotoi*	-	Threatened	NLAA	-
Nassau grouper *Epinephelus striatus*	-	Threatened	NLAA	-
Oceanic whitetip shark *Carcharhinus longimanus*	-	Threatened	NLAA	-
Scalloped hammerhead shark *Sphyrna lewini*	-	Threatened	NLAA	-
Sea Turtles				
Green sea turtle / *Chelonia mydas*	North Atlantic Ocean DPS	Threatened	NLAA	NLAA
	East Pacific DPS	Threatened	NLAA	
	Central North Pacific DPS	Threatened	NLAA	
	East Indian-West Pacific DPS	Threatened (Foreign)	NLAA	-
	North Indian DPS	Threatened (Foreign)	NLAA	-
	Southwest Indian Ocean DPS	Threatened (Foreign)	NLAA	-
Olive ridley sea turtle *Lepiodochelys olivacea*	-	Endangered	NLAA	-

Kemp's ridley sea turtle	-	Endangered	NLAA	-
Hawksbill sea turtle *Eretmochelys imbricata*	-	Endangered	NLAA	-
Leatherback sea turtle *Demochelys coriacea*	-	Endangered	NLAA	-
Loggerhead sea turtle *Caretta caretta*	Northwest Atlantic Ocean DPS	Threatened	NLAA	NLAA
	North Pacific Ocean DPS	Endangered	NLAA	
	South Pacific Ocean DPS	Endangered (Foreign)	NLAA	-
	North Indian Ocean DPS	Endangered (Foreign)	NLAA	-
	Southwest Indian Ocean DPS	Threatened (Foreign)	NLAA	-
	Southeast Indo-Pacific DPS	Threatened (Foreign)	NLAA	-
Marine Mammals				
Blue whale/pygmy blue whale *Balaenoptera musculus*	-	Endangered	NLAA	-
False killer whale *Pseudorca crassidens*	MHI Insular DPS	Endangered	NLAA	-
Fin whale *Balaenoptera physalus*	-	Endangered	NLAA	-
Humpback whale *Megaptera novaeangliae*	Mexico DPS	Threatened	NLAA	-
	Central America DPS	Endangered	NLAA	-
North Atlantic right whale *Eubalaena glacialis*	-	Endangered	NLAA	NLAA
Rice's whale *Balaenoptera ricei*	-	Endangered	NLAA	-
Sei whale *Balaenoptera borealis*	-	Endangered	NLAA	-

Species Name	*DPS*	*ESA Status*	*Species Effects Determination*	*Critical Habitat Effects Determination*[1]
Sperm whale *Physeter macrocephalus*	-	Endangered	NLAA	-
Guadalupe fur seal *Arctocephalus townsendii*	-	Threatened	NLAA	-
Hawaiian monk seal *Neomonachus schauinslandi*	-	Endangered	NLAA	-

Notes: DPS=Distinct Population Segment, ESA=Endangered Species Act, NLAA=Not Likely Adversely Affect

1. "-" in the Critical Habitat column indicates that the species does not have critical habitat designated in the Action Area.

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Submitted to: mary_orms@fws.gov

RE: Request for Second Reinitiation of Formal Consultation under Endangered Species Act Section 7 for the SpaceX Starship-Super Heavy Project, Cameron County, Texas (Consultation Number 02ETCC00-2012-F-0186-R001; 2023-0087412)

Dear Ms. Yeargan:

The Federal Aviation Administration (FAA) is evaluating changes to SpaceX Exploration Technologies Corporation's (SpaceX) Starship-Super Heavy launch vehicle program at its Boca Chica Launch Site in Cameron County, Texas. To date, the FAA and the Service have consulted on the following:

- SpaceX previously obtained a vehicle operator license from the FAA to operate the Starship-Super Heavy for which the Service issued a Final Biological and Conference Opinion (BCO) and Incidental Take Statement (ITS) on May 12, 2022 (Consultation Number 02ETCC00-2012-F-0186-R001).

- The FAA reinitiated Endangered Species Act (ESA) Section 7 consultation with the Service in 2023 to evaluate the effects of operating a deluge and detonation suppression system at the SpaceX Vertical Launch Area. The Service issued a Final BCO Addendum on November 14, 2023 (Consultation Number 2023-008741).

- The FAA requested and the Service provided written concurrence on October 11, 2024, that greater estimated sonic boom overpressures would not likely adversely affect any species listed or proposed for listing under the ESA or any designated or proposed critical habitats beyond those effects already evaluated in the 2022 BCO/ITS and 2023 Addendum (Consultation Number 2025-0000669).

The FAA is developing a Revised Tiered Environmental Assessment (EA) to assess the potential environmental impacts associated with SpaceX's proposed increase in launch and landing cadence of the Starship-Super Heavy launch vehicle at its Boca Chica Launch Site. The EA will support FAA's modification to SpaceX's Vehicle Operator License for Starship and Super Heavy at Boca Chica, and to use associated launch systems at a higher cadence than analyzed in the 2022 *Final Programmatic Environmental Assessment for the SpaceX Starship/Super Heavy Launch Vehicle Program at the SpaceX Boca Chica Launch Site in Cameron County, Texas*.

This assessment of potential environmental impacts includes potential effects to species listed and critical habitat designated under the ESA.

FAA submits to the Service Addendum #2 to the October 2021 Biological Assessment for the SpaceX Starship-Super Heavy Launch Vehicle Program at Boca Chica. Addendum #2 reviews and considers new information regarding effects of the action (including a variety of monitoring data, an observed gravel plume, and increased estimated sonic boom overpressures), evaluates the effects of increased launch cadence, and expands the action area to include consideration of landing activities over the ocean and greater estimated sonic boom overpressure contours. FAA requests to reinitiate formal consultation with the Service regarding this new information and analysis.

Thank you for your assistance in this matter. Please contact Amy Hanson, Environmental Specialist, at Amy.Hanson@faa.gov or (847) 243-7609 to discuss any questions or concerns.

Sincerely,

STACEY MOLINICH ZEE

Digitally signed by STACEY MOLINICH ZEE
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Stacey Zee

Manager, Operations Support

attachment

Addendum #2 to the October 2021 Biological Assessment for the SpaceX Starship-Super Heavy Launch Vehicle Program at the SpaceX Boca Chica Launch Site in Cameron County, Texas Addressing an Increased Launch Cadence

October 24, 2024

Introduction

In October 2021, the Federal Aviation Administration (FAA) prepared a Biological Assessment (BA) for the SpaceX Starship-Super Heavy Launch Vehicle Program at the SpaceX Boca Chica Launch Site in Cameron County, Texas (FAA 2021). The BA supported Endangered Species Act (ESA) Section 7 interagency consultation between the FAA and the United States Fish and Wildlife Service (USFWS). The BA evaluated the effects to ESA-listed species and designated or proposed critical habitat caused by FAA's proposed issuance of commercial space licenses or permits to SpaceX. The USFWS issued a Biological and Conference Opinion (BCO) and Incidental Take Statement (ITS) for this action on May 12, 2022 (consultation and conference number **02ETCC00-2012-F-0186-R001**; USFWS 2022a).

The original operational mission profile evaluated in the BA and BCO consisted of up to five annual Starship launches and up to five annual Super Heavy launches (which could occur by itself or with Starship attached as the second stage of the launch vehicle), for 10 total launch events from the SpaceX Boca Chica Vertical Launch Area (VLA). Up to two of these launches were expected to occur at night. Each launch event was associated with two static fire engine tests (20 total tests with a cumulative duration of up to 150 seconds for Starship tests and 135 seconds for Super Heavy tests). Together, the analysis considered a total of 30 annual engine ignition events (20 static fire tests and 10 launches). Each launch event was also associated with a landing for each vehicle, which could occur at the VLA or in the ocean. The BA and BCO considered up to 10 annual Starship landings (accounting for up to five individual Starship launches and five stacked Starship-Super Heavy launches) and up to five annual Super Heavy landings at the VLA. The BA and BCO also considered a variety of construction activities associated to improve operational efficiency, such as additional parking.

Test Launch #1 and Reinitiation #1

The first test launch of the stacked Starship-Super Heavy launch vehicle occurred on April 20, 2023. The first test launch caused damage to the VLA that distributed launch pad debris and dust and ignited a brush fire within the action area. In response, among other actions, SpaceX installed a stainless-steel plate below the launch pad and a deluge and detonation suppression system that sprays water during engine ignition to reduce heat and vibration from engine fire and thrust.

In October 2023, the FAA prepared an Addendum to the BA (herein, Addendum #1; FAA 2023). Addendum #1 considered the following:

- the effects of operation of a deluge and detonation suppression system at the VLA;
- updated the environmental baseline of the action area after an April 20, 2023, test launch of the Starship-Super Heavy launch vehicle; and

- added the threatened cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*) and proposed endangered tricolored bat (*Perimyotis subflavus*) to the analysis.

FAA reinitiated the consultation based on the information and analysis of Addendum #1. USFWS issued an amendment to the BCO (BCO Reinitiation #1) on November 14, 2023 (USFWS 2023a). The BCO Reinitiation #1 acknowledged FAA determinations of "no effect," concurred with FAA determinations of "not likely to adversely affect," and evaluated adverse effects to four listed species and two designated or proposed critical habitat areas. USFWS determined that the operation of the deluge and detonation system would not likely jeopardize listed species or result in the destruction or adverse modification of designated or proposed critical habitat. USFWS determined that no additional incidental take was reasonably certain to occur but amended the ITS to include new terms and conditions for implementing additional reasonable and prudent measures related to managing truck traffic and performing environmental monitoring.

Test Launch #2

On November 18, 2023, SpaceX performed its second test launch of the Starship-Super Heavy launch vehicles, which included operation of the deluge and detonation suppression system (Launch #2). Launch #2 did not cause damage to the launch pad, distribute debris across the action area, or ignite any brush fires.

As contemplated in Addendum #1, drone monitoring by SpaceX detected water released by the deluge and detonation suppression system extended approximately 0.3 mile from the launch pad in the form of a visible vapor cloud. Drone imagery was also used to estimate the extent of sheet flow or push out of deluge water, which was visible approximately 100 feet from the developed edge of the VLA (SpaceX 2024a).

Following the monitoring measures required by the BCO and ITS, SpaceX engaged Raba Kistner, Inc. (RKI), to perform pre- and post-launch vegetation monitoring within 0.6 mile of the VLA for Launch #2. This monitoring reported evidence of damage to vegetation from Launch #2 described in RKI (2024a) as:

- sand deposits and concrete debris approximately 360 feet southwest and southeast of the VLA;
- heavy surface disturbance in the mud flats within approximately 200 feet to the south of the VLA;
- light surface disturbance in the mud flats out to approximately 1,000 feet south of the VLA; and
- minimal damage to vegetation or mud flats to the north and west of the VLA, with some scattered metal and previously deposited concrete debris.

In light of these findings, the RKI vegetation monitoring report for Launch #2 concluded:

> After analyzing the data collected from pre- and post-launch surveys, RKI has determined that no significant effects to the surrounding vegetation occurred as a result [sic] of the activity. Any potential damage to vegetation is likely minor and will not cause harm to the surrounding ecosystem or imperiled species. (RKI 2024a)

SpaceX performed contaminant monitoring required by BCO Reinitiation #1 before, during, and after Launch #2. SpaceX tested soil/benthic media, air, and water for potential constituents of stainless steel, specifically total chromium, iron, aluminum, and nickel (SpaceX 2023a).

In the soil samples, testing found that levels of these stainless-steel constituents were below background concentrations for all samples (pre- and post-launch, and for all sample locations) and that variation in the detected amounts among locations and between pre- and post-launch collections were negligible and representative of variation in the environment rather than attributable to a point source of discharge (SpaceX 2023a). Further, hexavalent chromium (a constituent of prime concern for USFWS) was non-detectable in the post-launch soil/benthic media samples (SpaceX 2023a).

Air sampling from the "launch pad surface" detected trace amounts of iron in dust on sample pumps, but not in amounts representing an exposure risk if this dust had been airborne. The launch pad surface sample equipment was not sanitized prior to Launch #2 and results may not have been representative of air conditions during the launch itself. Other air sample locations at the Starbase production facility, South Padre Island, and Port Isabel returned test results significantly below the lowest measurable levels, posing no exposure risk (SpaceX 2023a).

SpaceX tested the potable water supplied for the deluge and detonation suppression system, water released during an October 25, 2023, static fire test using this system, and water released during Launch #2. Samples from the static fire test and Launch #2 included collections from the retention basin on the VLA and collections from approximately 20 to 30 feet south of the paved portion of the launch pad. Testing found no significant increase in tested analytes compared to pre-launch samples, and the results remain below the Standard for Industrial MSGP Numeric Effluent Limits (SpaceX 2023a).

As required by the BCO and ITS, SpaceX engaged RKI to perform pre- and post-launch avian monitoring for Launch #2 (RKI 2024b) following methods described in the May 5, 2023, version of the SpaceX Boca Chica Biological Monitoring Plan (SpaceX 2023b). Pre-launch monitoring performed on November 15, 2023 (2 days prior to the launch), reported nine detections of piping plovers (*Charadrius melodus*) on the portion of Boca Chica Beach within 1 mile of the VLA and none on any of the other three survey routes that sample mud flat habitats within 1 mile of the VLA. No red knots (*Calidris canutus rufa*) were detected during the pre-launch monitoring. Post-launch monitoring performed on November 19, 2023 (1 day after Launch #2), reported three detections of piping plovers (two on Boca Chica Beach and one on the South Bay route) and seven detections of red knots on the South Bay route. The South Bay route is located north of the VLA along the inland edge of the dunes. RKI did not detect any northern aplomado falcons during this pre- and post-launch monitoring (RKI 2024b). RKI (2024b) reported that no dead birds were detected during pre- or post-launch avian monitoring and no significant effects to avian species occurred as a result of Launch #2.

Test Launch #3

On March 14, 2024, SpaceX performed its third test launch of the Starship-Super Heavy launch vehicles, which also included operation of the deluge and detonation suppression system (Launch #3). Launch #3 did not cause damage to the launch pad. Debris was distributed in mudflats and upland vegetation north of the launch pad. Debris was mostly lightweight materials used for insulation on launchpad infrastructure (Raba Kistner 2024c). All debris from Launch #3 was removed in accordance with SpaceX's Anomaly Response Plan and Memorandum of Agreement with Texas Parks and Wildlife Department (TPWD) after coordination and approval from TPWD. Two small brush fires resulted from Launch #3. Approximately 0.1 acre was burned in a dry grassy area approximately 0.4 miles northwest of the launch mount. A second fire covering approximately 0.25 acre occurred in a dry grassy region approximately

0.15 miles south of the launch mount. No dead or injured ESA-listed species were observed. The northern fire was extinguished by SpaceX personnel using rakes and fire extinguishers and the southern fire self-extinguished.

Drone monitoring of the deluge and detonation suppression system conducted by SpaceX detected water released approximately 0.2 miles from the launch pad in the form of a visible vapor cloud. The sheet flow or push out was observed approximately 100 feet from the developed edge of the VLA (SpaceX 2024b). Additionally, SpaceX used thermocouples to measure temperature during the launch event at five locations 0.2, 0.4, 0.6, 0.8, and 1 mile from the launch mount. The thermocouple at 0.2 mile from the launch mount recorded a temperature change from ambient temperature (72 degrees Fahrenheit (°F)) to a maximum of 90° F. The maximum temperature of 90°F was recorded 30 seconds after engine ignition and stayed at 90°F for five seconds. No changes from ambient temperature were recorded at any other location.

The BCO and ITS required pre- and post-launch vegetation monitoring within 0.6 mile of the VLA was performed by RKI. This monitoring reported a 0.3-acre patch to the southeast of the launchpad and a 0.15-acre patch of vegetation damaged by a fire during the launch. Disturbance patterns were primarily observed northwest, northeast and directly south from the launch pad facilities. Damage to mangroves north of the launchpad were observed during filed reconnaissance, but not through the remote sensing analysis. New debris was found north of the launchpad, consisting of lightweight materials from a damaged tank (RKI 2024d).

SpaceX performed the required contaminant monitoring in accordance with the BCO Reinitiation #1 for Launch #3. SpaceX collected field samples of soil, benthic media, water, and air during and after Launch #3. All of the soil chemical analysis results were below Texas-specific background concentrations and there were no evident trends between pre- and post-launch conditions at any sample location for any monitored constituent. No soil or benthic media sample contained detectable levels of hexavalent chromium. Air samples returned only trace amounts of monitored constituents, with no apparent trend over time or distance. Water samples taken from the retention pond on the VLA and off-site also detected trace amounts of analyzed constituents that were well below the Standard for Industrial MSGP Numeric Effluent Limits. The report notes that compared to Launch #2 results, there were no evident trends (SpaceX 2024c).

RKI performed the pre- and post-launch avian monitoring for Launch #3 (RKI 2024d). Pre-launch monitoring performed on March 13, 2024 (1 day prior to the launch), reported two detections of piping plovers on the South Bay Route within 1 mile of the VLA and none on any of the other three survey routes within 1 mile of the VLA. No red knots were detected during the pre-launch monitoring. Post-launch monitoring performed on March 14, 2024 (the same day as Launch #3), reported no detections of piping plovers and no detections of red knots. RKI did not detect any northern aplomado falcons during this pre- and post-launch monitoring (RKI 2024d). RKI (2024d) reported that no dead birds were detected during pre- or post-launch avian monitoring and no significant effects to avian species occurred as a result of Launch #3.

Test Launch #4

SpaceX performed Test Launch #4 (Launch #4) of Starship-Super Heavy launch vehicles from the VLA on June 6, 2024. The test was considered nominal, however a small amount of inert debris was spread and

a 0.01 acre brush fire was caused. Associated with this test launch, SpaceX monitored air temperature changes at various distances from the launch mount (i.e., the extent, intensity, and duration of the heat plume); the visible extent of overland sheet flow/push out water and the water vapor plume from the operation of the deluge and detonation suppression system; performed pre- and post-launch monitoring for avian and vegetation impacts; and collected samples for contaminants testing which are still undergoing analysis. The findings of these monitoring activities are summarized below.

SpaceX recorded temperatures at various distances from the launch mount during the launch event (Table 1) and recorded a pre-ignition air temperature of 84°F. The temperature probe closest to the launch mount (at 250 feet) recorded a maximum temperature of 226°F, which occurred approximately 23 seconds after engine ignition and returned to ambient temperature (approximated as 90°F) after approximately 1 minute. The most distant, functioning probe at 800 feet from the launch mount recorded a maximum temperature of 142°F approximately 35 seconds after engine ignition and returned to ambient temperature after approximately 4 minutes (SpaceX 2024d).

The temperature measurements taken during Launch #3 and Launch #4 demonstrate that the deluge and detonation suppression system reduces the intensity of the heat plume substantially. Prior modeling of a launch heat plume without the operation of this system estimated maximum temperatures of approximately 300°F at the edge of the VLA and 212°F at a distance of 0.3 mile from the VLA. The monitoring data indicate that the temperature at the edge of the VLA reaches 226°F (a 25% reduction in the previously analyzed maximum temperature) and is likely less than 142°F at 0.3 mile from the VLA (at least a 33% reduction in the previously analyzed maximum temperature). Temperature probes at distances greater than 0.2 mile from the launch mount during Launch #3 recorded no change from ambient temperature during the launch. These findings also demonstrate that the heat plume with operation of the deluge and detonation suppression system likely extends approximately 0.2 mile from the VLA with the most intense heat dissipating quickly (within approximately 1 minute and consistent with prior analysis). Some areas may take several minutes to fully return to ambient temperature.

Table 1. Temperature Measurements During Test Launch #4

Distance from Launch Mount	Maximum Temperature	Time from Engine Ignition to Maximum Temperature	Time from Engine Ignition to Ambient Temperature
250 feet	226°F	23 seconds	1 minute
400 feet*	145°F	40 seconds	3 minutes
600 feet	189°F	25 seconds	4.5 minutes
800 feet	142°F	35 seconds	4 minutes
0.2 mile	No Data	No Data	No Data

Source: SpaceX (2024d)

* This probe was placed behind a building, which may have shielded the probe from some of the heat plume.

SpaceX used drone arial imagery to measure the extent of overland sheet flow of water discharging from the deluge and detonation suppression system and the extent of the vapor plume. Water discharging from this system is visibly projected up to 200 feet from the launch mount, extending approximately 100 feet past the edge of the developed portion of the VLA (but still contained within lands owned by SpaceX. This distance is consistent with the results of monitoring performed for Launch #2 and Launch #3. The vapor plume was observed to extend approximately 0.2 mile from the launch

mount. Wet sand immediately following the launch caused by projected water, overland sheet flow, or condensation of the vapor plume was observed approximately 200 feet from the launch mount and up to 100 feet from the paved launch pad (i.e the developed edge of the VLA) (SpaceX 2024d). Wet sand conditions may be the result of discharged water from the VLA or weather or tide conditions.

RKI performed the pre- and post-launch avian monitoring for Test Launch #4 (RKI 2024e). RKI did not observe any piping plovers, red knots, or northern aplomado falcons during these surveys. RKI did not report detections of any other listed species in connection with these surveys. Piping plovers and red knots are not expected to occur in south Texas in June; instead, in June, most individuals are expected to be at their breeding grounds outside of Texas.

RKI performed pre- and post-launch vegetation monitoring for Test Launch #4 (RKI 2024f) with orthometric aerial imagery (i.e., aerial images that are corrected for camera tilt and topographic relief and that are representative of a "photographic map") and with a Normalized Difference Vegetation Index (NVDI) tool (i.e., a score based on the differential reflection of infrared and red light waves that can help distinguish among areas of water or rocks, dead vegetation, bare soil, sparse or stressed vegetation, and dense vegetation). Review of the orthometric aerial imagery revealed approximately 535 square feet of vegetation damage due to fire south of the VLA. No other visibly noticeable vegetation changes were reported from the orthometric aerial imagery comparisons. The NVDI analysis revealed some areas of minor to moderate negative changes in NVDI values, mostly in upland and dune habitats, which may indicate a reduction in vegetation density or health or increased area of surface water. Overall, RKI determined that minimal damage to the vegetation surrounding the launch pad occurred following Test Launch #4, primarily due to the small fire (RKI 2024f).

RKI (2024f) reported that debris composed of non-hazardous materials was observed following Test Launch #4, but that it was removed immediately after the launch by SpaceX. The specific type, quantity, and location of the debris scatter was not reported.

The Coastal Bend Bays & Estuaries Program documented a "thick cloud of dust and small debris" pushed out from the engine thrust during Test Launch #4 and a pea-sized piece of concrete debris damaged a camera lens (LeClaire and Newstead 2024). This report suggests that a "gravel plume" that moves up to pea-sized particles of mud, sand, gravel, and similar materials with enough force to damage shorebird eggs extends at least 0.25 miles from the VLA. A gravel plume was not previously analyzed in the 2021 BA or the BCO but is considered in this Addendum #2. Incidentally, the game camera footage also documented adult nesting shorebirds moving away from nesting areas near the VLA in response to the noise, activity, and heat/vapor/gravel plumes generated by launch activity and quickly returned to areas exposed to these plumes following a launch.

As part of the October 12, 2024 Written Re-Evaluation of the 2022 Final Programmatic Environmental Assessment for the SpaceX Starship/Super Heavy Launch Vehicle Program at the Boca Chica Launch Site in Cameron County, Texas for Updates to the Forward Heat Shield Interstage Landing Area, Sonic Boom Coverage, Use of the Deluge System During Return to Launch Site Landings, and use of US Coast Guard Safety Zones, the FAA conducted informal consultation with USFWS to evaluate impacts of expansion of the 1 psf sonic boom modeled contour. The FAA requested concurrence with USFWS on September 12, 2024 that the updated sonic boom estimates are consistent with prior analyses and determinations supporting the program, and USFWS provided concurrence on October 11, 2024 that expansion of the action area under the Proposed Action may affect, but is not likely to adversely affect ESA-listed species

and designated habitat beyond those effects already evaluated in the 2022 Biological and Conference Opinion (BCO) and Incidental Take Statement (ITS) and 2023 BCO Addendum (Consultation Number 02ETCC00-2012-F-0186-R001).

Addendum #2 for Proposed Action

This Addendum #2 addresses changes to the proposed action and incorporates new information from ongoing testing and monitoring:

- **Increased Launch Cadence** -- This Addendum #2 to the BA evaluates a proposed change to the original mission profile for the launch operations licensed by the FAA. As described in more detail below, the modified license and related SpaceX activities evaluated in herein would authorize an increased number of Starship-Super Heavy orbital launches and landings. Related to the increased number of licensed launches and landings would be an increased number and decreased total duration of static fire engine tests, decreased number of nighttime launches, increased volume of water applied by the deluge and detonation suppression system, and increased truck traffic on State Highway (SH) 4. Other aspects of the original mission profile, such as mission rehearsals, ground support operations, and personnel, would not change under the new proposed mission profile and are not reconsidered.
- **Gravel Plume** - Addendum #2 evaluates the effects of a gravel plume generated by engine thrust that moves mud, sand, gravel, and other small particulates from the ground with sufficient force to damage bird eggs. The extent of the gravel plume is assumed to be approximately 0.3 mile based on observations reported in LeClaire and Newstead (2024).
- **Landing Action Areas** – Addendum #2 explicitly evaluates the landing of SpaceX vehicles in or over the ocean. These landings will take place over portions of the Atlantic, Pacific, and Indian Oceans, with the vehicle either being expended into the water or landing on a platform. The landing areas expand the Action Area of this BA to include new Landing Action Areas. Updated official species lists and additional species (i.e., several species of seabird) are evaluated for the Landing Action Areas.
- **Updated Sonic Boom Modeling and Expanded VLA Action Area** – Addendum #2 incorporates new modeling of sonic boom overpressure level contours for Starship and Super Heavy landings. The updated modeling predicts that exposure to a 1 psf sonic boom overpressure level is possible to a distance of approximately 20 to 27 miles over land or 33 miles over water for a Super Heavy landing at the VLA (noting, however, that these contours are approximate and actual exposure at any particular location or time varies greatly with a number of different atmospheric, physical, and operational parameters). This new modeling conservatively (i.e., generously) expands the VLA- based Action Area, which is updated to include the new estimated 1 psf sonic boom overpressure contour for a Super Heavy landing. An updated official species list, updated environmental baseline descriptions, and updated cumulative activities are provided for the expanded VLA Action Area.

Review of Previously Evaluated Activities and Ongoing Consultations

SpaceX launches the stacked Starship-Super Heavy launch vehicles from launch pads constructed at the VLA, supported by production and manufacturing activities at Boca Chica Village (also known as Starbase).

Boca Chica Village also includes other support infrastructure such as housing, restaurants, and offices used in connection with SpaceX's production and manufacturing facility. The original mission cadence is described above.

Without operation of the deluge and detonation suppression system, the heat plume generated by the Starship-Super Heavy engines travels radially away from launch pad, with estimated temperatures of about 300 degrees Fahrenheit at the edge of the VLA, 212 degrees Fahrenheit approximately 0.3 mile from the launch pad, and temperatures reaching ambient temperature (90 degrees Fahrenheit) approximately 0.6 mile from the launch pad. The heat plumes and increased temperatures only occur during engine ignition and dissipate within a few to several minutes. The heat plume temperature and distance estimates decrease with the operation of the deluge and detonation suppression system. Now installed, the deluge and detonation suppression system will be used for during future booster static fires, launches, and landings at the VLA. Data collected during Launch #3 and Launch #4 suggest that the magnitude of the temperature decrease may be approximately 25% to 33% within approximately 800 feet of the launch mount and the extent of the heat plume where temperatures exceed approximately 90°F may be reduced to approximately 0.3 mile. However, Addendum #2 retains the initial heat plume assumptions as a conservative approach to the analysis.

The deluge and detonation suppression system operates during engine ignition activities. As described in Addendum #1, as much as 361,000 gallons of water could be applied during an engine ignition event, but most actual applications would likely use less than this amount. During test flights two and three, during which the deluge system was operated, 180,0000 gallons of water was applied during each launch. Most of the applied water is either vaporized by engine fire or contained within the developed portion of the VLA. Approximately 20% of the water used during deluge system operation is assumed to be dispersed outside the constructed portion of the VLA as overland sheet flow, push out, or condensation from a vapor cloud. Monitoring indicates that overland sheet flow or push out water likely extends up to 100 feet beyond the developed edge of the VLA. The water vapor plume could extend up to 0.6 mile from the launch pad, coextensive with the estimated heat plume; but monitoring during the test launches has only detected the vapor plume extending 0.2 to 0.3 miles from the launch pad.

Landing areas for the Super Heavy vehicle would include the Gulf of Mexico, either expended or on a floating platform, or at the VLA. Landing areas for the Starship vehicle, either expended or on a floating platform, could occur:

- outside the exclusive economic zone (EEZ) in ocean waters greater than 200 nautical miles (nmi) from land, between 55 degrees South and 55 degrees North in latitude; and
- inside the EEZ in ocean waters greater than 16 nmi from land or any national marine sanctuaries, except near the launch location at Boca Chica, for which consultation is ongoing for landing areas as close as 3 nmi from shore.

Landing areas for Starship or Super Heavy are illustrated in Figures 1 through 5.

Landings that occurred downrange on a floating platform would continue to be delivered by barge to the Port of Brownsville and transported the remaining distance to the Boca Chica Launch Site over roadways. Landings will create a sonic boom.

SpaceX trucks in propellants, commodities, and water to the Boca Chica Launch Site. The current mission profile with the operation of the deluge system requires up to 3,850 propellant or commodity truck trips per year and up to 2,190 water truck trips per year between Brownsville and the Boca Chica Launch Site on SH 4.

SpaceX would not change the number of access restrictions for licensed activities at the VLA (500 hours) or anomaly response (300 hours). In the beginning phase of the program, SpaceX estimated needing approximately 100 closures per launch campaign. However, since the 2022 PEA, SpaceX has dramatically reduced the duration of operations and the number of access restrictions through engineering analysis and improvements. There has been an 85% reduction in the number of access restrictions from Flight 1 to Flight 3. Additionally, a majority of the testing that required access restrictions has been moved to SpaceX's Massey's Test Site that no longer requires access restrictions. SpaceX is expected to need less than 20 closure hours per launch campaign to complete any needed booster static fires and launch activity at the VLA. The potential for anomalies, such as explosions that distribute debris or ignite fires, and responses to anomalies to retrieve debris and monitor the extent of damage are contemplated generally in prior analyses as events that may modify habitats outside of the VLA. However, the occurrence of anomalies is unplanned and specific type or extent of an anomaly is unknown. The risk of an unexpected anomaly is expected to decrease as the reliability of the vehicle increases with the number of successful launches. To approximate effects, prior analyses evaluated the impact of anomalies involving debris scatter and fire and anomaly responses within an area of approximately 700 acres, based on the mapped extent of debris fall from testing activities prior to October 2022.

Together, the previously evaluated heat plume, water vapor plume, and debris area extend across a combined 903.65 acres in the immediate vicinity of the VLA. This is the impact area associated with most of the expected adverse effects to species and critical habitats.

Review of Previously Committed Conservation Measures

The FAA and SpaceX have previously committed to implementing a number of conservation measures that avoid, minimize, compensate, or monitor adverse effects to listed/proposed species and designated/proposed critical habitats. These prior commitments are documented in the May 2022 BCO and Reinitiation #1. SpaceX continues to implement these required conservation measures, some of which are briefly summarized below; complete descriptions of all of the measures are contained in the May 2022 BCO and Reinitiation #1. The status of each measure will continue to be reported by SpaceX to the FAA and USFWS through the required annual report.

- Installation of construction shakers, rumble plates, or rock beds at the entry/exit point of the VLA to help prevent the introduction and spread of non-native plants.
- Inspection of heavy equipment to ensure that hydraulic fittings and hoses are in good working order to prevent accidental release of petroleum products at the VLA.
- Environmental briefings for SpaceX personnel and construction contractors to address wildfire prevention, invasive/non-native weed spread, handling and disposal of hazardous wastes and garbage, potential for vehicle collisions with wildlife (including ocelots and jaguarundis), and the availability of an employee shuttle.

- Conducting field surveys for migratory bird nests in advance of construction activities that occur during the avian breeding season and avoiding activities that would directly or indirectly disturbed nesting birds until the nest is no longer in use.
- Incorporating raptor protection measures, as applicable, to project structures and above-ground utility upgrades discourage nest building and perching.
- Vehicle speed limits of 25 miles per hour within the VLA and restriction of vehicle use to paved and dirt roads and parking areas.
- Partnership with Sea Turtle Inc. to provide sea turtle survey data to the USFWS annually. SpaceX will continue to collaborate with Sea Turtle, Inc. by supplying and storing field equipment and to provide sea turtle survey data within the Action Area to the Service annually.
- Partnership with USFWS National Wildlife Refuge staff to identify additional activities that would assist in protecting refuge lands and species habitats from impacts that may occur from public intrusions prior to closures.
- Updates to Stormwater Pollution Prevention Plans (SWPPP) to address the construction of additional facilities proposed for the VLA and ensure compliance with its TCEQ stormwater permit.
- Implementation of a Spill Prevention, Control, and Countermeasure Plan (SPCCP) with quarterly notices of any updates to this plan.
- Compliance with Clean Water Act Section 404 rules and any permit terms and conditions regarding the discharge of dredged or fill material into waters of the U.S.
- Contracting with a qualified biologist to conduct biological monitoring for vegetation and birds. Monitoring reports will continue to be sent to the Service annually.
- Operation of an employee shuttle between Brownsville and the project site and between parking areas at LLCC and the VLA to reduce the number of project-related vehicles traveling to and from the project site. SpaceX will continue to encourage employees to use the shuttle by providing information on shuttle operation in new hire onboarding materials, routine staff communications (such as staff meetings), and in contractor environmental trainings.
- Updates to and implementation of a Lighting Management Plan that addresses the type, placement, and use of lighting to minimize lateral light spread while maintaining safe operating conditions.
- Upon Service and SpaceX agreement of locations alongside SH 4 or other identified roads where the footprint is disturbed, SpaceX will fund the purchase of vehicle barrier materials to prevent trucks or ATVs from entering the refuge. The amount needed in any given year will be determined by the Refuge and is not to exceed $10,000 annually. SpaceX will install the barriers and Refuge staff will perform general maintenance and repairs of the barriers. SpaceX will be responsible for replacing or restoring damaged barriers caused by SpaceX personnel or an anomaly.
- In coordination with NWR staff, SpaceX will develop a protocol (e.g., Access Restriction Notification Plan) providing as much advance notice as practicable to minimize disruption to refuge and land management activities. This measure would minimize traffic within the restricted zone during launch activities and minimize modification of habitat for sea turtles, ocelots, jaguarundis, piping plovers, and red knots.

Proposed Action for Increased Mission Cadence and Additional Conservation Commitments

Increased Mission Cadence: The FAA's proposed action is to modify SpaceX's vehicle operator license, which would allow SpaceX to conduct up to 25 orbital launches of the stacked Starship-Super Heavy vehicles from the VLA and up to 50 landings of the individual Starship or Super Heavy vehicles at the VLA or one of the over-ocean landing areas annually. The number of annual launch events would increase by 150% and the number of annual landings would increase by 233% over the previously analyzed mission cadence. The likely distribution of vehicle landings between the VLA and any of the over-ocean landing areas is not known.

SpaceX no longer anticipates performing sub-orbital launches of the Starship vehicle. Therefore, no Starship-only launches are proposed. The proportion of annual launches that involve the Super Heavy vehicle will double from 50% to 100%.

Decreased Total Duration of Static Fire Testing: SpaceX anticipates conducting static fire engine tests of the Starship and Super Heavy vehicles as described below:

- Starship Static Fire Engine Tests: 90 total seconds of static fire per year
- Super Heavy Static Fire Engine Tests: 70 total seconds of static fire per year

In total, SpaceX estimates that it will conduct static fire tests for a combined total duration of 160 seconds per year, which is a decrease from 285 seconds per year (44% decrease).

Increased Nighttime Activities: Up to 12% of the Starship-Super Heavy launches are assumed to occur at night (between 7pm to 7am). For the purposes of this analysis, SpaceX assumes that 3 of the 25 annual launches could occur at night. SpaceX no longer intends to conduct static fire engine tests at night. The number of possible nighttime launches would increase by 150% to 3, while the number of nighttime static fire tests would be reduced to zero.

Increased Deluge and Detonation Suppression System Volume: SpaceX anticipates increasing its water tank storage capacity at the VLA to up to 600,000 gallons. SpaceX also anticipates increasing the amount of water it uses during each Super Heavy static fire or launch from 361,000 gallons (see Addendum #1) to up to 422,000 gallons. The new volume is based on the estimated amount of water that would be used during a 60-second run of the deluge and detonation suppression system associated with 45 seconds of engine ignition. This application of water is the maximum amount that SpaceX anticipates using during any single Super Heavy static fire or launch at the VLA. SpaceX does not anticipate using the entire water storage volume during a static fire or launch. The additional volume is related to the addition of more water tanks at the VLA to facilitate recycling of applied and recaptured water, provide water for cooling the launch mount deck after vehicle lift-off, and suppress sound. The increased amount of water will support a longer duration for individual static fire tests.

SpaceX does not anticipate using the deluge or detonation suppression system during static fire tests of Starship.

With the increased volume of water used during operation of the deluge and detonation suppression system, SpaceX also adjusts its estimates for the disposition of this water. The new estimates are:

- The system begins to apply water for up to 10 seconds prior to engine ignition. Approximately 70,300 gallons of pre-ignition water is assumed to be pushed out as liquid water beyond the constructed portion of the VLA (17% of total);
- Nearly all applied water is vaporized when the engines are ignited (assumed to burn for 45 seconds) with the vapor cloud dispersing (evaporating) into the air beyond the VLA. An unknown, but likely very small, amount of this vapor cloud may condense into liquid water on the ground or other surfaces. The estimated vapor cloud accounts for approximately 316,500 gallons of the applied water (75% of total);
- The remaining applied water (35,200 gallons) moves across the VLA pad deck as sheet flow during or after completion of the burn. Approximately one-half of this sheet flow (17,600 gallons; 4% of total) is captured by on-site containment structures (e.g., ponds and curbing) and remains within the constructed portion of the VLA. The other one-half of this sheet flow (17,600 gallons; 4% of total) disperses beyond the constructed portion of the VLA.

Therefore, for Addendum #2, SpaceX estimates that each use of the deluge and detonation suppression system would release beyond the constructed portion of the VLA up to 87,900 gallons as liquid water (i.e., push out or sheet flow) and 316,500 gallons as water vapor (most of which would evaporate into the air). Test Launch #2 indicates that most of the liquid water is likely to remain within approximately 100 feet of the constructed VLA and most of the vapor cloud is visible for a short time within 0.3 mile of the VLA.

The total volume of liquid water that may be discharged beyond the constructed limits of the VLA is 87,900 gallons × (25 launches + up to 25 static fire tests) = up to 4,395,000 gallons per year. The estimated volume of liquid water discharged outside the VLA would increase by 106%.

Increased Truck Traffic: Propellants, commodities, and water would continue to be trucked in and/or produced on-site to support launches. Under the proposed mission profile, SpaceX anticipates related truck traffic would increase to up to 18,421 propellant or commodity truck trips per year and up to 5,350 water truck trips per year (i.e., 18,421 + 5,350 = 23,771 total truck trips per year). The number truck trips would increase by 294%. SpaceX will continue to schedule truck deliveries to the VLA during daytime hours to the maximum extent practicable.

Increased Ablation: During engine ignition of the Starship/Super Heavy, surfaces of the steel infrastructure could experience ablation. The metal components of the steel could remain localized to the launch pad, captured in the deluge water and retained on-site, or dispersed in vapor the plume. Contaminants monitoring by SpaceX is ongoing and will help determine how much, if any, of this metal is actually deposited outside the boundary of the VLA. Monitoring conducted for Launch #2 did not detect more than negligible or trace amounts of any of the stainless-steel constituents evaluated (SpaceX 2023a). The increased launch operations are anticipated to continue to have negligible impacts to soil, air, and water during launch operations from potential ablation. There is presently no data to indicate that airborne particles are likely given the deluge system. No changes to baseline contaminant levels have been detected to date.

No Change to Access Restrictions: SpaceX continues to improve testing procedures in ways that minimize the number of anticipated access restrictions. Therefore, the increased mission profile of the proposed action would not increase the previously evaluated access restriction hours for licensed activities at the VLA (500 hours) or anomaly responses (300 hours).

Table 2 summarizes and compares the proposed activities and consequences to previously analyzed activities and consequences.

Table 2. Summary and Comparison of Increased Mission Profile and Related Activities and Consequences

Activity or Consequence	Original Mission Profile (BA and BCO)	Deluge and Detonation System Addition (Addendum #1 and Reinitiation #1)	Increased Mission Cadence (Addendum #2)	Comparison Between Increased Mission Cadence and Previously Reviewed Activities
Launches and Landings	10 launches annually (five sub-orbital Starship launches and five orbital Starship-Super Heavy launches) 15 landings annually (10 Starship landings and five Super Heavy landings)	No change	25 orbital launches of the stacked Starship-Super Heavy vehicles annually 50 landings annually (25 Starship landings and 25 Super Heavy landings, with no more than 22 daytime Super Heavy and 22 daytime Starship landings at the VLA)	Number of annual launch events increased by 150% Number of annual landings increased by 233% Increased magnitude of engine fire (from 50% Super Heavy launches to 100% Super Heavy launches)
Static Fire Engine Tests	Starship: 150 seconds per year Super Heavy: 135 seconds per year Together, 285 seconds per year	No change to cumulative test durations	Starship: 90 seconds Super Heavy: 70 seconds Together, 160 seconds per year	Cumulative duration of test events decreased by 44%
Nighttime Launches and Static Fires	Up to 20% of total events at night (10 launches × 20% = 2 launches per year)	No change Assumed 20 test events × 20% = 4 test events per year	Up to 3 nighttime launches per year	Number of nighttime launches increased by 150%. Number of nighttime static fire reduced to zero

Activity or Consequence	Original Mission Profile (BA and BCO)	Deluge and Detonation System Addition (Addendum #1 and Reinitiation #1)	Increased Mission Cadence (Addendum #2)	Comparison Between Increased Mission Cadence and Previously Reviewed Activities
Deluge and Detonation System Water Volume Discharge Outside VLA	Not analyzed	71,000 gallons discharged outside of VLA per event Cumulative discharge of 2,130,000 gallons outside VLA annually	87,900 gallons of liquid water discharged outside of VLA per event Cumulative 4,395,000 gallons of liquid water discharged outside of VLS per year	Volume of liquid water discharged outside VLA increased by 106%
Truck Traffic on State Highway 4	Up to 3,850 commodity truck trips per year	No change to commodity truck trips Up to 2,190 water truck trips per year	Up to 23,771 truck trips per year	Number of truck trips increased by 294%
Ablation	Not analyzed	Up to 190 pounds per launch Cumulative 1,900 pounds per year (190 pounds per launch × 10 launches)	Up to 190 pounds per launch event Cumulative 4,750 pounds per year	The actual amount of eroded material deposited outside the constructed limits of the VLA, if any, is unknown

Activity or Consequence	Original Mission Profile (BA and BCO)	Deluge and Detonation System Addition (Addendum #1 and Reinitiation #1)	Increased Mission Cadence (Addendum #2)	Comparison Between Increased Mission Cadence and Previously Reviewed Activities
Access Restrictions	Up to 500 hours of nominal operational access restrictions per year Up to 300 hours of anomaly response access restrictions per year	No change	No change	No change

As part of this Addendum #2, SpaceX makes the following additional commitments for conservation of the species addressed in this BA:

- SpaceX understands that USFWS may make recommendations to modify one or more of the existing monitoring, management, or reporting plans related to the Starship-Super Heavy program at Boca Chica. This includes, but is not limited to, the vegetation monitoring protocols contained in the Biological Monitoring Plan. These recommendations may be transmitted to SpaceX before or after completion of this reinitiation process. SpaceX commits to promptly engage with USFWS to discuss any recommendations for change to its monitoring or management plans and to implement recommendations that are practicable and that would likely result in the avoidance or minimization of impacts of incidental take authorized through the consultation process. SpaceX commits to responding to USFWS recommendations within 5 business days of receipt.
- SpaceX commits to provide USFWS and FAA with a quarterly summary of licensed closure hours that are associated with the metrics for incidental take of piping plovers and red knots. The quarterly summary will include the date, start and end time, and duration of individual closure events and a comparison of the total annual duration of closures to date with the authorized annual limit.
- SpaceX will review the locations of existing bollard and sign installation along SH 4 with USFWS and coordinate with USFWS (as part of the existing annual reporting and coordination process) to identify remaining high priority locations for the installation of bollards and/or signage to help manage vehicle access to protected lands and wildlife habitats in the immediate vicinity of VLA and Starbase. SpaceX commits to funding the installation of high priority bollards and signage within 12 months of completing the reinitiation process associated with Addendum #2.
- SpaceX will conduct a review of the existing literature on impulsive noise effects of other non-domesticated shorebird species for purposes of comparison. SpaceX will deliver this review to the Service prior to the conclusion of consultation on Addendum #2 or as soon as possible.
- SpaceX will monitor sonic boom levels during Flight 5 mission profile's Super Heavy booster landing. SpaceX will provide the monitoring data to the FAA within 15 days of the launch for review with other post-launch reporting. SpaceX will continue monitoring the Flight 5 mission profile flights if FAA deems necessary. The FAA will notify the Service if FAA discontinues monitoring.
- SpaceX will collaborate with the Service and FAA to identify and prioritize a list of research studies that would help address data gaps regarding the effects of SpaceX launch activity on ESA-listed wildlife. SpaceX will also seek input on research priorities from scientists with expertise in avian acoustics and dispersal. SpaceX commits to initiating this measure prior to Flight 6 and delivering a completed research priority list to the Service and FAA by April 1, 2025, or as soon as possible.
- SpaceX will provide funds for a necropsy by a qualified professional (subject to Service approval) of any piping plover or red knot found dead within the 15 psf sonic boom overpressure contour. The purpose of the necropsy will be to determine if the bird exhibits indicators of hearing damage.

VLA Action Area

The action area defined in the BA and BCO, which approximated the combined extent of access restrictions and sonic boom impacts, extended approximately 13 to 15 miles around the VLA.[1] Updated sonic boom modeling has expanded the extent of the 1 psf overpressure contour associated with Super Heavy landings at the VLA to a distance of approximately 20 to 27 miles from the VLA over land, and approximately 33 miles over water (SpaceX 2024e). This Addendum #2 adopts this new distance as the limits of the VLA Action Area.

The updated sonic boom overpressure contour modeling estimates that Super Heavy landings at the VLA could generate a sonic boom with approximately 21 psf close to the VLA (i.e., within approximately 2.5 miles of the VLA), diminishing with increasing distance to 1 psf at approximately 20 to 27 miles over land and 33 miles over water. Intense sonic booms can damage buildings and other human-made structures and could plausibly cause physical injury to animals. However, NASA (2003) reported that sonic boom overpressure events generating between 20 and 144 psf have been experienced by humans without injury. A 1991 study funded by the U.S. Air Force found that chicken eggs, when exposed to sonic booms of 17 to 19 psf for a duration of 9 days, did not develop cracks or deviations (Bowles et al. 1991). Numerous other studies also cite sonic booms of varying intensity as having no detrimental effect on wildlife (Maglieri et al. 2014). Therefore, direct physical injury or death of wildlife from sonic booms are not anticipated. Teufel and Horn (2024) state that although species such as western snowy plovers flush in response to booms, the overall population has not been affected by U.S. Space Force operations in California. Therefore, despite the likely increase in the magnitude of the sonic boom overpressure levels generated by landing (at least of the Super Heavy vehicle), the likely effects on listed wildlife are consistent with prior analysis and are related to behavioral responses such as startling or flushing.

The impact areas described in the BA and BCO (i.e., the combined extent of the debris field and the heat/vapor plume) remain unchanged.

Additional Cumulative Activities: The FAA and SpaceX are aware of the following future activities in the expanded VLA Action Area that would not involve federal lands; federal authorizations, permits, or approvals; or federal funds; and that were not previously considered in the BA and BCO. This information is compiled from a review of public meeting records for local governments mentioning approvals for specific projects involving new development projects, searches of local newspapers for activities related to development projects, and other publicly available databases and planning documents such as transportation project dashboards. Where applicable, the search period was limited to May 2022 through December 2023. Projects with likely federal involvement (e.g., authorizations or funding from agencies like U.S. Army Corps of Engineers, Federal Highway Administration, or Federal Energy Regulatory Commission) were not included. SpaceX also provided a summary of other non-federal activities with independent utility from its proposed FAA-licensed activities that it anticipates initiating in the foreseeable future.

[1] The May 2022 BCO describes the extent of the action area as extending approximately 13 miles beyond the VLA. Mapping layers depicting the spatial extent of the sonic boom overpressure zone and the November 2023 Reinitiation #1 describe the action area as extending approximately 14 miles beyond the VLA. The difference is not consequential for the purpose of describing effects of the action since the spatial extent of reasonably certain to occur adverse effects to the species and critical habitat areas considered herein are limited to the combined extent of the debris field and heat/vapor plume. The spatial extent of the action area is depicted in Figure 12 of the May 2022 BCO.

The following unrelated activities may contribute to cumulative effects in the action area:

1. South Padre Island – FAA reviewed South Padre Island planning and zoning commission meeting minutes posted on its public website (City of South Padre Island 2024) covering the period of May 2022 to August 2023. Actions related to approvals for new subdivisions or other new development (excluding replats, rezoning, and other changes to ordinances or rules) included:
    a. Approved preliminary plat for "The Shores Island 2 Subdivision" to include 23 lots within a zoned Planned Development District on the laguna side of the island at the north end of the city (South Padre Island Planning and Zoning Commission 2023).
2. Port Isabel – FAA reviewed Port Isabel planning and zoning commission meeting minutes posted on its public website (City of Port Isabel 2024) covering the period of April 2022 to November 2023. Actions related to approvals for new subdivisions or other new development (excluding replats, rezoning, and other changes to ordinances or rules) included:
    a. Queens Point Development proposed mixed-use public marina with residential spaces, a water-front hotel, a boardwalk, retail spaces, and park-like areas (Donnelly 2022).
    b. Preliminary and final subdivision plats for the Spacious Bay Subdivision on approximately 12.89 acres located north of the Port Isabel High School (Port Isabel Planning and Zoning Commission 2023a, 2023b).
3. Cameron County – FAA reviewed the Cameron County website[2] for public meeting minutes and Department of Transportation project information for non-federal activities approved since May 2022.
    a. Cameron County is proposing to construct the Isla Blanca Road Project, a 0.41-mile long, two-way, rural road at the south end of South Padre Island. The project includes a new road alignment adjacent to the existing Channel View Road (Cameron County Department of Transportation 2023).
4. Texas Department of Transportation – FAA reviewed the Texas Department of Transportation Project Tracker[3] for construction projects classified as beginning construction within the next 4 years or within the next 5 to 10 years. Identified projects consisted of new seal coats, overlays, and other rehabs or upgrades (e.g., sidewalks, curb ramps) of existing roads, including SH 4.
5. Other SpaceX Activities – SpaceX anticipates performing the following activities in the action area that would not involve federal lands, authorizations, or funding.
    a. Construction at Boca Chica Village – SpaceX anticipates expanding its production and manufacturing facility and consolidating work areas within a single building (to be dubbed "StarFactory"). SpaceX also anticipates constructing additional office space and parking structures, expanding the existing Starbase facilities.
    b. Construction and Use of Massey's Static Fire Test Stand – SpaceX anticipates continued construction activity at its Massey Site located on private land along the Rio Grande approximately 4.5 miles southwest of Boca Chica Village. SpaceX also anticipates using this site to perform static fire engine tests of the Starship and Super Heavy vehicles, potentially including operation of a deluge system, that are not subject to licensing by the FAA and would be performed regardless of the FAA-licensed operations. SpaceX

[2] https://www.cameroncountytx.gov/

[3] https://apps3.txdot.gov/apps-cq/project_tracker/

estimates that testing at the Massey Site could generate a heat plume that extends up to 0.5 mile from the test pad before temperatures from engine fire decline to ambient temperature.

c. Rio East Home Construction – SpaceX anticipates constructing homes on each of six previously platted but undeveloped, privately owned lots along Tarpon Haven Drive within an existing subdivision currently referred to as Rio East. Rio East is located along the Rio Grande approximately 1.5 miles southwest of Boca Chica Village. The extent of construction activities would involve approximately 3 acres (estimated as approximately 0.5 acre per home site).
d. Rio West Civil Infrastructure – SpaceX anticipates performing site clearing and other infrastructure preparation activities in advance of potential residential or commercial development on existing, undeveloped, privately owned platted lots within a subdivision currently referred to as Rio West. Rio West is adjacent to Rio East.
e. Ad Astra School Expansion – SpaceX anticipates expanding facilities for its Ad Astra School located approximately 3.5 miles southwest of Boca Chica Village along SH 4 at Egido Street. These expanded facilities would occur within previously developed, private lands.

Landing Zone Action Areas

This portion of the action area refers to the Landing Zones identified by SpaceX where the Starship or Super Heavy vehicles may splash down into the ocean or land on a recovery platform. The Landing Zone Action Areas are found in the Atlantic, Pacific, and Indian Oceans. As SpaceX continues to develop the capability to perform a return to launch site landing of Super Heavy and the Starship, some vehicles may not be reused and instead expended in the ocean depending on the stage of development of the program:

1. Hard water landing at terminal velocity and break up on impact resulting in an explosive event at the surface of the water;
2. Soft water landing and tip over and sink or explode on impact at the surface of the water; or
3. In-flight breakup – Breakup during reentry resulting in debris falling into the ocean (up to 25 times per year of each vehicle stage).

Of the above scenarios, SpaceX anticipates no more than 20 explosive events at the surface of the water for each vehicle for the life of the program. These scenarios would occur within the first five years of the program (FAA 2024).

SpaceX currently lands Super Heavy in the Gulf of Mexico and Starship in the Pacific Ocean west of Hawaii and the Indian Ocean. SpaceX is proposing to expand the potential landing sites of Starship. Super Heavy would land on a droneship or continue to be expended in the Gulf of Mexico (Figure 1). Starship could land on a droneship or be expended in any of the five landing areas: the Indian Ocean (Figure 2), the Pacific Ocean west of Hawaii and the northeast Pacific Ocean (Figure 3), the southeast Pacific Ocean (Figure 4), or the Atlantic Ocean (Figure 5). The droneship operations and specifications were assessed in the 2022 Programmatic Environmental Assessment and 2022 National Marine Fisheries Service consultation (NMFS 2022).

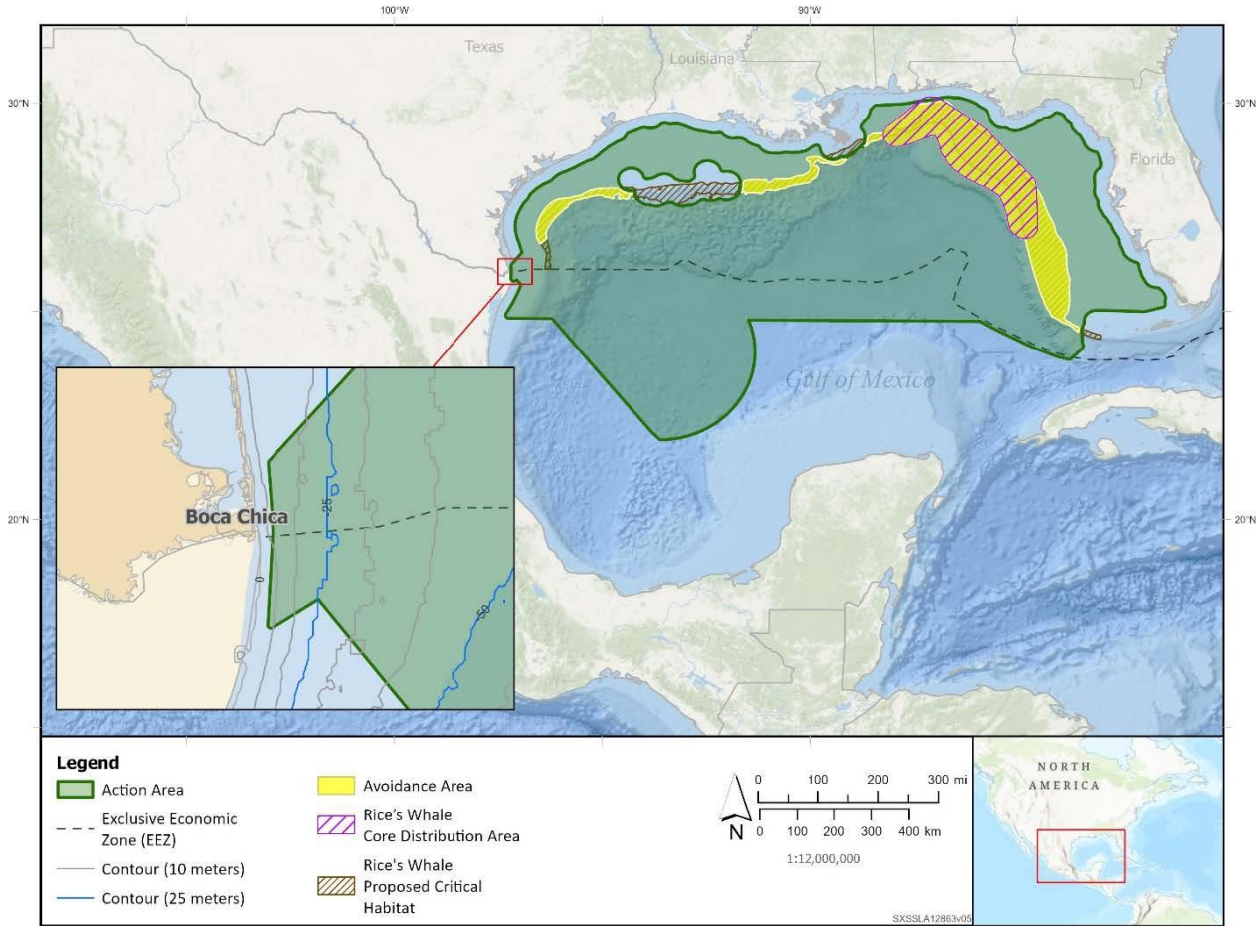

Figure 1. Gulf of Mexico Super Heavy Landing Area and Nominal Landing Location (from FAA 2024)

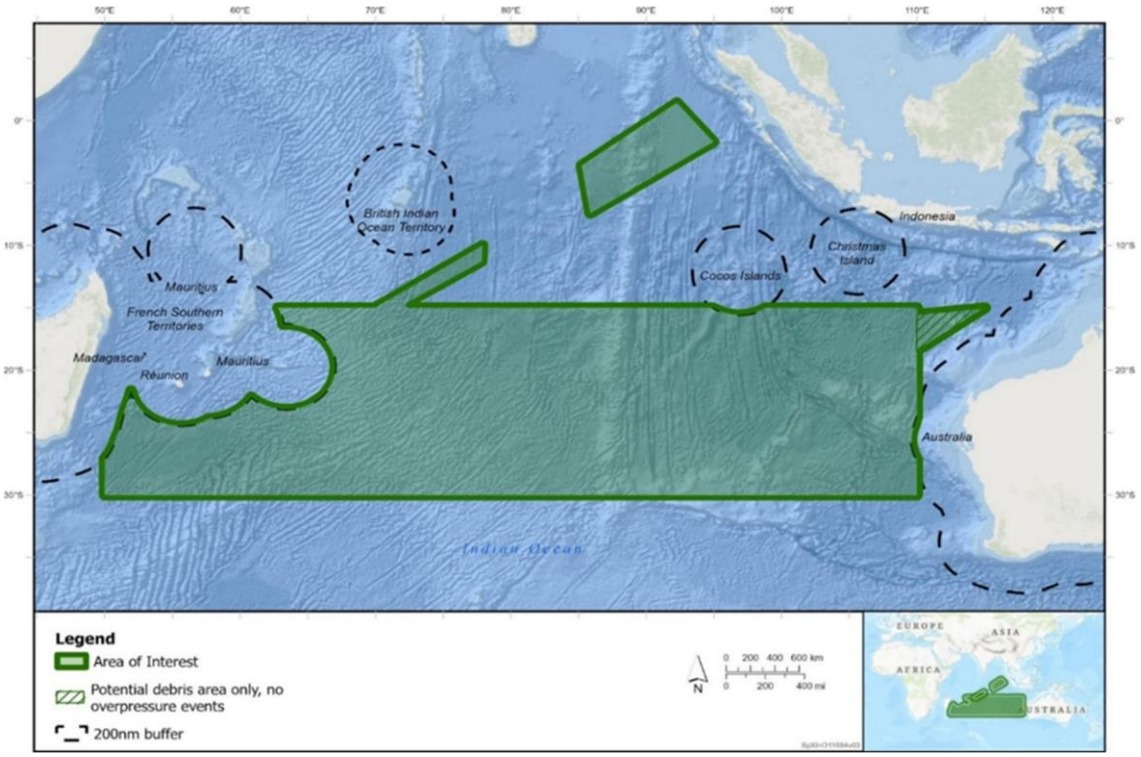

Figure 2. Indian Ocean Starship Landing Area (from FAA 2024)

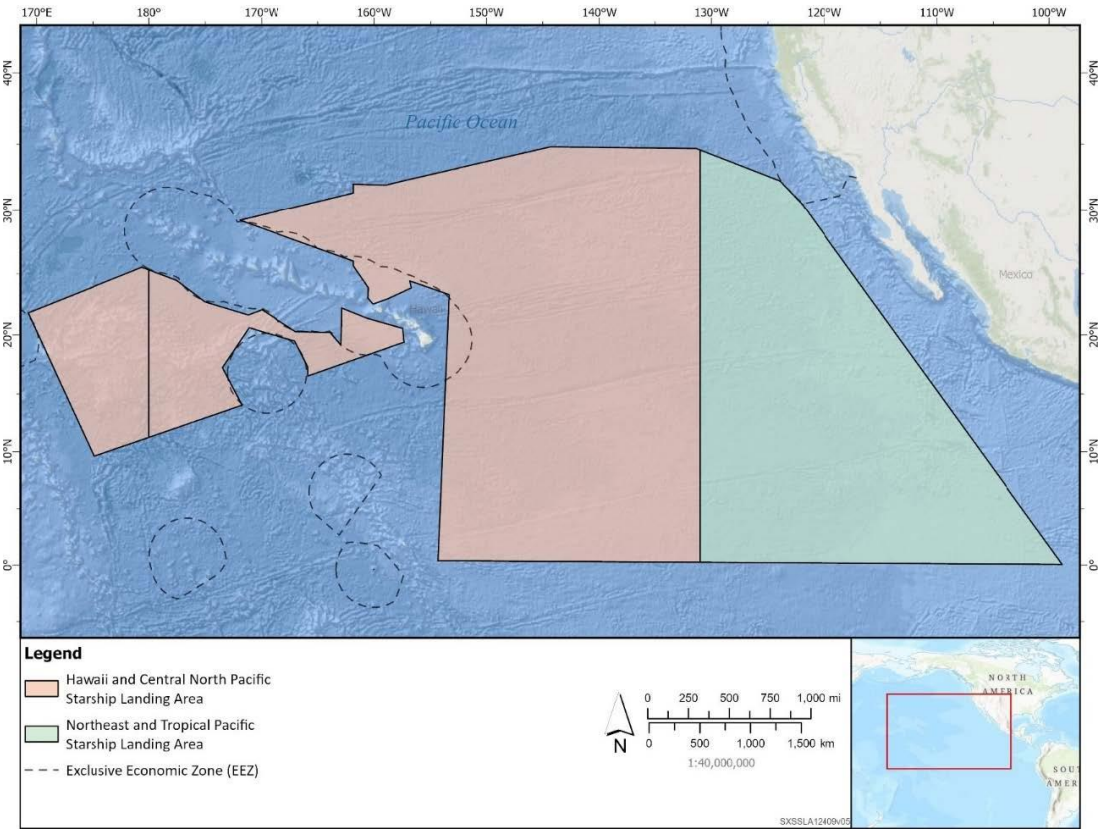

Figure 3: North Pacific Starship Landing Area (Hawaii and Central North Pacific Landing Area and Northeast and Tropical Pacific Ocean Landing Area)

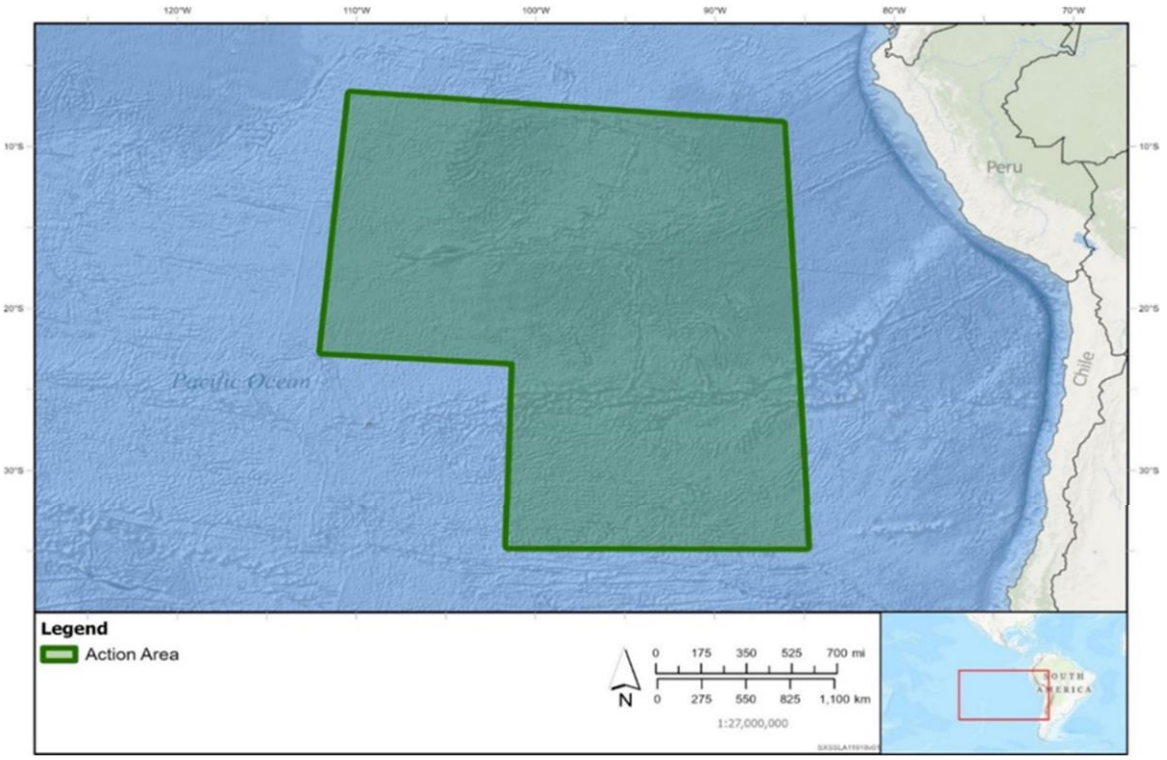

Figure 4. Southeast Pacific Starship Landing Area (from FAA 2024)

No future, non-federal, and reasonably certain to occur activities are identified within the Landing Zone Action Areas that contribute to cumulative effects.

Considered Species and Critical Habitat Areas

Action Area Official Species Lists and Effect Determinations Summary

The species and critical habitats previously considered in the BA, BCO, Addendum #1, and/or Reinitiation #1 are listed in Table 3. Each of these species and critical habitats is considered again herein. For this Addendum, #2, SpaceX requested new official species lists from the USFWS Information for Planning and Conservation (IPaC) database for the expanded VLA Action Area on July 22, 2024, and for the Landing Zone Action Areas on July 8, 2024. The official species lists for Addendum #2 identified 24 species and one critical habitat area for consideration (see Table 3) (Appendix A). The Indian, southeast Pacific, and parts of the northeast Pacific Ocean Landing Zone Action Areas are outside of the jurisdiction of the USFWS, so species lists for these areas are unavailable.

The analysis and rationale for Addendum #2 effect determinations are discussed in the following sections.

Table 3. Species and Critical Habitats Previously and Currently Considered for Effects of the Action

Species or Critical Habitat Area	Endangered Species Act Status	Effect Determination for Original Mission Profile (May 2022 BCO)	Effect Determination for Deluge System Addition (Reinitiation #1)	Effect Determinations for Addendum #2
MAMMALS				
Gulf Coast jaguarundi (*Puma yagouaroundi cacomitli*)	Endangered	Likely to adversely affect Incidental take authorized (up to one individual killed, wounded, or harmed)	Likely to adversely affect No additional incidental take	No effect No additional incidental take; prior authorizations carry forward
Ocelot (*Leopardus* [=*Felis*] *pardalis*)	Endangered	Likely to adversely affect Incidental take authorized (up to one individual killed, wounded, or harmed)	Likely to adversely affect No additional incidental take	Likely to adversely affect No additional incidental take; prior authorizations carry forward
West Indian manatee (*Trichechus manatus*)	Threatened	May affect, not likely to adversely affect	No effect	May affect, not likely to adversely affect
Tricolored bat (*Perimyotis subflavus*)	Proposed Endangered	May affect, not likely to adversely affect*	May affect, not likely to adversely affect	May affect, not likely to adversely affect (voluntary conference requested)
BIRDS				
Eastern black rail (*Laterallus jamaicensis jamaicensis*)	Threatened	May affect, not likely to adversely affect	No effect	May affect, not likely to adversely affect
Northern aplomado falcon (*Falco femoralis septentrionalis*)	Endangered	Likely to adversely affect Incidental take authorized (up to two adults and three chicks harmed)	May affect, not likely to adversely affect	Likely to adversely affect No additional incidental take; prior authorizations carry forward
Piping plover (*Charadrius melodus*)	Threatened (Northern Great Plains and Atlantic Coast breeding populations)	Likely to adversely affect Incidental take authorized (harm measured as up to 11 acres of permanent habitat loss from construction; up to 800 hours of access restrictions; up to 0.1 acre of demonstrated habitat loss from vegetation growth)	Likely to adversely affect No additional incidental take	Likely to adversely affect

Species or Critical Habitat Area	Endangered Species Act Status	Effect Determination for Original Mission Profile (May 2022 BCO)	Effect Determination for Deluge System Addition (Reinitiation #1)	Effect Determinations for Addendum #2
Red knot (*Calidris canutus rufa*)	Threatened	Likely to adversely affect Incidental take authorized (harm measured as up to 11 acres of permanent habitat loss from construction; up to 800 hours of access restrictions; up to 0.1 acre of demonstrated habitat loss from vegetation growth)	Likely to adversely affect No additional incidental take	Likely to adversely affect No additional incidental take; prior authorizations carry forward
Cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*)	Threatened	May affect, not likely to adversely affect*	May affect, not likely to adversely affect	May affect, not likely to adversely affect
Black-capped petrel (*Pterodroma hasitata*)	Endangered	Not considered	Not considered	May affect, not likely to adversely affect
Band-rumped storm-petrel (*Oceanodroma castro*)	Endangered	Not considered	Not considered	May affect, not likely to adversely affect
Hawaiian petrel (*Pterodroma sandwichensis*)	Endangered	Not considered	Not considered	May affect, not likely to adversely affect
Newell's shearwater (*Puffinus auricularis newelli*)	Threatened	Not considered	Not considered	May affect, not likely to adversely affect
Roseate tern (*Sterna dougallii*)	Endangered	Not considered	Not considered	May affect, not likely to adversely affect
Short-tailed albatross (*Phoebastria albatrus*)	Endangered	Not considered	Not considered	May affect, not likely to adversely affect
REPTILES				
Green sea turtle (*Chelonia mydas*) – North Atlantic Distinct Population Segment (DPS)	Threatened	Likely to adversely affect Incidental take authorized (up to one individual killed or harmed by vehicle collision; up to five false crawls on Boca Chica Beach; up to two hatched nests on Boca Chica Beach)	No effect	Likely to adversely affect Due to increased monitoring, incidental take increased to up to 15 false crawls on Boca Chica Beach; all other take limits remain the same and carry forward

Species or Critical Habitat Area	Endangered Species Act Status	Effect Determination for Original Mission Profile (May 2022 BCO)	Effect Determination for Deluge System Addition (Reinitiation #1)	Effect Determinations for Addendum #2
Hawksbill sea turtle (*Eretmochelys imbricata*)	Endangered	Likely to adversely affect Incidental take authorized (up to one individual killed or harmed by vehicle collision; up to one false crawl on Boca Chica Beach; up to one hatched nest on Boca Chica Beach)	No effect	Likely to adversely affect No additional incidental take; prior authorizations carry forward
Kemp's ridley sea turtle (*Lepidochelys kempii*)	Endangered	Likely to adversely affect Incidental take authorized (up to two individuals killed or harmed by vehicle collision; up to 15 false crawls on Boca Chica Beach; up to five hatched nests on Boca Chica Beach)	No effect	Likely to adversely affect To replace the amount of take realized to date, incidental take is increased by three false crawls and one hatched nest on Boca Chica Beach; all other take limits remain the same and carry forward
Leatherback sea turtle (*Dermochelys coriacea*)	Endangered	Likely to adversely affect Incidental take authorized (up to one individual killed or harmed by vehicle collision; up to one false crawl on Boca Chica Beach; up to one hatched nest on Boca Chica Beach)	No effect	Likely to adversely affect No additional incidental take; prior authorizations carry forward
Loggerhead sea turtle (*Caretta caretta*) – Northwest Atlantic DPS	Threatened	Likely to adversely affect Incidental take authorized (up to one individual killed or harmed by vehicle collision; up to five false crawls on Boca Chica Beach; up to two hatched nests on Boca Chica Beach)	No effect	Likely to adversely affect No additional incidental take; prior authorizations carry forward
MOLLUSCS				
Mexican fawnsfoot (*Truncilla cognata*)	Proposed	No effect*	No effect	No effect
Salina mucket (*Potamilus metnecktayi*)	Proposed	No effect*	No effect	No effect

Species or Critical Habitat Area	Endangered Species Act Status	Effect Determination for Original Mission Profile (May 2022 BCO)	Effect Determination for Deluge System Addition (Reinitiation #1)	Effect Determinations for Addendum #2
INSECTS				
Monarch butterfly (*Danaus plexippus*)	Candidate	Not Considered	Not Considered	Consideration not warranted
FLOWERING PLANTS				
South Texas ambrosia (*Ambrosia cheiranthifolia*)	Endangered	No effect	No effect	No Effect
Texas ayenia (*Ayenia limitaris*)	Endangered	No effect	No effect	No Effect
CRITICAL HABITAT				
Piping Plover Critical Habitat Units TX-01, TX-02, TX-3A (partial), and TX-3B (partial)	Designated	Likely to adversely affect	Likely to adversely affect	Likely to adversely affect
Red Knot Critical Habitat Unit TX-9 (partial) and TX-11	Proposed	Likely to adversely affect	Likely to adversely affect	Likely to adversely affect
Green Sea Turtle – North Atlantic DPS	Proposed	Not considered	Not considered	No effect
Mexican Fawnsfoot Critical Habitat	Proposed	No effect*	No effect	No effect
Salina Mucket Critical Habitat	Proposed	No effect*	No effect	No effect

* Not initially considered. Effect determination for the activities evaluated in the BA and BCO were made in Addendum #1 and Reinitiation #1.

The monarch butterfly is a candidate species and under consideration for listing. However, candidate species are not subject to evaluation under ESA Section 7 and, therefore, the monarch is not addressed in this Addendum #2.

No Effect Determinations

Gulf Coast Jaguarundi

The listing status of the Gulf Coast jaguarundi remains unchanged since 1976. However, USFWS corrected the scientific name for the subspecies in 2021 (USFWS 2021a). USFWS has not prepared a Species Status Assessment for the Gulf Coast jaguarundi and the latest 5-year Status Review was published in 2018. The 2018 5-year Status Review acknowledges that the last confirmed sighting of the subspecies in the United States occurred in 1986 as a road-killed individual collected approximately 2 miles east of Brownsville, Texas (USFWS 2018).

Lombardi et al. (2022) report findings of a camera trapping effort conducted at 16 properties and along two highways in southern Texas and northern Tamaulipas, Mexico. The effort involved 350,366 trap nights at 685 camera sites between 2003 and 2021. After approximately 18 years of study, no Gulf Coast jaguarundis were recorded in Texas; however, the subspecies was detected in Mexico. The authors conclude that the Gulf Coast jaguarundi is extirpated from Texas and that the current northern end of the subspecies' range terminates approximately 95 miles south of the Texas-Mexico border.

TPWD also considers the jaguarundi to be extinct in or extirpated from Texas (TWPD 2024a) and the species does not appear on the state's list of Species of Greatest Conservation Concern (TWPD 2023). The NatureServe state rank for the jaguarundi in Texas is "SX" (Hammerson and Cannings 2024) meaning "presumed extirpated" and described as "believed to be extirpated from the jurisdiction (i.e., nation, or state/province)…Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered." The USFWS recovery plan for the jaguarundi, revised in 2013, includes the following statement acknowledging that the species is not presently known to occur in the United States: "The Gulf Coast jaguarundi presents a significant challenge for recovery planning because, based on our current knowledge, it no longer occurs in the U.S. and, while it is known to still occur in Mexico, the status of the species in Mexico is largely unknown" (USFWS 2013:30). The 2018 5-year status review of the jaguarundi, presently the most current status review of the species by USFWS, affirms the status information described in the 2013 recovery plan: "USFWS also contacted Jonah Evans, State Mammalogist for the Texas Parks and Wildlife Department, who recently (2018) completed an exhaustive review of reported Gulf Coast jaguarundi sightings and concluded, as has USFWS, that the status of the Gulf Coast jaguarundi has not changed since the publication of the USFWS Recovery Plan" (USFWS 2018:2).

During the preparation of this Addendum #2, USFWS shared correspondence it received from a landowner on June 9, 2021, reporting a sighting of a purported jaguarundi crossing Highway 4 near Massey's Gun Range (now known as the Massey Test Site). The exchange also noted that the landowner had made two other purported jaguarundi sightings earlier (circa 2015 or 2016) nearby on Palmito Hill Road. The landowner did not provide photographic or physical evidence of the sightings but described the 2021 sighting as "smaller than a bobcat and had a very long tail" and that it was observed "running too fast across the road" to get a photograph of it (Orms 2024). According to TPWD (2021), jaguarundis are considered extirpated from Texas and TWPD confirmation of a sighting would require photographic or

physical evidence. TPWD also states that even a wildlife biologist trained in jaguarundi identification could not reliably identify a jaguarundi by a quick look at an animal, as jaguarundis are extremely similar to house cats in size and other physical differences cannot reliably be observed at a distance (TPWD 2021).

In the latest 5-year Status Review for the Gulf Coast jaguarundi (USFWS 2018), it is noted that no "Class I" sightings had been obtained in efforts by Giordano et. al (2011). A Class I sighting is denoted as one with photographic evidence, or one with physical evidence such as tracks, a carcass, or a pelt. Class II sightings are those where no physical evidence was obtained, but the report came from a trusted source with knowledge of the species, such as a biologist. Class III sightings were sightings that did not involve physical evidence or extensive prior experience with the species by the observer, or when the sighting was obtained from a long distance (Giordano et. al 2011). Using this classification scheme, the sightings that are the subject of Orms (2024) would be classified as Class III and not considered as evidence of the species inhabiting the area near the Massey Test Site.

Given the likely extirpation of the Gulf Coast jaguarundi from Texas and distance from the action area to the estimated northern extent of the current range in Mexico, the proposed activities will have no effect on the subspecies.

Mexican Fawnsfoot and Salina Mucket

The Mexican fawnsfoot and Salina mucket are proposed endangered. The action area does not overlap the current or historic ranges of either species as reported in their July 2023 Species Status Assessment (USFWS 2023b). Both species have proposed critical habitat, but not within the action area. Therefore, the activities evaluated in this Addendum #2 would have no effect on these two freshwater mussel species or their proposed critical habitat areas, and they are not addressed further.

Proposed Green Sea Turtle Critical Habitat

The USFWS published a proposed rule to designate critical habitat in Florida and Puerto Rico for the green sea turtle North Atlantic Distinct Population Segment (DPS) (USFWS 2023c). None of the proposed critical habitat occurs in the action area; therefore, the activities evaluated in this Addendum #2 would have no effect on this proposed critical habitat area, and this proposed designation is not addressed further.

Species Assessments

This Addendum #2 updates the current environmental baseline for each species that may be affected by the proposed increase in mission cadence and other changes described above. Environmental baseline updates consider whether there have been any changes to the listing or conservation status of the species (indicated by publications in the Federal Register, Species Status Assessments, 5-year Status Reviews, or Recovery Plans) or published updates to the distribution, habitat needs, or biology of the species in readily accessible scientific or commercial literature. The types and spatial extents of relevant effects are based on the analysis in the BA or Addendum #1, updated where appropriate with new information. The analysis focuses on the consequences of increased frequency, duration, or intensity of launches, landings, and related activities. If the proposed increase in mission cadence and other changes described above are likely to have an adverse effect on the species, then the cumulative effects to the species are also assessed.

Ocelot

Environmental Baseline: The listing status of the ocelot remains unchanged since 1972. The USFWS made a negative 90-day finding on a 2021 petition to list the Texas population of ocelot as a distinct population segment (i.e., the petition did not present substantial scientific or commercial information indicating that the petitioned action may be warranted) (USFWS 2022b). USFWS has not prepared a Species Status Assessment for the ocelot and the latest 5-year Status Review was published in 2018.

The 2018 5-year Status Review estimates the current Texas population of ocelots as numbering approximately 80 individuals in two separate populations. One population resides primarily on the Yturria Ranch and El Sauz Ranch in Kenedy and Willacy Counties; the other population primarily resides on the Laguna Atascosa National Wildlife Refuge in Cameron County, Texas (USFWS 2016a). As described in BCO, there have been no reports of ocelots in the action area since 1998, approximately 25 years ago. This individual was detected approximately 3.5 miles west of Boca Chica Village and used brushy lomas and open flats between State Highway 4 and the ship channel.

Veals et al. (2022) assessed habitat use and selection by ocelots in south Texas using a 35-year data set of detections made between 1982 and 2017. Most of the action area is modeled circa 2015 as having a low probability of use by male or female ocelots. Moderate or high probability of use in the action area is primarily limited to small and fragmented sites north of the ship channel, along the Rio Grande approximately 10 miles west of the VLA.

Effects of the Action: As described below, the proposed increase in mission cadence is likely to adversely affect ocelots by further encouraging avoidance of parts of the action area near the VLA and along State Highway 4 and by increased risk of vehicle mortality from the additional truck traffic. However, there is insufficient evidence to conclude that additional incidental take is reasonably certain to occur.

Habitat Loss – The increased mission cadence does not involve new construction outside of what has already been analyzed. Dense vegetation and thornscrub habitat used by ocelots would not be destroyed by the increased mission cadence. Potential habitat for the ocelot does not occur in the combined heat/vapor plume and debris impact area.

Heat and Vapor Plume Exposure – The estimated extent of the heat/vapor plume is where any effects to ocelots from engine fires would be most likely. The heat/vapor plume has generally low probability of ocelot use (Veals et al. 2022). Increased noise and activity at the VLA and repeated disruption by the heat/vapor plume is likely to further discourage ocelot presence in this impact area. Therefore, it is unlikely that ocelots will be exposed to adverse effects from an increased number and frequency of heat or vapor plumes.

Gravel Plume Exposure – The dense vegetation and thornscrub habitat that could potentially be used by ocelots is not located within the gravel plume impact area, greatly reducing the probability that an ocelot would be found within the gravel plume. In addition, any ocelots within the gravel plume would be within vegetation, as opposed to on an open mud or sand flat, where effects would be greatest. The gravel plume us unlikely to physically injure ocelots, if present, or modify potential ocelot habitat.

Noise, Activity, Sonic Booms, and Vibrations – The proposed increase in mission cadence would create more frequent disturbances from noise, activity, and vibrations at the VLA or sonic booms across the larger action area. In general, the action area has mostly low to moderate probability of use by ocelots

(Veals et al. 2022). The increased noise and activity at and near the VLA is likely to further discourage use of any potential habitat in the vicinity. Where the magnitude of these effects is greatest (i.e., close to the VLA), ocelots are least likely to be present or exposed to potentially harmful or disruptive disturbances. Where ocelots are more likely to occur (e.g., in the vicinity of the Laguna Atascosa National Wildlife Refuge near the outer edge of the action area), they would be exposed to more frequent disturbance from sonic booms. However, most of this potential exposure would be at the far (least intense) edge of the sonic boom overpressure zone, would be very brief, and occasional (i.e., no more than 50 times per year, up from 15 landings per year). The additional frequency of sonic boom exposure is unlikely to have an adverse effect on ocelots.

Traffic on State Highway 4 – The proposed increase in mission cadence would increase truck traffic on State Highway 4. Increased traffic increases the risk of vehicle mortality on ocelots if they are present. The probability of ocelots using areas along State Highway 4 is in general relatively low (Veals et al. 2022) but increases moderately towards the western edge of the action area. Vehicle mortality associated with the increased truck traffic would be an adverse effect if it occurs, but there is insufficient data to conclude that additional incidental take is reasonably certain to occur. To date, no ocelot vehicle strikes on SH4 have been reported since SpaceX activities at Boca Chica began.

Anomalies and Hazardous Material Exposure – Increased mission cadence is not expected to cause an increase to the risk of an unexpected anomaly, as the reliability of the vehicle will increase with the number of launches. Increased mission cadence may cause an increase to the risk of a spill and related cleanup activities. The estimated extent of any spill occurs in an area with generally low probability of ocelot use (Veals et al. 2022). It is unlikely that ocelots will be exposed to these effects.

Cumulative Effects: Most of the reasonably foreseeable cumulative activities in the action area identified above involved previously developed lands or facilities and would not be expected to have an adverse effect on ocelots.

However, SpaceX activities at the Massey Site occur in an area with a low to moderate modeled probability of use by ocelots circa 2015 (Veals et al. 2022). The Massey Site was previously developed, was used as a gun range before acquisition by SpaceX and is surrounded by a water-filled canal; the site itself does not contain ocelot habitat. Adjacent lands are undeveloped, and some currently exhibit brushy vegetation that could be used by ocelots. Heat, noise, and activity originating within the Massey Site could inhibit use of this brushy vegetation by ocelots. However, brushy vegetation within 0.5 mile of the Massey Site center is presently isolated and surrounded by largely non-brushy vegetation, the Rio Grande River, and a water-filled canal. Further, the most recent accepted detection of an ocelot in the action area occurred approximately 25 years ago, and there is no verifiable information to demonstrate that ocelots presently reside in or travel through potential habitat in the immediate vicinity of the Massey Site.

Similarly, brushy vegetation within and in the immediate vicinity of the Rio West, Rio East, and Ad Astra sites has a low modeled probability of use by ocelots circa 2015. It is unlikely that ocelots use these areas as part of a resident home range or for dispersal, and there is no current information to indicate that potential habitats are presently used by the species. However, these activities (particularly the addition of residential and commercial development) could generate additional vehicle traffic on SH 4 that increases the risk of ocelot road mortality, particularly within the western end of the action area where the modeled probability of ocelot use is higher (Veals et al. 2022). But, as described above, there is no

current information to indicate that ocelots presently reside in or travel through potential habitat along SH 4 in the action area. In addition, SpaceX is working with TxDOT to ensure that wildlife crossings are built along SH 4 to reduce wildlife collisions with vehicles.

The identified cumulative activities are not reasonably certain to cause an adverse effect on ocelots. If new or site-specific information indicated that an adverse effect leading to incidental take was reasonably certain to occur, then the non-federal project proponent would be expected to consider seeking an ESA Section 10 incidental take permit from the USFWS.

West Indian Manatee

Environmental Baseline: The listing status of the West Indian manatee remains as threatened since downlisting from endangered in 2017. The USFWS has not published a Species Status Assessment, and the most recent 5-year Status Review was published in 2017. As described in the BCO, West Indian manatees are occasionally detected in or near the action area.

Effects of the Action: Boat traffic in the relatively shallow waters of the action area creates a risk of lethal or non-lethal strikes of West Indian manatees, when they are present. It is possible that increased mission cadence would increase recreational boat traffic by potential onlookers seeking to view a launch event and increase ship traffic returning Starship or Super Heavy vehicles that have landed on platforms in the Gulf of Mexico to the Port of Brownsville. However, given that the species is known to only occasionally occur in the action area, the likelihood of a boat or ship strike is low. Therefore, the proposed increase in mission cadence may affect, but is not likely to adversely affect the West Indian manatee.

Cumulative Effects: Assessment of cumulative effects is not warranted due to absence of likely adverse effects of the action.

Tricolored Bat

Environmental Baseline: The USFWS proposed to list the tricolored bat as endangered in September 2022 and published a Species Status Assessment dated December 2021 (USFWS 2022c). Tricolored bats roost in woodland habitats with live or recently dead hardwoods, pines, and cedars during the spring, summer, and fall months (USFWS 2021b). During the winter, these bats may hibernate in caves and mines. In the southern part of its range, tricolored bats may also overwinter in culverts, tree cavities, and other abandoned artificial structures (USFWS 2021b). Tricolored bats have been detected in Cameron County, Texas (Schmidly and Bradley 2016), but there is little suitable habitat (e.g., woodlands, culverts) in the action area for this species.

Effects of the Action: The proposed increase in mission cadence may affect, but is not likely to adversely affect, tricolored bats. The potential for adverse effects is likely restricted to the debris field and heat/vapor/gravel plume areas, where most physical disturbances from launch activities take place. This area contains little suitable habitat for tricolored bats (e.g., trees with foliage for roosting; caves or culverts for wintering), and the likelihood for occurrence (and, therefore, exposure to adverse effects) is low.

Cumulative Effects: Assessment of cumulative effects is not warranted due to absence of likely adverse effects of the action.

Eastern Black Rail

Environmental Baseline: The eastern black rail remains listed as threatened since 2020. The USFWS published a Species Status Assessment in August 2019. The eastern black rail is described as a "rare to locally uncommon" resident species of the upper and central Texas coast (Arnold 2008) and prefers to use dense herbaceous vegetation in high fresh or salt marsh environments (Haverland et al. 2021). The May 2022 BCO indicates that the action area may contain suitable habitat for the species, but that "there is no recent documented presence of eastern black rain [sic] in the Action Area" or recent indication of breeding activity in Cameron County (USFWS 2022a). The 2019 Species Status Assessment for the eastern black rail indicates that likely eastern black rail distribution (in the spring/summer or year-round) does not currently extend to Cameron County (USFWS 2019a).

Effects of the Action: The proposed increase in mission cadence may affect, but is not likely to adversely affect, eastern black rails. The species may occur but is not presently known to be distributed in Cameron County and the final rule listing the eastern black rail as threatened did not identify noise or vibration as a particular threat (USFWS 2020a). Brief and occasional noise or sonic boom exposure, particularly when these effects are attenuated by distance, is not likely to disrupt the activities of rails. The potential for adverse effects is likely restricted to the debris field and heat/vapor/gravel plume areas, where most physical disturbances from launch activities take place. This area contains little suitable habitat for eastern black rails and no known occurrences of the species. The likelihood for occurrence and exposure to adverse effects is possible, but low.

Cumulative Effects: Assessment of cumulative effects is not warranted due to absence of likely adverse effects of the action.

Northern Aplomado Falcon

Environmental Baseline: The northern aplomado falcon remains listed as endangered since 1986. The USFWS has not prepared a Species Status Assessment, and the last 5-year Status Review occurred in 2014. The northern aplomado falcon is known to reside in the action area (FAA 2021, USFWS 2022a) and, as described in Addendum #1, the most recent detection of an individual in the immediate vicinity of the VLA occurred in April 2023 approximately 2.5 miles to the north (SWCA 2023).

Effects of the Action: As described below, the proposed increase in mission cadence is likely to adversely affect northern aplomado falcons by reducing access to potential habitat resources in the debris field and heat/vapor plume areas. However, there is insufficient evidence to conclude that additional incidental take is reasonably certain to occur.

Habitat Loss – The increased mission cadence does not involve new construction beyond what has been previously assessed. Nest platforms, trees or tall vegetation, and other structures will not be removed with the increased mission cadence.

Heat and Vapor Plume Exposure – Northern aplomado falcons may occasionally perch or forage within the 0.6-mile heat/vapor plume radius where they could be exposed to adverse effects of increased temperature or vapor conditions. Increased mission cadence may increase exposure of falcons to potentially adverse temperature or vapor conditions that risk causing death or injury. However, it is also likely that the increased frequency of these disturbances, coupled with increased noise and activity at the

VLA, will further discourage northern aplomado falcon use of this area. By avoiding these more frequent disturbances, northern aplomado falcons may nonetheless lose some access to habitat resources in the heat/vapor plume area; an adverse effect to the species already considered in the BA and BCO.

Gravel Plume Exposure – The effect of a gravel plume was not previously evaluated. Northern aplomado falcons may occasionally perch or forage within the gravel plume radius, where they could be exposed to adverse effects of the gravel plume. However, there have been no observations of any northern aplomado falcons this close to the VLA since avian monitoring began. The noise and activity of engine ignition preceding the advance of the gravel plume is likely to cause any northern aplomado falcons present within the gravel plume impact area to flush and move out of range before the gravel plume actually occurs. Therefore, the gravel plume is unlikely to cause physical injury or death of a northern aplomado falcon. The redistribution of mud, sand, and gravel particles by engine thrust is also unlikely to substantially modify habitat used by northern aplomado falcons, since these birds forage over vegetated areas. Noise, Activity, Sonic Booms, and Vibrations – The proposed increase in mission cadence would create more frequent disturbances from noise, activity, and vibrations originating from the VLA. The increased noise and activity at and near the VLA is likely to further discourage use of potential habitat in the vicinity (approximated by the extent of the heat/vapor plume area). Therefore, where the magnitude of these effects is greatest (i.e., close to the VLA), northern aplomado falcons are least likely to be present and exposed to potentially harmful or disruptive noise or activity levels. Northern aplomado falcons in the action area may be exposed to additional disturbance from sonic booms. The May 2022 BCO considers that falcons may be startled and distracted from normal behaviors when a sonic boom occurs, but that related peregrine falcons may also been shown to become habituated to sonic booms over time. Therefore, the additional frequency of sonic boom exposure may affect, but is not likely to have an adverse effect on northern aplomado falcons.

Anomalies, Hazardous Material Exposure, and Debris Fall/Removal – Increased mission cadence is not expected to cause an increase to the risk of an unexpected anomaly, as the reliability of the vehicle will increase with number of launches. Increased mission cadence may cause an increase to the risk of a spill and related cleanup activities. The estimated extent of any spill occurs in an area where northern aplomado falcons are not known to be regularly present. Therefore, the increased risk of an anomaly, spill, or cleanup action may affect, but is not likely to adversely affect, northern aplomado falcons.

Cumulative Effects: Most of the reasonably foreseeable cumulative activities in the action area identified above involved previously developed lands or facilities and would not be expected to have an adverse effect on northern aplomado falcons.

One of the artificial nesting platforms installed for northern aplomado falcons occurs to the east of the Rio East site, where SpaceX is proposing to construct homes on existing platted lots. The nest platform is near an area with a grove of yucca that could provide perching habitat for foraging falcons. However, this nest platform is not used by falcons, and avian monitoring performed since 2014 (with survey routes in the immediate vicinity of this nesting platform) has not detected the species in this area.

The identified cumulative activities are not reasonably certain to cause an adverse effect on northern aplomado falcons. If new or site-specific information indicated that an adverse effect leading to incidental take was reasonably certain to occur, then the non-federal project proponent would be expected to consider seeking an ESA Section 10 incidental take permit from the USFWS.

Piping Plover and Red Knot

This Addendum #2 combines the analysis of effects of the action and cumulative effects for piping plovers and red knots since the types of effects and responses by individuals of both species are expected to be similar. Both species at Boca Chica use similar habitat (e.g., relatively unvegetated beach and mudflat habitats), in similar ways (e.g., for foraging and resting), at similar times (e.g., during migration and/or wintering).

Environmental Baselines: The listing statuses of the piping plover and red knot remain unchanged. For the piping plover, the USFWS has not published a Species Status Assessment, and the most recent 5-year Status Review is dated March 2020. For the red knot, the USFWS has not updated the November 2020 Species Status Assessment, and the most recent 5-year Status Review is dated December 2021.

Addendum #1 considered the findings of ongoing avian monitoring within 3 miles of the VLA through June 2023 (SWCA 2023). Piping plovers and red knots are target species for this monitoring effort. Since June 2023, SWCA Environmental Consultants has continued monthly surveys of this area (Condell 2023a, 2023b, 2024a–d). Preliminary findings reported by SpaceX to the FAA and USFWS from these additional survey visits demonstrate that piping plovers and red knots continue to use habitat near the VLA, subject to seasonal variations in the species' ranges (Table 4). Complete survey findings, with analysis and conclusions, will be reported by SpaceX to USFWS with the annual monitoring report due in August.

Table 4. Avian Monitoring Preliminary Counts of Piping Plover and Red Knot Detections since June 2023

Avian Survey Route (Length)	July 2023	August 2023	September 2023	October 2023	November 2023*	December 2023*	January 2024*	February 2024*	March 2024*	April 2024*	May 2024*	June 2024*
PIPING PLOVERS												
Boca Chica Beach (6.0 miles)	22	30	30	49	0	3	0	0	0	1	0	0
South Bay (2.8 miles)	0	0	0	0	3	3	5	0	0	6	0	0
Boca Chica Flats (4.3 miles)	0	0	0	12	20	1	20	0	0	0	0	0
Las Palomas (10.7 miles)	22	62	59	2	1	25	100	70	50	2	0	0
Total Detections All Routes	44	92	89	63	24	32	125	70	50	9	0	0
RED KNOTS												
Boca Chica Beach (6.0 miles)	0	0	0	1	0	0	0	0	0	0	2	0
South Bay (2.8 miles)	0	0	0	1	0	0	0	0	0	0	0	0
Boca Chica Flats (4.3 miles)	0	0	0	0	0	0	0	0	0	0	0	0
Las Palomas (10.7 miles)	0	0	0	3	0	0	0	0	0	0	0	0
Total Detections All Routes	0	0	0	5	0	0	0	0	0	0	2	0

Note: Surveys completed in a given month typically occur over 2 or 3 days. Care is taken to avoid counting the same bird multiple times when completing a survey route. However, detection totals within or across routes may represent multiple counts of the same bird. All counts reported herein are preliminary and subject to further review. Final counts will be provided in the annual monitoring report.

*These surveys occurred during flooded conditions that precluded completion of the entire length of the Las Palomas route. The January survey covered mile markers 2.1 to 10.7. Surveys in other indicated months covered route mile markers 3.1 to 10.7.

Pre- and post-launch avian monitoring conducted by RKI is described above (RKI 2024b, 2024d, 2024e). RKI (2024b, 2024d, 2024e) reported no dead birds detected during pre- or post-launch avian monitoring, the variation in piping plover and red knot detections was consistent with previously observed seasonal variation within the survey area, and no significant effects to piping plovers or red knots occurred because of Launches #2, 3, or 4.

Effects of the Action: As described below, the proposed increase in mission cadence is likely to adversely affect piping plovers and red knots by increasing the number of times that birds may be flushed from the immediate vicinity of the VLA. Flushing, while beneficial for reducing the risk of death or physical injury from the heat/vapor/gravel plume, disrupts normal feeding, resting, and movement behavior that could eventually lead to reduced fitness and, ultimately, later death or injury. The increased number and frequency of ignition events (and potentially anomalies) would also increase the frequency and cumulative duration of temporary habitat loss in the debris field and heat/vapor/gravel plume impact areas due to the increased heat/vapor, noise, human or visual activity, and vibrations (including the pressure of engine thrust through the air). Repeated, temporary habitat loss is a reduction of habitat resources that could lead to reduced fitness of individual birds and ultimately death or injury; however, the cumulative exposure to these stressors is not likely to substantially alter the typical time-activity budget of these birds, suggesting that reduced fitness is unlikely. Also, the increased mission cadence is not expected to expand the area over which these adverse effects would occur (i.e., the impact areas remain the union of the heat/vapor/gravel plume radius and the debris field area). More intense sonic boom overpressures estimated in the vicinity of the VLA are not expected to cause physical death or injury.

In the BCO, the number of access restriction hours estimate the amount of incidental take associated with temporary habitat losses from ignition events and anomalies. The increased mission would not change the number of access restrictions.

Habitat Loss or Degradation – The additional volume and frequency of deluge water used during each engine fire event and the increased number of events would increase the amount of fresh water that escapes the developed part of the VLA as overland sheet flow, push water, or (to a likely nominal extent) condensation. How far this water travels outside of the VLA is not precisely known but is conservatively assumed to be limited to the 0.6-mile radius heat/vapor plume area, decreasing with increasing distance from the launch pad.

The amount of liquid deluge system water that could escape the developed VLA during each use (estimated as 87,900 gallons) would be roughly equivalent to a rainfall of 0.004 inch across the area of the 0.6-mile heat/vapor plume area. If this volume were applied to the area of the 0.3-mile inner heat/vapor plume radius, the equivalent rainfall depth would be 0.02 inch. If applied to only the area within 100 feet of the developed VLA (roughly estimated as the difference in area between a 200-foot circle and a 100-foot circle), the equivalent rainfall depth would be 1.509 inches. Annually, the cumulative discharge of water (4,395,000 gallons) would be the equivalent of an additional 0.22 inch of rain if distributed across 0.6 mile, 0.90 inch if across 0.3 mile, and 74.63 inches if across 100 feet. The mean annual precipitation in the Brownsville area (as reported monthly between 2000 and 2022) was 26.91 inches (U.S. Department of Commerce 2023). If deluge water is distributed across an area beyond 100 feet of the developed VLA boundary, then the proposed annual increase in discharge is less than 5% of the annual mean precipitation. If discharges are largely restricted to the area within 100 feet of the developed VLA (which

seems likely based on monitoring data), then the amount of extra water in this relatively small area would exceed annual precipitation by 277%.

Soils exposed to more fresh water could begin to support more vegetation that could encroach into the unvegetated mud/wind tidal flats that provide habitat for piping plovers and red knots. Such encroachment, if it occurs outside of the boundary of the VLA, could reduce the amount or quality of habitat and adversely affect these species. Many other factors, such as weather events and tides, would also contribute to the growing conditions in the heat/vapor plume area and influence vegetation independent of the proposed action. At this time, vegetation monitoring has not detected substantial changes to vegetation outside of and adjacent to the VLA (RKI 2024a, RKI 2024c, UTRGV 2023), and these areas continue to be regularly flooded by salt water. Therefore, the best available information suggests that significant vegetation growth leading to piping plover or red knot habitat loss is possible, but not likely.

Heat and Vapor Plume Exposure – Piping plovers and red knots regularly or occasionally use habitat within the heat/vapor plume area for foraging and resting. Increased mission cadence would increase exposure to potentially harmful temperature and vapor conditions within the heat/vapor plume radius. The noise, activity, and vibrations associated with preparing for static fires and launches, such as initiation of the deluge and detonation suppression system in the seconds before ignition, may cause piping plovers or red knots close to the VLA to flush prior to the creation of the heat and vapor plume. This behavioral response would adversely affect foraging or resting behaviors of the birds but would also reduce the likelihood of death or physical injury. To date, no piping plovers or red knots have been found dead or injured following testing of the Starship and Super Heavy launch vehicles. Since piping plovers and red knots do not breed in Texas, no immobile eggs or chicks would be present in the vicinity of the VLA, and none would be exposed to the potentially harmful effects of the heat/vapor plume.

Gravel Plume Exposure – The effects of gravel plumes on piping plovers and red knots were not previously evaluated. Piping plovers and red knots regularly or occasionally use habitat within the gravel plume area for foraging and resting. The noise and activity associated with engine ignition likely cause piping plovers or red knots that may be close to the VLA to flush prior to the creation of the gravel plume. This behavioral response would likely prevent physical injury or death from the gravel plume. To date, no piping plovers or red knots have been found dead or injured following testing of the Starship and Super Heavy launch vehicles. Since piping plovers and red knots do not breed in Texas, no immobile eggs or chicks would be present in the vicinity of the VLA, and none would be exposed to the potentially harmful effects of the gravel plume.

Noise, Activity, Sonic Booms, and Vibrations – Piping plovers and red knots using the action area appear to acclimate to human presence, as indicated by their continued use of Boca Chica Beach, which is open to the public and vehicle use. Nonetheless, the disruptions associated with the static fires and launches appear to be effective at flushing piping plovers from the immediate area of the VLA prior to the onset of potentially harmful temperatures. Flushing is an adverse disruption of otherwise normal feeding or resting behavior and is similar to a temporary reduction in habitat availability. Ultimately, flushing is beneficial for avoiding lethal or injurious outcomes and appears to be a temporary effect since piping plovers and red knots continue to use areas close to the VLA. It is possible that the increased frequency of static fires and launches, and any potential nighttime launches, would eventually reduce (on a more continuous basis) use of habitat within the 0.6-mile heat/vapor plume area. However, available bird

monitoring data on launches that have occurred to date and monthly monitoring data have not yet demonstrated evidence of such an effect.

Studies of piping plover time-activity budgets indicate that these birds spend approximately 76% of a typical day foraging; 19% resting, roosting, or preening; and 5% engaging in other activities such as territory defense, displaying, and responding to disturbances (e.g., flushing) (Johnson and Baldassare 1987). On a daily basis, piping plovers spend approximately 1,368 minutes roosting or foraging (or approximately 499,320 minutes per year), which are important activities contributing to their fitness. The timing and distribution of these activities are primarily influenced by tides, weather conditions, and the occurrence of disturbances (Johnson and Baldassare 1987). Given the similarity of habitat use, it is likely that red knots exhibit similar behavioral capabilities and patterns as piping plovers.

Launch activities create disturbances that likely cause piping plovers and red knots to flush and at least temporarily move away from the activity. This behavior is indirectly supported by camera monitoring of nesting plovers and terns near the VLA immediately before, during and after Launch #4 (LeClaire and Newstead 2024).

As described in Table 2 above, an individual static engine fire test lasts only a few to several seconds and the cumulative duration of static fire engine testing under the increased cadence would be approximately 160 seconds per year (i.e., 2.7 minutes). Similarly, an individual launch has duration of engine fire that would affect the ground surface lasting approximately 4.5 minutes based on the observed duration of increased temperature near the VLA measured during Launch #4. With 25 launches per year under the increased cadence, the annual cumulative duration of engine fire during a launch would be approximately 112.5 minutes. For the purpose of this analysis, it is assumed that landings at the VLA would have a similar engine fire duration. With up to 44 vehicle landings at the VLA per year under increased cadence, the total landing engine fire duration would (as a very generous estimate) be approximately 313.2 minutes per year.

Table 5 compares the duration of engine fires for single static fire or launch/landing events and the cumulative yearly duration of engine fires to the typical amount of time that piping plovers and red knots likely spend roosting or foraging. While not precise estimates (since breeding season activities and range distributions are not accounted for), this rough comparison of the duration of engine fire disturbances against the typical time that piping plovers and red knots spend engaged in essential roosting and foraging behaviors indicates that these disturbances would only result in small changes to time-activity budgets. There is abundant quality habitat in the vicinity of the VLA and these species routinely change their locations to adjust to dynamic habitat conditions. Therefore, disturbance from relatively short duration and infrequent engine fire events is not reasonably certain to cause a substantial reduction in the fitness of individual piping plovers and red knots on a daily or annual basis.

Table 5. Estimated Potential Disruption of Roosting or Foraging Activities by Piping Plovers and Red Knots

Engine Fire Activity	Individual Engine Fire Duration	Percent of Daily Roosting/Foraging Time Potentially Disrupted by Individual Engine Fire Activities	Cumulative Annual Engine Fire Duration	Percent of Annual Roosting/Foraging Time Potentially Disrupted by Engine Fire Activities
Static Fire Engine Test	0.05 minutes	<0.004%	2.7 minutes	<0.0001%

Launch	4.5 minutes	0.3%	112.5 minutes	0.02%
Landing (2 Vehicles)	9.0 minutes	0.6%	198.0 minutes	0.04%
All Engine Fire Activities	13.6 minutes	0.9%	313.2 minutes	0.06%

Note: Percent disruption is based on an assumed daily budget of 1,440 minutes of roosting or foraging and an annual budget of 499,320 minutes of roosting or foraging. These estimates are based on winter-season time-activity budgets (e.g., not breeding season activities) and for annual estimates are applied over 365 days. Seasonal presence on wintering grounds is not addressed. Therefore, these estimates of impact are generous, since these species are not typically present in the Action Area year-round.

Piping plovers do not roost exclusively at night, have extremely good night vision, and are known to engage in roosting and foraging under daytime and nighttime conditions (Rojas et al. 1999). As high tides cover the mudflats, less exposed ground is available for plovers to feed in. As the tides recede, regardless of the time of day, plovers will begin to feed (Johnson and Baldassare 1987). Tides and mudflat inundation from strong wind or rainfall can also cause shorebirds to move closer to or farther away from the VLA, as observed in field survey efforts. Therefore, any nighttime launch activity is unlikely to have a disproportionate adverse effect on the fitness of piping plovers and red knots.

Anomalies, Hazardous Material Exposure, Debris Fall/Removal – Anomalies are unplanned outcomes and may involve explosions that scatter debris, ignite fires, or release hazardous materials. Responses to anomalies may include activities to suppress fires or activities to retrieve debris or contain and remediate spills. Both the anomaly itself and the response activities can create noise and activity disruptions for piping plovers or red knots that flush birds and temporarily reduce habitat availability and can also permanently or temporarily damage or destroy habitat. Increased mission cadence may increase the cumulative likelihood of an anomaly over time and the number of anomalies that occur. The consequences of any particular anomaly are not predictable, but the debris field and heat/vapor plume impact areas are those most likely to be exposed to these consequences. The increased mission cadence is not expected to expand these impact areas.

Cumulative Effects: The identified cumulative activities occur in areas that are previously developed or are distant from potential piping plover and red knot habitat, such that construction and use of these areas would be unlikely to adversely affect piping plovers or red knots. If new or site-specific information indicated that an adverse effect leading to incidental take was reasonably certain to occur, then the non-federal project proponent would be expected to consider seeking an ESA Section 10 incidental take permit from the USFWS.

Cactus Ferruginous Pygmy-owl

Environmental Baseline: The threatened status of the cactus ferruginous pygmy-owl remains unchanged. The USFWS Species Status Assessment is dated December 2022 and USFWS has not prepared a 5-year Status Review. The Species Status Assessment reports the current known distribution of the pygmy-owl as “almost extirpated along Rio Grande, but more common now in areas of Kenedy and Brooks counties” (USFWS 2022d). Kenedy County is approximately 22 miles from the action area and Brooks County is approximately 52 miles from the action area. However, USFWS reported that the species has also been detected at the headquarters of the Laguna Atascosa National Wildlife Refuge, citing a personal communication from Brandon Jones, Refuge Manager. The refuge is partially within the action area, with the southeastern half within the action area and the northwestern half outside of the action area. The debris field and heat/vapor plume impact areas do not contain many trees or large columnar cacti that could provide habitat for this species. Avian monitoring performed by SpaceX within 3 miles of the VLA

has not detected cactus ferruginous pygmy-owls. While the species has been reported at Laguna Atascosa National Wildlife Refuge, no other records exist within the action area.

Effects of the Action: The proposed increase in mission cadence may affect, but is not likely to adversely affect, cactus ferruginous pygmy-owls. The species may occur in the outer reaches of the action area and be exposed to noise or sonic boom overpressure events. Brief and occasional noise or sonic boom exposure, particularly when these effects are attenuated by distance, is not likely to disrupt the activities of owls. The most physical disturbances from launch activities are likely to take place in the debris field and heat/vapor/gravel plume areas around the VLA, which contains little or no suitable habitat for cactus ferruginous pygmy-owls and no known occurrences of the species. The likelihood for occurrence and exposure to adverse effects is possible, but low.

Cumulative Effects: Assessment of cumulative effects is not warranted due to absence of likely adverse effects of the action.

Sea Turtles

This Addendum #2 combines the analysis of effects of the action and cumulative effects for the green sea turtle, hawksbill sea turtle, Kemp's ridley sea turtle, leatherback sea turtle, and loggerhead sea turtle since the types of effects and responses by individuals of these species are expected to be similar. Each of these species use habitat (e.g., beach) and in similar ways (e.g., for nesting).

Environmental Baseline:

Green Sea Turtle (North Atlantic DPS) – The BA and BCO evaluated the green sea turtle as a single listed entity with a threatened status under the ESA. However, a 2016 final listing rule for green sea turtles (USFWS 2016b) established 11 DPSs of green sea turtle and extended endangered status to three DPSs and threatened status to eight DPSs. The threatened North Atlantic DPS has a range that includes the Gulf of Mexico, and this DPS is the listed entity that occurs in the action area. The 2016 listing rule describes the North Atlantic DPS has having a high nesting abundance with approximately 167,424 females using 73 nesting sites and with long-term increasing trends in abundance at all major nesting sites under a diversity of mainland and insular nesting locations. The listing rule also identifies development, armoring, lighting, erosion, sand extraction, and vehicle and pedestrian traffic as threats to nesting beaches, among other threats to foraging habitat and from climate change and sea level rise. The USFWS has not published a Species Status Assessment or a 5-year Status Review for the green sea turtle or any of its DPS.

The BCO considered that green sea turtles are known to nest on beaches in the action area; but the species had not been recently detected nesting on Boca Chica Beach at the time of the document. SpaceX supports sea turtle monitoring on Boca Chica Beach by Sea Turtle, Inc., following protocols approved by the USFWS. Data collected by Sea Turtle, Inc. in 2022 and through October 2023 (Sea Turtle, Inc. unpublished data) documented dozens of live, dead, and cold-stunned green sea turtles on or near Boca Chica Beach, one false crawl by a green sea turtle on Boca Chica Beach near the Rio Grande in 2022, four false crawls on Boca Chica Beach in 2023, and one green sea turtle nest on Boca Chica Beach in July of 2023. None of the deaths were noted as likely vehicle strikes. The detection of five false crawls on Boca Chica Beach represents instances of incidental take using the metrics established in the BCO (i.e., five of five authorized false crawls for this species).

Hawksbill Sea Turtle – The endangered status of the hawksbill sea turtle remains unchanged. The USFWS has not published a Species Status Assessment for the hawksbill sea turtle, and the most recent 5- year Status Review was published in 2013. The BCO states that there are no documented nests by this species in the action area. Data collected by Sea Turtle, Inc. in 2022 and through October 2023 (Sea Turtle, Inc. unpublished data) did not document any hawksbill sea turtles (live or dead) or their nests on or near Boca Chica Beach.

Kemp's Ridley Sea Turtle – The endangered status of the Kemp's ridley sea turtle remains unchanged. The USFWS has not published a Species Status Assessment for the Kemp's ridley sea turtle, and the most recent 5-year Status Review was published in 2015. The BCO acknowledges that the species nests in the action area, including on Boca Chica Beach. Data collected by Sea Turtle, Inc. in 2022 and through October 2023 (Sea Turtle, Inc. unpublished data) documented several dead Kemp's ridley sea turtles; none were from injuries attributed to a likely vehicle strike. Sea Turtle, Inc. also documented three false crawls and 26 nests by this species on Boca Chica Beach. One of the nests was previously undetected and hatched from the beach, with at least one hatchling found dead in a tire track; the other nests were collected by Sea Turtle, Inc. The detection of false crawls by a Kemp's ridley sea turtle and the hatched nest on Boca Chica Beach are instances of incidental take using the metrics of the BCO (i.e., three of 15 authorized false crawls and one of five authorized hatched nests).

Leatherback Sea Turtle – The endangered status of the leatherback sea turtle remains unchanged. The National Marine Fisheries Service (NMFS) and the USFWS published a joint Status Review for the leatherback sea turtle in 2020 (NMFS and USFWS 2020), which the USFWS acknowledges as fulfilling the role of a 5-year Status Review. The BCO states that there are no documented nests by this species in the action area, although one nest was detected just outside of the action area boundary on South Padre Island. Data collected by Sea Turtle, Inc. in 2022 and through October 2023 (Sea Turtle, Inc. unpublished data) did not document any leatherback sea turtles (live or dead) or their nests on or near Boca Chica Beach.

Loggerhead Sea Turtle – The BA and BCO evaluated the loggerhead sea turtle as a single listed entity with a threatened status under the ESA. However, a 2011 final listing rule for loggerhead sea turtles (NMFS and USFWS 2011) established nine DPSs and extended endangered status to five DPSs and threatened status to four DPSs. The threatened Northwest Atlantic DPS has a range that includes the Gulf of Mexico, and this DPS is the listed entity that occurs in the action area.

The USFWS has not published a Species Status Assessment for the loggerhead sea turtle or the Northwest Atlantic DPS. However, the NMFS and USFWS jointly published a 5-year Status Review for the Northwest Atlantic DPS in 2023 (NMFS and USFWS 2023). The 2023 5-year Status Review states that the overall nesting trend of the Northwest Atlantic DPS appears to be stable for over two decades. The 2023 5-year Status Review identifies fisheries bycatch, habitat modification, vessel strikes, and dredging as continuing threats to the DPS, among other threats from climate change, disease, predation, and overuse.

The BCO considered that loggerhead turtles are known to nest on beaches in the action area but had not recently been detected nesting on Boca Chica Beach. Data collected by Sea Turtle, Inc. in 2022 and through October 2023 (Sea Turtle, Inc. unpublished data) detected several dead loggerhead sea turtles on or near Boca Chica Beach; none were from injuries attributed to a likely vehicle strike. Sea Turtle, Inc. collected one loggerhead sea turtle nest from Boca Chica Beach in 2022. No false crawls or hatched nests were detected.

Effects of the Action: The proposed action is likely to adversely affect each of the listed sea turtles considered herein by increasing the likelihood or frequency of death from vehicle strikes on the beach and false crawls triggered by noise or lighting disturbances on Boca Chica Beach.

Increased frequency of monitoring by Sea Turtle, Inc. as part of SpaceX's Biological Monitoring Plan has resulted in increased detections of false crawls by green sea turtles, such that the previously estimated take limit in the May 2022 BCO (which was based on a lower level of monitoring effort) has been met for this metric. While the extent to which SpaceX activities or monitoring effort contributed to the detected false crawl behaviors is unknown, it is clear that the frequency of detections of green sea turtle false crawls warrants an increase in the amount of authorized take using this metric. Therefore, this Addendum #2 increases the estimated number of false crawls by green sea turtles on Boca Chica Beach from five total (estimated as one documented false crawl per year for 5 years) to a new estimate of 15 total (estimated as three false crawls per year for 5 years). The increase is based on five documented false crawls over 2 years of monitoring under the current protocol, for an average of two and a half per year, rounded up to three per year.

A portion of the incidental take authorization for Kemp's ridley sea turtles was also utilized since the BCO was issued in 2022, represented by three false crawls and one hatched nest on Boca Chica Beach. To replenish the estimated amount of take that has been realized to date, take of Kemp's ridley sea turtles is increased by three false crawls and one hatched nest on Boca Chica Beach.

Monitoring has not indicated that an increase in take authorization is warranted for the other sea turtle species. Previously authorized and unutilized incidental take will carry forward.

Habitat Loss – The increased mission cadence does not involve new construction beyond what was previously assessed. Beach habitat used by nesting sea turtles would not be destroyed by the increased mission cadence.

Heat and Vapor Plume Exposure – The increased mission cadence will increase the frequency that beach habitat is exposed to heat and vapor plumes. However, the addition of the deluge and detonation suppression system reduces the temperature of the heat plume and the amount of beach habitat that is exposed to temperatures above 90 degrees Fahrenheit. Both reduce the severity of adverse effects to any nesting female sea turtles or hatchlings that may be present on the beach during a launch event. As described in the BCO, sea turtle nests on Boca Chica Beach are insulated by moist sand and would not be harmed by the heat plume. Therefore, the increased frequency of exposure to heat plumes of reduced intensity is not expected to cause additional adverse effects to sea turtles.

Gravel Plume Exposure – The effects of gravel plumes on sea turtles were not previously evaluated. The gravel plume is estimated to extend approximately 0.3 mile from the developed VLA. Boca Chica Beach, where sea turtles may be present, is at the far edge of this impact area and a line of dunes topped by vegetation separates the VLA from the beach where adult or hatchling turtles may be present. This line of vegetated dunes likely attenuates the spread of mud, sand, and gravel mobilized by engine thrust, insulating the beach from this impact. Sea turtle nests and eggs are also insulated by moist sand and would not be harmed by the gravel plume. Therefore, injuries to turtles from the gravel plume are not expected. Gravel transported to the beach from the plume is not expected to affect the beach habitat, as tides frequently add and remove material from the beach. Therefore, the increased frequency of exposure to gravel plumes of reduced is not expected to cause additional adverse effects to sea turtles.

Noise, Light, Activity, Sonic Booms, and Vibrations – The increased mission cadence will increase the frequency that beach habitat is exposed to noise and vibrations, including those from sonic booms. The continued use of the deluge and detonation suppression system will also reduce the intensity of noise and vibrations during launch. Therefore, the increased frequency of exposure to noise and vibrations of reduced intensity is not expected to cause additional adverse effects to sea turtles.

As to light and activity impacts originating from the VLA, the increased mission cadence will decrease the number of possible nighttime launches and potentially decrease the number of false crawls by female sea turtles on Boca Chica Beach or disorient hatchlings that may emerge from nests on Boca Chica Beach. However, the BCO already considers that SpaceX may have near continuous activity at the VLA, including light and activity at night. Monitors from Sea Turtle, Inc. presently search for and collect sea turtle eggs that are laid on Boca Chica Beach, such that the potential for on-beach hatching (and potential disorientation) is reduced. The available sea turtle monitoring data from Boca Chica Beach do not indicate that activities at the VLA have increased the number of documented false crawls or caused hatchlings to become stranded in the dunes. Data are presently lacking to determine whether the light and visual activity from additional nighttime launches would increase false crawls or lead to more disoriented hatchlings. However, more detections of false crawls of green sea turtles were recorded in 2022 and through October 2023 than estimated in the May 2022 BCO, suggesting that an increase in this part of the incidental take metric is warranted to accommodate the additional monitoring frequency.

Studies suggest that the typical ratio of sea turtle false crawls to successful nesting is roughly 1:1 (NPS 2021). Beach light levels have not been found to correlate with the occurrence of sea turtle false crawls (Byrd 2022), suggesting that light is not a primary driver of this behavior. However, light pollution has been found to correlate with fewer sea turtles emerging from the beach and also with hatchlings not reaching the sea (Witherington et al. 2014).

The increased mission cadence should not reduce access to Boca Chica Beach by sea turtle monitors. However, there is insufficient evidence to determine whether any additional incidental take is reasonably certain to occur.

Traffic on Boca Chica Beach – SpaceX performs patrols of Boca Chica Beach to enforce access restrictions. Increased mission cadence would increase the number and frequency of such patrols and increase the risk of a patrol vehicle striking a sea turtle on the beach, particularly at night. While a possible adverse effect, present minimization measures reduce the risk of an actual strike through training, speed limits, and other awareness measures. No sea turtle strikes by SpaceX patrol vehicles have been documented to date. It is not likely that increased patrol vehicle use would increase the number of sea turtle strikes.

Anomalies, Hazardous Material Exposure, Debris Fall/Removal – Anomalies are unplanned outcomes and may involve explosions that scatter debris, ignite fires, or release hazardous materials. Responses to anomalies may include activities to suppress fires or activities to retrieve debris or contain and remediate spills. Both the anomaly itself and the response activities can temporarily disturb habitat. Increased mission cadence may increase the cumulative likelihood of an anomaly over time and the number of anomalies that occur. The consequences of any particular anomaly are not predictable, but the debris field and heat/vapor plume impact areas are those most likely to be exposed to these consequences. The increased mission cadence is not expected to expand these impact areas. Prior

analyses have considered the effects of anomalies and measured adverse effects (and incidental take) in terms of hours of access restrictions for licensed activities (i.e., closure hours).

Cumulative Effects: None of the cumulative activities identified above are expected to affect sea turtles in the action area. None involves construction on or use of nesting beaches, and none occurs in an area where lighting and urban noise is not already present.

Sea Birds

This Addendum #2 combines the analysis of effects of the action and cumulative effects for the black-capped petrel, band-rumped storm-petrel, Hawaiian petrel, Newell's shearwater, roseate tern, and short-tailed albatross, since the types of effects and responses by individuals of these species are expected to be similar. Each of these species use the same habitat (e.g., open ocean) and in similar ways (e.g., for foraging). These species are being analyzed with respect to activities conducted in the Landing Zone Action Areas.

Environmental Baseline:

Black-capped Petrel – The black-capped petrel was listed as endangered by the USFWS in 2024. This species is known to forage within or travel through the Landing Zone Action Areas in the Gulf of Mexico and Atlantic Ocean. The black-capped petrel breeds on Hispaniola, which is just outside of the Landing Zone Action Area to the north. The USFWS published a final listing of the species in 2023 and noted that recent reports in the northeast and central Gulf of Mexico show a greater use of the area than previously thought (USFWS 2023d). Black-capped petrels spend most of their time over the northwest Atlantic, passing through the Landing Zone Action Area in the Atlantic Ocean after leaving breeding locations in Hispaniola (USFWS 2023d).

Band-rumped Storm-petrel – The band-rumped storm-petrel was listed as endangered by the USFWS in 2016. This species is known to forage within or travel through the Landing Zone Action Areas in the Pacific and Atlantic Oceans. The band-rumped storm-petrel breeds on the Hawaiian Islands, which are just outside of the Landing Zone Action Areas that are south and east of the islands. The USFWS published a 5-year Review of the species in 2021 and a Species Report in 2022. The 2022 Species Report states that the overall population trend of the band-rumped storm-petrel appears to be decreasing, and their resilience is low. The 2022 Species Report identifies breeding colony predation, oceanic predation, climate change, invasive species, habitat modification, stochastic events, light attraction, fallout, collisions, wind farms, and inadequate regulation as the main causes of decline (USFWS 2021c).

Hawaiian Petrel – The Hawaiian petrel was listed as endangered by the USFWS in 1975. This species is known to forage within or travel through the Landing Zone Action Areas in the Pacific Ocean. The Hawaiian petrel breeds on the Hawaiian Islands, which are just outside of the Landing Zone Action Areas that are south and east of the islands. The USFWS published a Recovery Plan for the Hawaiian Petrel in 1983, and amended the plan in 2019, citing a 78% decrease in population since 1993, or 6% per year. The main causes of decline are listed as predation and light-induced fallout (USFWS 2019b).

Newell's Shearwater – The Newell's shearwater was listed as threatened by the USFWS in 1975. This species is known to forage within or travel through the Landing Zone Action Areas in the Pacific Ocean. The Newell's shearwater breeds on the Hawaiian Islands, which are just outside of the Landing Zone Action Areas that are south and east of the islands. The USFWS published a Recovery Plan for the

Newell's shearwater in 1983, and amended the plan in 2019, citing a 94% decrease in population since 1993, or 13% per year. The main causes of decline are listed as predation, light-induced fallout, collisions with infrastructure, and habitat loss (USFWS 2019c).

Roseate Tern – The roseate tern was listed as endangered by the USFWS in 1987. This species is known to forage within or travel through the Landing Zone Action Area in the Atlantic Ocean. The USFWS published a 5-year Status Review of the northeastern North American population of the roseate tern in 2020, and a 5-year review of the Caribbean population in 2022. According to the 5-year Status Reviews, the northeastern North American population has had multiple large increases and multiple large decreases in population since the species was listed in 1987, while the Caribbean population has decreased overall. The main reasons cited for population decreases are predation, hurricanes and tropical storms, food availability, and human disturbance (USFWS 2020b, 2022e).

Short-tailed Albatross – The short-tailed albatross was listed as endangered by the USFWS in 2000. This species is known to forage within or travel through the Landing Zone Action Areas in the Pacific Ocean. The short-tailed albatross breeds on Midway Atoll, just north of the Landing Zone Action Areas in the Pacific Ocean. The USFWS published a 5-year Status Review of the short-tailed albatross in 2014. According to the 5-year Status Review, the population has slightly increased since the species' listing, with the main threats being habitat loss, climate change, fishing, disease, predation, inadequate regulations, contaminants, plastics, and energy development (USFWS 2014).

Effects of the Action:

Noise, Light, Activity, Sonic Booms, and Vibrations – Foraging individuals could be exposed and subsequently startled by launch activities (if foraging near the VLA), or by landings and other activities associated with downrange recovery. The black-capped petrel is the only species out of these six seabirds that ranges close enough to the VLA to be exposed to launch activities. However, this species has not been recorded during monitoring efforts and does not typically come inland, so launch activities are not expected to have an adverse effect. Species that are drawn in by light may have a higher risk of injury depending on lighting of landing platforms and droneships. Petrels, storm-petrels, and shearwaters, including Newell's shearwater and band-rumped storm-petrel, have been shown to be attracted to lights on ships and platforms at sea as they forage at night (Troy et. al 2013), and any attraction towards platforms or ships where a rocket is to land could increase the chance of the birds being injured from the heat/vapor plume. However, the number of birds attracted to the light is expected to be low, given the distance that the platform or ship is to be stationed from the Hawaiian Islands and the fact that most observed fallout from light occurs on land, near populated areas (Troy et al. 2013). During the day, it is not expected that the lights would have any effect on sea birds, however birds may still forage or rest on or around ships or platforms, as they are known to do around offshore oil and gas platforms (Rodriguez et al. 2019). It is not expected that the noise would affect sea birds, as they would flush from the area as the vehicle lands and continue to forage elsewhere.

Heat and Vapor Plume Exposure – The increased mission cadence will increase the frequency that the open ocean around the landing platform or droneship is exposed to heat and vapor plumes. As a landing is initiated, any birds that are resting on the platform or foraging around the platform could be exposed to the heat and vapor plume created by the landing. However, the birds would be expected to flush in advance of the heat and vapor plume, avoiding physical injury. As sea birds that are adapted to flying long distances, these species would not be expected to encounter any long-term adverse effects

induced by infrequent flushing from the landings. It is also not expected that there would be a high density of birds resting or foraging around the landing platform or droneship, due to the distance from land, where a vast majority of these birds nest and roost.

Anomalies, Hazardous Material Exposure, Debris Fall/Removal – Anomalies are unplanned outcomes and may involve explosions that scatter debris or release hazardous materials. Responses to anomalies may include activities to retrieve debris or contain and remediate spills. Both the anomaly itself and the response activities can temporarily disturb foraging habitat. It is not expected that landings in the Landing Zone Action Areas would result in any anomalies.

Cumulative Effects: None of the cumulative activities identified above are expected to affect sea birds in the Landing Zone Action Areas.

Critical Habitat Assessments

This Addendum #2 updates the current environmental baseline for each critical habitat area that may be affected by the proposed increase in mission cadence and other changes described above. Effects of the action on critical habitats are assessed to reach an effect determination for the proposed actions considered herein. If the proposed increase in mission cadence and other changes described above are likely to have an adverse effect on the critical habitat, then the cumulative effects to the critical habitat are also assessed.

Plover and Red Knot Critical Habitat

Environmental Baseline: The final and proposed designations of piping plover and red knot critical habitat remain unchanged. The action area contains piping plover critical habitat units TX-01, TX-02, and portions of TX-3A and TX-3B. The action area contains a portion of proposed red knot critical habitat unit TX-9 and all of proposed critical habitat unit TX-11. The units include mud flats, intertidal flats, and salt flats and do not include densely vegetated habitat or developed lands within those boundaries.

The VLA and the combined heat/vapor plume and debris impact area is within the piping plover critical habitat unit TX-01 and proposed red knot critical habitat unit TX-11. The BA and BCO considered that some piping plover and red knot habitat within the combined heat plume and debris impact area could be permanently or temporarily lost, modified, or degraded by the proposed activities. Addendum #1 and Reinitiation #1 considered that some of these critical habitats could be affected by vegetation growth supported by increased freshwater discharges from operation of the deluge and detonation suppression system.

Vegetation monitoring to date has been reported in Addendum #1 and considered in Reinitiation #1. Avian monitoring confirms that temporary habitat losses (i.e., periods when critical habitat within the heat/vapor plume and debris impact area may be unavailable for use by piping plovers or red knots) do not preclude either species from returning to impacted areas for foraging or resting (see Table 4).

Effects of the Action: As described below, the proposed increase in mission cadence is likely to adversely affect piping plover and red knot critical habitats. The increased mission cadence is not expected to expand the area over which adverse effects would occur (i.e., the impact areas remain the union of the heat/vapor plume radius and the debris field area). The increased use of the deluge and detonation suppression system and increased volumes of freshwater that are expected to discharge into critical

habitat areas will also increase and may increase the risk that vegetation growth reduces the amount of available habitat within these critical habitat units or that these habitats will become contaminated by eroded metals from the stainless-steel components of the launch pad. However, actual habitat reductions or metal contamination have not been documented by the ongoing monitoring activities to date.

Habitat Loss or Degradation – The additional volume and frequency of deluge water discharged from the VLA would increase the amount of fresh water that escapes the developed part of the VLA as overland flow, push water, or condensation. How far this water travels outside of the VLA is not precisely known but is assumed to be limited to the 0.6-mile radius heat/vapor plume area, decreasing in volume with increasing distance from the launch pad.

Soils exposed to more fresh water could begin to support more vegetation that could encroach into the unvegetated mud/wind tidal flats that provide habitat for piping plovers and red knots. Such encroachment, if it occurs outside of the boundary of the VLA, could reduce the amount or quality of critical habitat. Many other factors, such as weather events and tides, would also contribute to the growing conditions in the heat/vapor plume area and influence vegetation independent of the proposed action. At this time, vegetation monitoring has not detected substantial changes to vegetation adjacent to the VLA. Therefore, the best available information suggests that significant vegetation growth leading to piping plover or red knot critical habitat impacts is possible, but not likely.

Gravel Plume – The increased mission cadence will increase the frequency that critical habitat is exposed to airborne gravel from launches. Due to tides constantly changing the sediment of the critical habitat, the gravel expelled by the plume is not expected to cause adverse effects to the quality of the critical habitat.

Noise, Light, Activity, Sonic Booms, and Vibrations – The increased mission cadence will increase the frequency that critical habitat is exposed to noise and vibrations, including those from sonic booms. The addition of the deluge and detonation suppression system will also reduce the intensity of noise and vibrations during launch. Therefore, the increased frequency of exposure to noise and vibrations of reduced intensity is not expected to cause additional adverse effects to the quality of critical habitat.

Anomalies, Hazardous Material Exposure, Debris Fall/Removal – Anomalies are unplanned outcomes and may involve explosions that scatter debris, ignite fires, or release hazardous materials. Responses to anomalies may include activities to suppress fires or activities to retrieve debris or contain and remediate spills. Both the anomaly itself and the response activities can create noise and activity disruptions that temporarily reduce habitat availability and can also permanently or temporarily damage or destroy habitat. Increased mission cadence may increase the cumulative likelihood of an anomaly over time and the number of anomalies that occur. The consequences of any particular anomaly are not predictable, but the debris field and heat/vapor plume impact areas are those most likely to be exposed to these consequences. The increased mission cadence is not expected to expand these combined impact areas.

Cumulative Effects: The cumulative activities identified above are not expected to affect final or proposed critical habitats for the piping plover or red knot. Each occurs outside of critical habitat units or in areas of non-habitat that are excluded from the critical habitat designation (i.e., are developed lands or are densely vegetated).

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Appendix A

U.S. Fish and Wildlife Service Official Species List

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Texas Coastal & Central Plains Esfo
17629 El Camino Real, Suite 211
Houston, TX 77058-3051
Phone: (281) 286-8282 Fax: (281) 488-5882

In Reply Refer To: 07/22/2024 17:43:11 UTC
Project Code: 2024-0119535
Project Name: Contour

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The U.S. Fish and Wildlife Service (Service) field offices in Clear Lake, Corpus Christi, Fort Worth, and Alamo, Texas, have combined administratively to form the Texas Coastal Ecological Services Field Office. All project related correspondence should be sent to the field office address listed below responsible for the county in which your project occurs:

Project Leader; U.S. Fish and Wildlife Service; 17629 El Camino Real Ste. 211; Houston, Texas 77058
Angelina, *Austin*, *Brazoria*, *Brazos*, *Chambers, Colorado, Fayette, Fort Bend, Freestone, Galveston, Grimes, Hardin, Harris, Houston, Jasper, Jefferson, Leon, Liberty, Limestone, Madison, Matagorda, Montgomery, Newton, Orange, Polk, Robertson, Sabine, San Augustine, San Jacinto, Trinity, Tyler, Walker, Waller, and Wharton.*

Assistant Field Supervisor, U.S. Fish and Wildlife Service; 4444 Corona Drive, Ste 215; Corpus Christi, Texas 78411
Aransas, Atascosa, Bee, Brooks, Calhoun, De Witt, Dimmit, Duval, Frio, Goliad, Gonzales, Hidalgo, Jackson, Jim Hogg, Jim Wells, Karnes, Kenedy, Kleberg, La Salle, Lavaca, Live Oak, Maverick, McMullen, Nueces, Refugio, San Patricio, Victoria, and Wilson.

U.S. Fish and Wildlife Service; Santa Ana National Wildlife Refuge; Attn: Texas Ecological Services Sub-Office; 3325 Green Jay Road, Alamo, Texas 78516
Cameron, Hidalgo, Starr, Webb, Willacy, and Zapata.

For questions or coordination for projects occurring in counties not listed above, please contact arles@fws.gov.

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your

proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the Service under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2) (c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at: http://www.fws.gov/media/endangered-species-consultation-handbook.

Non-Federal entities may consult under Sections 9 and 10 of the Act. Section 9 and Federal regulations prohibit the take of endangered and threatened species, respectively, without special exemption. “Take” is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. “Harm” is further defined (50 CFR § 17.3) to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. “Harass” is defined (50 CFR § 17.3) as intentional or negligent actions that create the likelihood of

injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Should the proposed project have the potential to take listed species, the Service recommends that the applicant develop a Habitat Conservation Plan and obtain a section 10(a)(1)(B) permit. The Habitat Conservation Planning Handbook is available at: https://www.fws.gov/library/collections/habitat-conservation-planning-handbook.

Migratory Birds:
In addition to responsibilities to protect threatened and endangered species under the Act, there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts visit: https://www.fws.gov/program/migratory-birds.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable National Environmental Policy Act (NEPA) documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures see https://www.fws.gov/library/collections/threats-birds.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- Bald & Golden Eagles
- Migratory Birds
- Marine Mammals
- Coastal Barriers
- Wetlands

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Texas Coastal & Central Plains Esfo
17629 El Camino Real, Suite 211
Houston, TX 77058-3051
(281) 286-8282

PROJECT SUMMARY

Project Code: 2024-0119535
Project Name: Contour
Project Type: Airport - Maintenance/Modification
Project Description: Contour
Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@25.97264975,-97.08304921048764,14z

Counties: Cameron County, Texas

ENDANGERED SPECIES ACT SPECIES

There is a total of 20 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Gulf Coast Jaguarundi *Puma yagouaroundi cacomitli* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/3945	Endangered
Ocelot *Leopardus (=Felis) pardalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4474	Endangered
Tricolored Bat *Perimyotis subflavus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10515	Proposed Endangered
West Indian Manatee *Trichechus manatus* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. ***This species is also protected by the Marine Mammal Protection Act, and may have additional consultation requirements.*** Species profile: https://ecos.fws.gov/ecp/species/4469	Threatened

BIRDS

NAME	STATUS
Black-capped Petrel *Pterodroma hasitata* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4748	Endangered
Cactus Ferruginous Pygmy-owl *Glaucidium brasilianum cactorum* There is **final** critical habitat for this species. Species profile: https://ecos.fws.gov/ecp/species/1225	Threatened
Eastern Black Rail *Laterallus jamaicensis ssp. jamaicensis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10477	Threatened
Northern Aplomado Falcon *Falco femoralis septentrionalis* Population: Wherever found, except where listed as an experimental population No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1923	Endangered
Piping Plover *Charadrius melodus* Population: [Atlantic Coast and Northern Great Plains populations] - Wherever found, except those areas where listed as endangered. There is **final** critical habitat for this species. Your location overlaps the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6039	Threatened
Rufa Red Knot *Calidris canutus rufa* There is **proposed** critical habitat for this species. Species profile: https://ecos.fws.gov/ecp/species/1864	Threatened

REPTILES

NAME	STATUS
Green Sea Turtle *Chelonia mydas* Population: North Atlantic DPS There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6199	Threatened
Hawksbill Sea Turtle *Eretmochelys imbricata* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/3656	Endangered
Kemp's Ridley Sea Turtle *Lepidochelys kempii* There is **proposed** critical habitat for this species. Species profile: https://ecos.fws.gov/ecp/species/5523	Endangered
Leatherback Sea Turtle *Dermochelys coriacea* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/1493	Endangered
Loggerhead Sea Turtle *Caretta caretta* Population: Northwest Atlantic Ocean DPS There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/1110	Threatened

CLAMS

NAME	STATUS
Mexican Fawnsfoot *Truncilla cognata* There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/7870	Proposed Endangered
Salina Mucket *Potamilus metnecktayi* There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/8753	Proposed Endangered

INSECTS

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

FLOWERING PLANTS

NAME	STATUS
South Texas Ambrosia *Ambrosia cheiranthifolia* No critical habitat has been designated for this species.	Endangered

NAME	STATUS
Species profile: https://ecos.fws.gov/ecp/species/3331	
Texas Ayenia *Ayenia limitaris* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4942	Endangered

CRITICAL HABITATS

There is 1 critical habitat wholly or partially within your project area under this office's jurisdiction.

NAME	STATUS
Piping Plover *Charadrius melodus* https://ecos.fws.gov/ecp/species/6039#crithab	Final

BALD & GOLDEN EAGLES

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act[1] and the Migratory Bird Treaty Act[2].

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats[3], should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

1. The Bald and Golden Eagle Protection Act of 1940.
2. The Migratory Birds Treaty Act of 1918.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

THERE ARE NO BALD AND GOLDEN EAGLES WITHIN THE VICINITY OF YOUR PROJECT AREA.

MIGRATORY BIRDS

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats[3] should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the PROBABILITY OF PRESENCE SUMMARY below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
American Golden-plover *Pluvialis dominica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/10561	Breeds elsewhere
American Oystercatcher *Haematopus palliatus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8935	Breeds Apr 15 to Aug 31
Audubon's Shearwater *Puffinus lherminieri* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9635	Breeds Mar 1 to Aug 5
Black Scoter *Melanitta nigra* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/10413	Breeds elsewhere
Black Skimmer *Rynchops niger* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/5234	Breeds May 20 to Sep 15
Black-legged Kittiwake *Rissa tridactyla* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/10459	Breeds elsewhere
Brown Pelican *Pelecanus occidentalis* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/6034	Breeds Jan 15 to Sep 30
Brownsville Curve-billed Thrasher *Toxostoma curvirostre oberholseri* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/11981	Breeds Feb 15 to Aug 15

NAME	BREEDING SEASON
Chihuahuan Raven *Corvus cryptoleucus* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/11945	Breeds Apr 1 to Aug 31
Chimney Swift *Chaetura pelagica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9406	Breeds Mar 15 to Aug 25
Common Loon *gavia immer* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/4464	Breeds Apr 15 to Oct 31
Cory's Shearwater *Calonectris diomedea* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/10452	Breeds elsewhere
Dickcissel *Spiza americana* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9453	Breeds May 5 to Aug 31
Double-crested Cormorant *phalacrocorax auritus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/3478	Breeds Apr 20 to Aug 31
Eastern Meadowlark *Sturnella magna* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9455	Breeds Apr 25 to Aug 31
Forster's Tern *Sterna forsteri* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/11953	Breeds Mar 1 to Aug 15
Gull-billed Tern *Gelochelidon nilotica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9501	Breeds May 1 to Jul 31
Hudsonian Godwit *Limosa haemastica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9482	Breeds elsewhere

NAME	BREEDING SEASON
King Rail *Rallus elegans* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8936	Breeds May 1 to Sep 5
Least Tern *Sternula antillarum antillarum* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/11919	Breeds Apr 25 to Sep 5
Lesser Yellowlegs *Tringa flavipes* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679	Breeds elsewhere
Long-billed Curlew *Numenius americanus* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/5511	Breeds elsewhere
Long-tailed Duck *Clangula hyemalis* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/7238	Breeds elsewhere
Magnificent Frigatebird *Fregata magnificens* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9588	Breeds elsewhere
Marbled Godwit *Limosa fedoa* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9481	Breeds elsewhere
Mountain Plover *Charadrius montanus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3638	Breeds elsewhere
Orchard Oriole *Icterus spurius* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9457	Breeds Jun 10 to Aug 15
Painted Bunting *Passerina ciris* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9511	Breeds Apr 25 to Aug 15

NAME	BREEDING SEASON
Pectoral Sandpiper *Calidris melanotos* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9561	Breeds elsewhere
Pomarine Jaeger *Stercorarius pomarinus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/10458	Breeds elsewhere
Prairie Loggerhead Shrike *Lanius ludovicianus excubitorides* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/8833	Breeds Feb 1 to Jul 31
Prothonotary Warbler *Protonotaria citrea* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9439	Breeds Apr 1 to Jul 31
Red Knot *Calidris canutus roselaari* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8880	Breeds elsewhere
Red-breasted Merganser *Mergus serrator* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/10693	Breeds elsewhere
Red-headed Woodpecker *Melanerpes erythrocephalus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9398	Breeds May 10 to Sep 10
Red-necked Phalarope *Phalaropus lobatus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/10467	Breeds elsewhere
Reddish Egret *Egretta rufescens* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/7617	Breeds Mar 1 to Sep 15

NAME	BREEDING SEASON
Ring-billed Gull *Larus delawarensis* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/10468	Breeds elsewhere
Royal Tern *Thalasseus maximus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/10471	Breeds Apr 15 to Aug 31
Ruddy Turnstone *Arenaria interpres morinella* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/10633	Breeds elsewhere
Sandwich Tern *Thalasseus sandvicensis* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9731	Breeds Apr 25 to Aug 31
Short-billed Dowitcher *Limnodromus griseus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9480	Breeds elsewhere
Sooty Tern *Onychoprion fuscatus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/10695	Breeds Mar 10 to Jul 31
Sprague's Pipit *Anthus spragueii* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8964	Breeds elsewhere
Surf Scoter *Melanitta perspicillata* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/10463	Breeds elsewhere
Swallow-tailed Kite *Elanoides forficatus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8938	Breeds Mar 10 to Jun 30

NAME	BREEDING SEASON
Whimbrel *Numenius phaeopus hudsonicus* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/11991	Breeds elsewhere
White-winged Scoter *Melanitta fusca* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/10462	Breeds elsewhere
Willet *Tringa semipalmata* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/10669	Breeds Apr 20 to Aug 5
Wilson's Plover *Charadrius wilsonia* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9722	Breeds Apr 1 to Aug 20

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

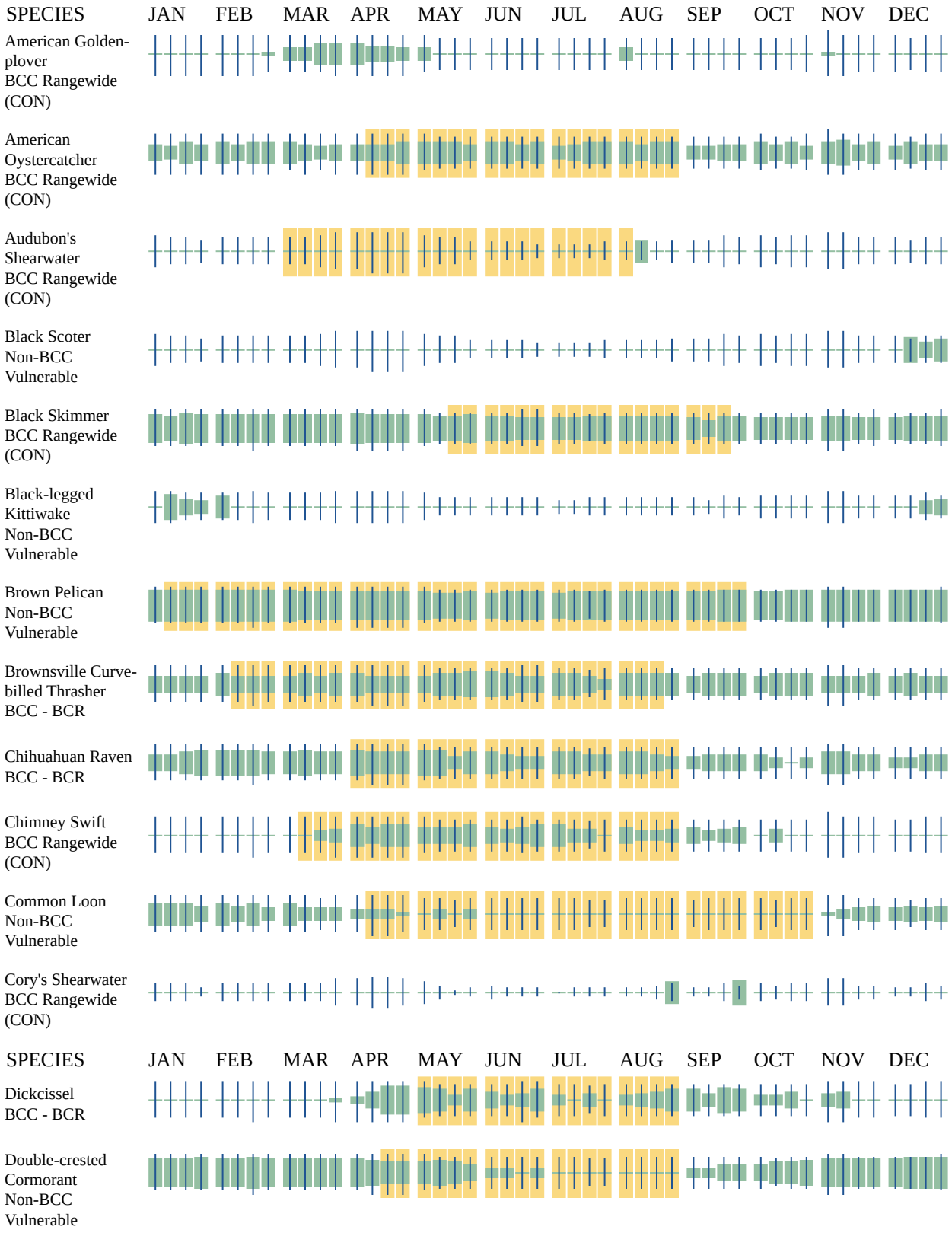
Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (■)
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)
Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

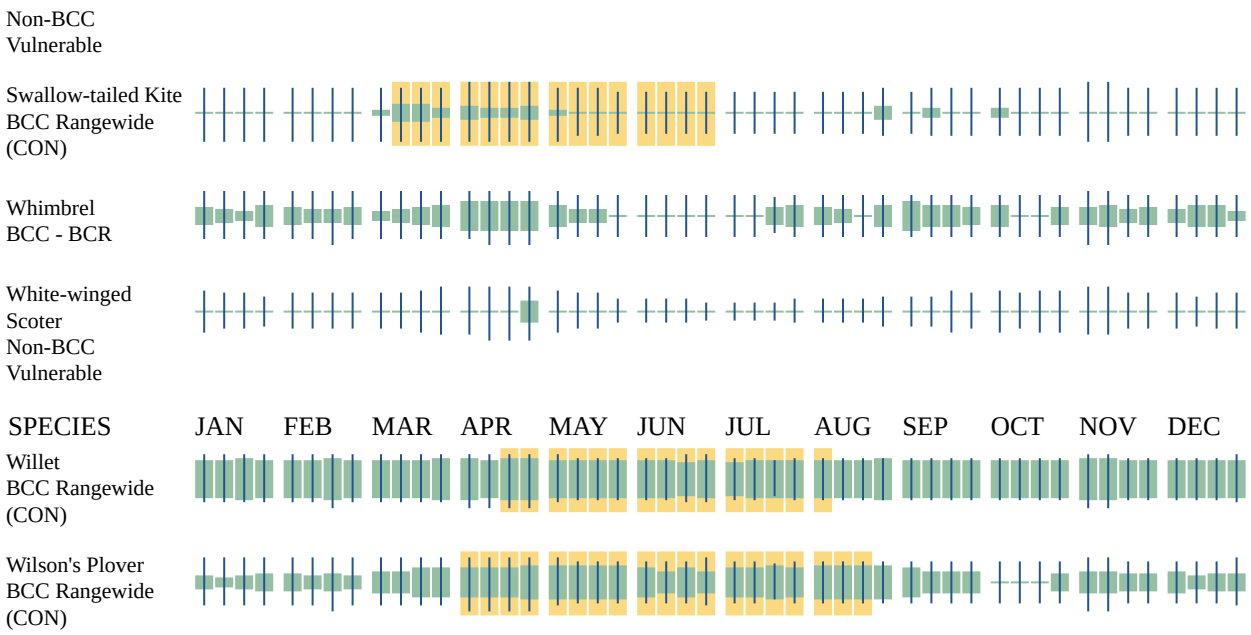
No Data (–)
A week is marked as having no data if there were no survey events for that week.

■ probability of presence ■ breeding season | survey effort – no data


SPECIES
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
American Golden-plover
BCC Rangewide (CON)
American Oystercatcher
BCC Rangewide (CON)
Audubon's Shearwater
BCC Rangewide (CON)
Black Scoter
Non-BCC Vulnerable
Black Skimmer
BCC Rangewide (CON)
Black-legged Kittiwake
Non-BCC Vulnerable
Brown Pelican
Non-BCC Vulnerable
Brownsville Curve-billed Thrasher
BCC - BCR
Chihuahuan Raven
BCC - BCR
Chimney Swift
BCC Rangewide (CON)
Common Loon
Non-BCC Vulnerable
Cory's Shearwater
BCC Rangewide (CON)
SPECIES
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
Dickcissel
BCC - BCR
Double-crested Cormorant
Non-BCC Vulnerable


Eastern Meadowlark BCC - BCR
Forster's Tern BCC - BCR
Gull-billed Tern BCC Rangewide (CON)
Hudsonian Godwit BCC Rangewide (CON)
King Rail BCC Rangewide (CON)
Least Tern BCC Rangewide (CON)
Lesser Yellowlegs BCC Rangewide (CON)
Long-billed Curlew BCC - BCR
Long-tailed Duck Non-BCC Vulnerable
Magnificent Frigatebird BCC - BCR
SPECIES
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
Marbled Godwit BCC Rangewide (CON)
Mountain Plover BCC Rangewide (CON)
Orchard Oriole BCC - BCR
Painted Bunting BCC - BCR
Pectoral Sandpiper BCC Rangewide (CON)
Pomarine Jaeger Non-BCC Vulnerable


Prairie Loggerhead Shrike BCC - BCR
Prothonotary Warbler BCC Rangewide (CON)
Red Knot BCC Rangewide (CON)
Red-breasted Merganser Non-BCC Vulnerable
Red-headed Woodpecker BCC Rangewide (CON)
Red-necked Phalarope Non-BCC Vulnerable
SPECIES
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
Reddish Egret BCC Rangewide (CON)
Ring-billed Gull Non-BCC Vulnerable
Royal Tern Non-BCC Vulnerable
Ruddy Turnstone BCC - BCR
Sandwich Tern BCC - BCR
Short-billed Dowitcher BCC Rangewide (CON)
Sooty Tern Non-BCC Vulnerable
Sprague's Pipit BCC Rangewide (CON)
Surf Scoter



Additional information can be found using the following links:

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

COASTAL BARRIERS

Projects within the John H. Chafee Coastal Barrier Resources System (CBRS) may be subject to the restrictions on Federal expenditures and financial assistance and the consultation requirements of the Coastal Barrier Resources Act (CBRA) (16 U.S.C. 3501 et seq.). For more information, please contact the local Ecological Services Field Office or visit the CBRA Consultations website. The CBRA website provides tools such as a flow chart to help determine whether consultation is required and a template to facilitate the consultation process.

SYSTEM UNIT (SU)

Most new Federal expenditures and financial assistance, including Federal flood insurance, are prohibited within System Units. ***Federally-funded projects within System Units require***

consultation with the Service. *Consultation is not required for projects using private, state, or local funds.*

OTHERWISE PROTECTED AREA (OPA)

OPAs are denoted with a "P" at the end of the unit number. The only prohibition within OPAs is on Federal flood insurance. ***CBRA consultation is not required for projects within OPAs.*** *However, agencies providing disaster assistance that is contingent upon a requirement to purchase flood insurance after the fact are advised to disclose the OPA designation and information on the restrictions on Federal flood insurance to the recipient prior to the commitments of funds.*

UNIT	NAME	TYPE	SYSTEM UNIT ESTABLISHMENT DATE	FLOOD INSURANCE PROHIBITION DATE
T11	South Padre Island	SU	10/18/1982	10/1/1983
T11	South Padre Island	SU	11/16/1990	11/16/1990
T12	Boca Chica	SU	10/18/1982	10/1/1983
T12	Boca Chica	SU	10/18/1982	10/1/1983
T12	Boca Chica	SU	10/18/1982	10/1/1983
T12	Boca Chica	SU	11/16/1990	11/16/1990
T12	Boca Chica	SU	11/16/1990	11/16/1990
T12	Boca Chica	SU	11/16/1990	11/16/1990
T12	Boca Chica	SU	11/16/1990	11/16/1990
T12	Boca Chica	SU	11/16/1990	11/16/1990
T12	Boca Chica	SU	11/16/1990	11/16/1990
T12	Boca Chica	SU	11/16/1990	11/16/1990
T12	Boca Chica	SU	11/16/1990	11/16/1990
T12	Boca Chica	SU	11/15/1993	11/16/1991
T11P	South Padre Island	OPA	N/A	11/16/1991
T12P	Boca Chica	OPA	N/A	11/16/1991
T12P	Boca Chica	OPA	N/A	11/16/1991
T12P	Boca Chica	OPA	N/A	11/16/1991
TX-22P	Andy Bowie	OPA	N/A	11/16/1991

MARINE MAMMALS

Marine mammals are protected under the Marine Mammal Protection Act. Some are also protected under the Endangered Species Act[1] and the Convention on International Trade in Endangered Species of Wild Fauna and Flora[2].

The responsibilities for the protection, conservation, and management of marine mammals are shared by the U.S. Fish and Wildlife Service [responsible for otters, walruses, polar bears, manatees, and dugongs] and NOAA Fisheries[3] [responsible for seals, sea lions, whales, dolphins, and porpoises]. Marine mammals under the responsibility of NOAA Fisheries are **not** shown on this list; for additional information on those species please visit the Marine Mammals page of the NOAA Fisheries website.

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

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

NAME

West Indian Manatee *Trichechus manatus*
Species profile: https://ecos.fws.gov/ecp/species/4469

WETLANDS

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

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

Due to your project's size, the list below may be incomplete, or the acreages reported may be inaccurate. For a full list, please contact the local U.S. Fish and Wildlife office or visit https://www.fws.gov/wetlands/data/mapper.HTML

ESTUARINE AND MARINE WETLAND

- E2AB1N
- E2USNs
- E2USMx
- E2SS3N
- E2USMs
- E2EM1P
- E2EM1Ps
- E2EM1Px
- E2AB3M
- E2SS3Ns
- E2SS3Ps
- E2AB3Ms
- E2EM1N
- E2USN
- E2EM1Ph
- E2EM1Ns
- E2SS3P
- E2AB1M
- E2USM
- E2SS1P
- E2AB1Ns

ESTUARINE AND MARINE DEEPWATER

- E1AB3L
- E1UBLx
- E1UBL

IPAC USER CONTACT INFORMATION

Agency: Private Entity
Name: Rhett Raibley
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LEAD AGENCY CONTACT INFORMATION

Lead Agency: Federal Aviation Administration

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Raleigh Ecological Services Field Office
3916 Sunset Ridge Rd
Raleigh, NC 27607
Phone: (919) 856-4520 Fax: (919) 856-4556

In Reply Refer To: 07/05/2024 18:06:34 UTC
Project Code: 2024-0112156
Project Name: SpaceX Atlantic Action Area

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). If your project area contains suitable habitat for any of the federally-listed species on this species list, the proposed action has the potential to adversely affect those species. If suitable habitat is present, surveys should be conducted to determine the species' presence or absence within the project area. The use of this species list and/or North Carolina Natural Heritage program data should not be substituted for actual field surveys.

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered

species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

https://www.fws.gov/sites/default/files/documents/endangered-species-consultation-handbook.pdf

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts, see https://www.fws.gov/program/migratory-bird-permit/what-we-do.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures, see https://www.fws.gov/library/collections/threats-birds.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/partner/council-conservation-migratory-birds.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Note: IPaC has provided all available attachments because this project is in multiple field office jurisdictions.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Bald & Golden Eagles
- Migratory Birds
- Marine Mammals
- Wetlands

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Raleigh Ecological Services Field Office
3916 Sunset Ridge Rd
Raleigh, NC 27607
(919) 856-4520

This project's location is within the jurisdiction of multiple offices. However, only one species list document will be provided for all offices. The species and critical habitats in this document reflect the aggregation of those that fall in each of the affiliated office's jurisdiction. Other offices affiliated with the project:

Florida Ecological Services Field Office
777 37th St
Suite D-101
Vero Beach, FL 32960-3559
(352) 448-9151

Georgia Ecological Services Field Office
355 East Hancock Avenue
Room 320
Athens, GA 30601-2523
(706) 460-7161

South Carolina Ecological Services
176 Croghan Spur Road, Suite 200
Charleston, SC 29407-7558
(843) 727-4707

PROJECT SUMMARY

Project Code: 2024-0112156
Project Name: SpaceX Atlantic Action Area
Project Type: Airport - Maintenance/Modification
Project Description: The area defined is the Action Area for the increased cadence launches by SpaceX at Boca Chica, TX Vertical Launch Area. The scope of the project is the increase in cadence of launches by SpaceX.

Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@29.50000555,-73.983335,14z

Counties: Brevard County, Florida

ENDANGERED SPECIES ACT SPECIES

There is a total of 11 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Note that 1 of these species should be considered only under certain conditions.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Northern Long-eared Bat *Myotis septentrionalis*	Endangered

No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:
- This species only needs to be considered if the project includes wind turbine operations.

Species profile: https://ecos.fws.gov/ecp/species/9045

West Indian Manatee *Trichechus manatus*	Threatened

There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
This species is also protected by the Marine Mammal Protection Act, and may have additional consultation requirements.
Species profile: https://ecos.fws.gov/ecp/species/4469
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/J3O6KOBGFRCEPH75EJ2YCQGTXE/documents/generated/7281.pdf

BIRDS

NAME	STATUS
Black-capped Petrel *Pterodroma hasitata*	Endangered

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/4748

Eastern Black Rail *Laterallus jamaicensis ssp. jamaicensis*	Threatened

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/10477

Roseate Tern *Sterna dougallii dougallii*	Endangered

Population: Northeast U.S. nesting population
No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/2083

REPTILES

NAME	STATUS
Green Sea Turtle *Chelonia mydas*	Threatened

Population: North Atlantic DPS
There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/6199

Hawksbill Sea Turtle *Eretmochelys imbricata*	Endangered

There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/3656

Leatherback Sea Turtle *Dermochelys coriacea*	Endangered

There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/1493

INSECTS

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

FLOWERING PLANTS

NAME	STATUS
Carter's Mustard *Warea carteri* Population: No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/5583	Endangered
Lewton's Polygala *Polygala lewtonii* Population: No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6688	Endangered

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

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

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

BALD & GOLDEN EAGLES

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act[1] and the Migratory Bird Treaty Act[2].

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats[3], should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

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1. The Bald and Golden Eagle Protection Act of 1940.

2. The Migratory Birds Treaty Act of 1918.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

THERE ARE NO BALD AND GOLDEN EAGLES WITHIN THE VICINITY OF YOUR PROJECT AREA.

MIGRATORY BIRDS

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats[3] should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

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1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the PROBABILITY OF PRESENCE SUMMARY below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Audubon's Shearwater *Puffinus lherminieri* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9635	Breeds Mar 1 to Aug 5
Band-rumped Storm-petrel *Hydrobates castro* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/11999	Breeds elsewhere
Black Scoter *Melanitta nigra* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/10413	Breeds elsewhere

NAME	BREEDING SEASON
Black-capped Petrel *Pterodroma hasitata* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/4748	Breeds elsewhere
Brown Pelican *Pelecanus occidentalis* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/6034	Breeds Jan 15 to Sep 30
Common Loon *gavia immer* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/4464	Breeds Apr 15 to Oct 31
Cory's Shearwater *Calonectris diomedea* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/10452	Breeds elsewhere
Double-crested Cormorant *phalacrocorax auritus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/3478	Breeds Apr 20 to Aug 31
Dovekie *Alle alle* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/6041	Breeds elsewhere
Great Shearwater *Puffinus gravis* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/9634	Breeds elsewhere
Great Skua *Stercorarius skua* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/10697	Breeds elsewhere
Manx Shearwater *Puffinus puffinus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/10465	Breeds Apr 15 to Oct 31

NAME	BREEDING SEASON
Pomarine Jaeger *Stercorarius pomarinus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/10458	Breeds elsewhere
Razorbill *Alca torda* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/10461	Breeds Jun 15 to Sep 10
Red Phalarope *Phalaropus fulicarius* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/10469	Breeds elsewhere
Red-breasted Merganser *Mergus serrator* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/10693	Breeds elsewhere
Red-necked Phalarope *Phalaropus lobatus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/10467	Breeds elsewhere
Red-throated Loon *Gavia stellata* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/9589	Breeds elsewhere
Ring-billed Gull *Larus delawarensis* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/10468	Breeds elsewhere
Royal Tern *Thalasseus maximus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/10471	Breeds Apr 15 to Aug 31

NAME	BREEDING SEASON
Sooty Shearwater *Ardenna grisea* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/10417	Breeds elsewhere
Sooty Tern *Onychoprion fuscatus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/10695	Breeds Mar 10 to Jul 31
Surf Scoter *Melanitta perspicillata* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/10463	Breeds elsewhere
White-winged Scoter *Melanitta fusca* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/10462	Breeds elsewhere
Wilson's Storm-petrel *Oceanites oceanicus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/10416	Breeds elsewhere

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

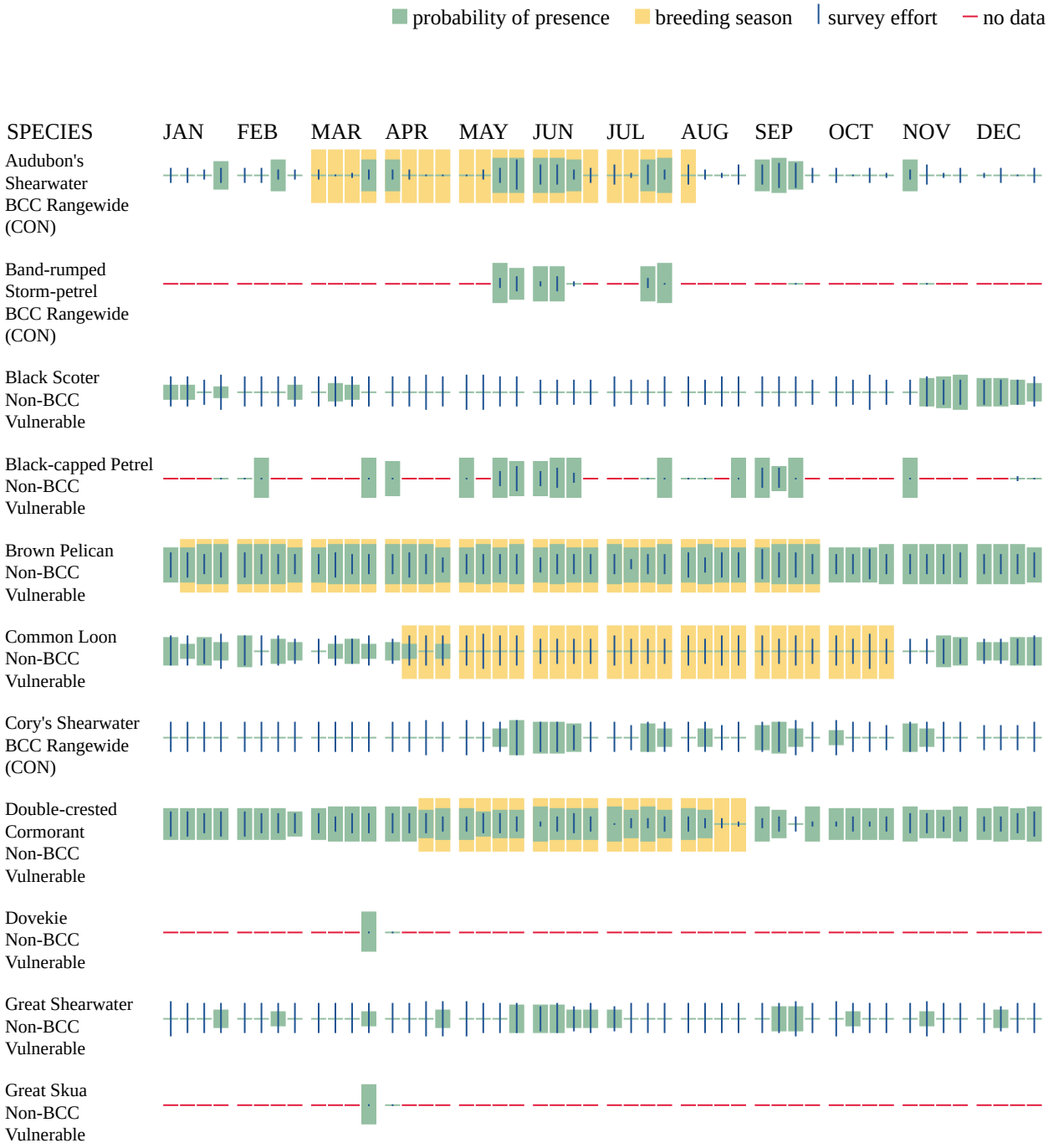
Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (■)
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)

Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (–)
A week is marked as having no data if there were no survey events for that week.




Manx Shearwater
BCC Rangewide
(CON)
SPECIES
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
Pomarine Jaeger
Non-BCC
Vulnerable
Razorbill
Non-BCC
Vulnerable
Red Phalarope
Non-BCC
Vulnerable
Red-breasted
Merganser
Non-BCC
Vulnerable
Red-necked
Phalarope
Non-BCC
Vulnerable
Red-throated Loon
Non-BCC
Vulnerable
Ring-billed Gull
Non-BCC
Vulnerable
Royal Tern
Non-BCC
Vulnerable
Sooty Shearwater
Non-BCC
Vulnerable
Sooty Tern
Non-BCC
Vulnerable
Surf Scoter
Non-BCC
Vulnerable
White-winged
Scoter
Non-BCC
Vulnerable
SPECIES
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
Wilson's Storm-
petrel
Non-BCC
Vulnerable

Additional information can be found using the following links:

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

MARINE MAMMALS

Marine mammals are protected under the Marine Mammal Protection Act. Some are also protected under the Endangered Species Act[1] and the Convention on International Trade in Endangered Species of Wild Fauna and Flora[2].

The responsibilities for the protection, conservation, and management of marine mammals are shared by the U.S. Fish and Wildlife Service [responsible for otters, walruses, polar bears, manatees, and dugongs] and NOAA Fisheries[3] [responsible for seals, sea lions, whales, dolphins, and porpoises]. Marine mammals under the responsibility of NOAA Fisheries are **not** shown on this list; for additional information on those species please visit the Marine Mammals page of the NOAA Fisheries website.

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

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

NAME

West Indian Manatee *Trichechus manatus*
Species profile: https://ecos.fws.gov/ecp/species/4469

WETLANDS

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

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

WETLAND INFORMATION WAS NOT AVAILABLE WHEN THIS SPECIES LIST WAS GENERATED. PLEASE VISIT HTTPS://WWW.FWS.GOV/WETLANDS/DATA/MAPPER.HTML OR CONTACT THE FIELD OFFICE FOR FURTHER INFORMATION.

IPAC USER CONTACT INFORMATION

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Address Line 2: Suite 400
City: Arlington
State: TX
Zip: 76006
Email rhett.raibley@swca.com
Phone: 5015938553

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Federal Aviation Administration

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Louisiana Ecological Services Field Office
200 Dulles Drive
Lafayette, LA 70506
Phone: (337) 291-3100 Fax: (337) 291-3139

In Reply Refer To: 07/05/2024 18:15:28 UTC
Project Code: 2024-0112166
Project Name: SpaceX Gulf of Mexico Action Area

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, and candidate species, as well as designated and proposed critical habitat that may occur within the boundary of your proposed project and may be affected by your proposed project. The Fish and Wildlife Service (Service) is providing this list under section 7 (c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.). Changes in this species list may occur due to new information from updated surveys, changes in species habitat, new listed species and other factors. Because of these possible changes, feel free to contact our office (337-291-3109) for more information or assistance regarding impacts to federally listed species. The Service recommends visiting the IPaC site or the Louisiana Ecological Services Field Office website (https://www.fws.gov/southeast/lafayette) at regular intervals during project planning and implementation for updated species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the habitats upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to utilize their authorities to carry out programs for the conservation of Federal trust resources and to determine whether projects may affect Federally listed species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2) (c)).

Bald eagles have recovered and were removed from the List of Endangered and Threatened Species as of August 8, 2007. Although no longer listed, please be aware that bald eagles are protected under the Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. 668 et seq.).

The Service developed the National Bald Eagle Management (NBEM) Guidelines to provide landowners, land managers, and others with information and recommendations to minimize potential project impacts to bald eagles, particularly where such impacts may constitute "disturbance", which is prohibited by the BGEPA. A copy of the NBEM Guidelines is available at: https://www.fws.gov/migratorybirds/pdf/management/nationalbaldeaglenanagementguidelines.pdf

Those guidelines recommend: (1) maintaining a specified distance between the activity and the nest (buffer area); (2) maintaining natural areas (preferably forested) between the activity and nest trees (landscape buffers); and (3) avoiding certain activities during the breeding season. Onsite personnel should be informed of the possible presence of nesting bald eagles within the project boundary, and should identify, avoid, and immediately report any such nests to this office. If a bald eagle nest occurs or is discovered within or adjacent to the proposed project area, then an evaluation must be performed to determine whether the project is likely to disturb nesting bald eagles. That evaluation may be conducted on-line at: https://www.fws.gov/southeast/our-services/eagle-technical-assistance/. Following completion of the evaluation, that website will provide a determination of whether additional consultation is necessary. The Division of Migratory Birds for the Southeast Region of the Service (phone: 404/679-7051, e-mail: SEmigratorybirds@fws.gov) has the lead role in conducting any necessary consultation.

Activities that involve State-designated scenic streams and/or wetlands are regulated by the Louisiana Department of Wildlife and Fisheries and the U.S. Army Corps of Engineers, respectively. We, therefore, recommend that you contact those agencies to determine their interest in proposed projects in these areas.

Activities that would be located within a National Wildlife Refuge are regulated by the refuge staff. We, therefore, recommend that you contact them to determine their interest in proposed projects in these areas.

Additional information on Federal trust species in Louisiana can be obtained from the Louisiana Ecological Services website at: https://www.fws.gov/southeast/lafayette

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Note: IPaC has provided all available attachments because this project is in multiple field office jurisdictions.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Bald & Golden Eagles

- Migratory Birds
- Marine Mammals
- Coastal Barriers
- Wetlands

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Louisiana Ecological Services Field Office
200 Dulles Drive
Lafayette, LA 70506
(337) 291-3100

This project's location is within the jurisdiction of multiple offices. However, only one species list document will be provided for all offices. The species and critical habitats in this document reflect the aggregation of those that fall in each of the affiliated office's jurisdiction. Other offices affiliated with the project:

Alabama Ecological Services Field Office
1208 B Main Street
Daphne, AL 36526-4419
(251) 441-5181

Florida Ecological Services Field Office
777 37th St
Suite D-101
Vero Beach, FL 32960-3559
(352) 448-9151

Mississippi Ecological Services Field Office
6578 Dogwood View Parkway, Suite A
Jackson, MS 39213-7856
(601) 965-4900

Texas Coastal & Central Plains Esfo
17629 El Camino Real, Suite 211
Houston, TX 77058-3051
(281) 286-8282

PROJECT SUMMARY

Project Code: 2024-0112166
Project Name: SpaceX Gulf of Mexico Action Area
Project Type: Airport - Maintenance/Modification
Project Description: The area defined is the Action Area for the increased cadence of launches by SpaceX at the Boca Chica, TX Vertical Launch Area. The scope of the proposed project is increased launches by SpaceX.

Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@26.0343791,-89.65618214952252,14z

Counties: Cameron County, Texas

ENDANGERED SPECIES ACT SPECIES

There is a total of 20 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Gulf Coast Jaguarundi *Puma yagouaroundi cacomitli* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/3945	Endangered
Ocelot *Leopardus (=Felis) pardalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4474	Endangered
Tricolored Bat *Perimyotis subflavus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10515 General project design guidelines: https://ipac.ecosphere.fws.gov/project/P37VP7F2HNHQTNBQRZUQILLIFI/documents/generated/7127.pdf	Proposed Endangered
West Indian Manatee *Trichechus manatus* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. ***This species is also protected by the Marine Mammal Protection Act, and may have additional consultation requirements.*** Species profile: https://ecos.fws.gov/ecp/species/4469 General project design guidelines: https://ipac.ecosphere.fws.gov/project/P37VP7F2HNHQTNBQRZUQILLIFI/documents/generated/7127,7281.pdf	Threatened

BIRDS

NAME	STATUS
Black-capped Petrel *Pterodroma hasitata* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4748	Endangered
Cactus Ferruginous Pygmy-owl *Glaucidium brasilianum cactorum* There is **final** critical habitat for this species. Species profile: https://ecos.fws.gov/ecp/species/1225	Threatened
Eastern Black Rail *Laterallus jamaicensis ssp. jamaicensis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10477 General project design guidelines: https://ipac.ecosphere.fws.gov/project/P37VP7F2HNHQTNBQRZUQILLIFI/documents/generated/7127.pdf	Threatened
Northern Aplomado Falcon *Falco femoralis septentrionalis* Population: Wherever found, except where listed as an experimental population No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1923	Endangered
Piping Plover *Charadrius melodus*	Threatened

NAME STATUS

Population: [Atlantic Coast and Northern Great Plains populations] - Wherever found, except those areas where listed as endangered.
There is **final** critical habitat for this species. Your location overlaps the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/6039
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/P37VP7F2HNHQTNBQRZUQILLIFI/documents/generated/7127.pdf

Rufa Red Knot *Calidris canutus rufa* — Threatened
There is **proposed** critical habitat for this species.
Species profile: https://ecos.fws.gov/ecp/species/1864
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/P37VP7F2HNHQTNBQRZUQILLIFI/documents/generated/7127.pdf

REPTILES

NAME STATUS

Green Sea Turtle *Chelonia mydas* — Threatened
Population: North Atlantic DPS
There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/6199

Hawksbill Sea Turtle *Eretmochelys imbricata* — Endangered
There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/3656
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/P37VP7F2HNHQTNBQRZUQILLIFI/documents/generated/7127.pdf

Kemp's Ridley Sea Turtle *Lepidochelys kempii* — Endangered
There is **proposed** critical habitat for this species.
Species profile: https://ecos.fws.gov/ecp/species/5523
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/P37VP7F2HNHQTNBQRZUQILLIFI/documents/generated/7127.pdf

Leatherback Sea Turtle *Dermochelys coriacea* — Endangered
There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/1493
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/P37VP7F2HNHQTNBQRZUQILLIFI/documents/generated/7127.pdf

Loggerhead Sea Turtle *Caretta caretta* — Threatened
Population: Northwest Atlantic Ocean DPS
There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/1110

CLAMS

NAME	STATUS
Mexican Fawnsfoot *Truncilla cognata* There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/7870	Proposed Endangered
Salina Mucket *Potamilus metnecktayi* There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/8753	Proposed Endangered

INSECTS

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743 General project design guidelines: https://ipac.ecosphere.fws.gov/project/P37VP7F2HNHQTNBQRZUQILLIFI/documents/generated/7127.pdf	Candidate

FLOWERING PLANTS

NAME	STATUS
South Texas Ambrosia *Ambrosia cheiranthifolia* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/3331	Endangered
Texas Ayenia *Ayenia limitaris* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4942	Endangered

CRITICAL HABITATS

There is 1 critical habitat wholly or partially within your project area under this office's jurisdiction.

NAME	STATUS
Piping Plover *Charadrius melodus* https://ecos.fws.gov/ecp/species/6039#crithab	Final

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

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

The following FWS National Wildlife Refuge Lands and Fish Hatcheries lie fully or partially within your project area:

FACILITY NAME	ACRES
LOWER RIO GRANDE VALLEY NATIONAL WILDLIFE REFUGE https://www.fws.gov/our-facilities?$keywords="%5C%22LOWER+RIO+GRANDE+VALLEY+NATIONAL+WILDLIFE+REFUGE%5C%22"	82,548.441

BALD & GOLDEN EAGLES

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act[1] and the Migratory Bird Treaty Act[2].

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats[3], should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

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1. The Bald and Golden Eagle Protection Act of 1940.
2. The Migratory Birds Treaty Act of 1918.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

There are likely bald eagles present in your project area. For additional information on bald eagles, refer to Bald Eagle Nesting and Sensitivity to Human Activity

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the PROBABILITY OF PRESENCE SUMMARY below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Sep 1 to Jul 31

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

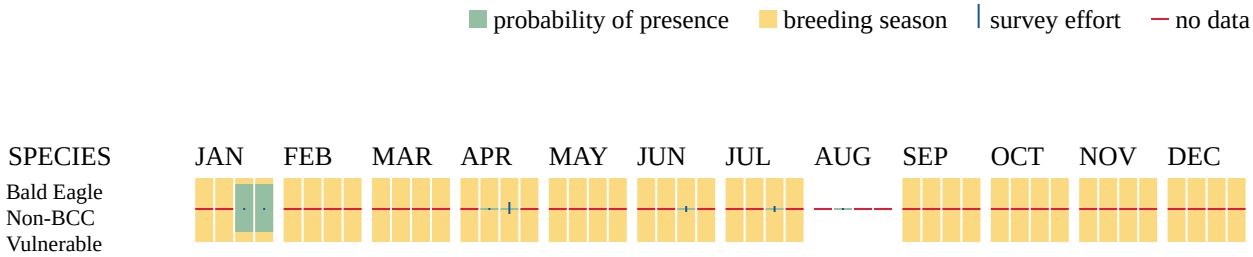
Probability of Presence (■)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (■)
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)
Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (–)
A week is marked as having no data if there were no survey events for that week.



Additional information can be found using the following links:

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

MIGRATORY BIRDS

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats[3] should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

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1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the PROBABILITY OF PRESENCE SUMMARY below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
American Golden-plover *Pluvialis dominica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/10561	Breeds elsewhere
American Oystercatcher *Haematopus palliatus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8935	Breeds Apr 15 to Aug 31
Audubon's Shearwater *Puffinus lherminieri* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9635	Breeds Mar 1 to Aug 5
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Sep 1 to Jul 31
Band-rumped Storm-petrel *Hydrobates castro* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/11999	Breeds elsewhere

NAME	BREEDING SEASON
Black Scoter *Melanitta nigra* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/10413	Breeds elsewhere
Black Skimmer *Rynchops niger* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/5234	Breeds May 20 to Sep 15
Black-legged Kittiwake *Rissa tridactyla* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/10459	Breeds elsewhere
Brown Pelican *Pelecanus occidentalis* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/6034	Breeds Jan 15 to Sep 30
Chimney Swift *Chaetura pelagica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9406	Breeds Mar 15 to Aug 25
Common Loon *gavia immer* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/4464	Breeds Apr 15 to Oct 31
Cory's Shearwater *Calonectris diomedea* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/10452	Breeds elsewhere
Dickcissel *Spiza americana* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9453	Breeds May 5 to Aug 31
Double-crested Cormorant *phalacrocorax auritus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/3478	Breeds Apr 20 to Aug 31

NAME	BREEDING SEASON
Forster's Tern *Sterna forsteri* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/11953	Breeds Mar 1 to Aug 15
Great Shearwater *Puffinus gravis* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/9634	Breeds elsewhere
Gull-billed Tern *Gelochelidon nilotica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9501	Breeds May 1 to Jul 31
Hudsonian Godwit *Limosa haemastica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9482	Breeds elsewhere
King Rail *Rallus elegans* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8936	Breeds May 1 to Sep 5
Least Tern *Sternula antillarum antillarum* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/11919	Breeds Apr 25 to Sep 5
Lesser Yellowlegs *Tringa flavipes* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679	Breeds elsewhere
Long-billed Curlew *Numenius americanus* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/5511	Breeds elsewhere
Magnificent Frigatebird *Fregata magnificens* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9588	Breeds elsewhere
Manx Shearwater *Puffinus puffinus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/10465	Breeds Apr 15 to Oct 31

NAME	BREEDING SEASON
Marbled Godwit *Limosa fedoa* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9481	Breeds elsewhere
Painted Bunting *Passerina ciris* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9511	Breeds Apr 25 to Aug 15
Pectoral Sandpiper *Calidris melanotos* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9561	Breeds elsewhere
Pomarine Jaeger *Stercorarius pomarinus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/10458	Breeds elsewhere
Prairie Loggerhead Shrike *Lanius ludovicianus excubitorides* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/8833	Breeds Feb 1 to Jul 31
Prothonotary Warbler *Protonotaria citrea* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9439	Breeds Apr 1 to Jul 31
Red Knot *Calidris canutus roselaari* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8880	Breeds elsewhere
Red Phalarope *Phalaropus fulicarius* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/10469	Breeds elsewhere
Red-breasted Merganser *Mergus serrator* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/10693	Breeds elsewhere

NAME	BREEDING SEASON
Red-headed Woodpecker *Melanerpes erythrocephalus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9398	Breeds May 10 to Sep 10
Red-necked Phalarope *Phalaropus lobatus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/10467	Breeds elsewhere
Reddish Egret *Egretta rufescens* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/7617	Breeds Mar 1 to Sep 15
Ring-billed Gull *Larus delawarensis* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/10468	Breeds elsewhere
Roseate Tern *Sterna dougallii* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/10661	Breeds May 10 to Aug 31
Royal Tern *Thalasseus maximus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/10471	Breeds Apr 15 to Aug 31
Ruddy Turnstone *Arenaria interpres morinella* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/10633	Breeds elsewhere
Sandwich Tern *Thalasseus sandvicensis* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9731	Breeds Apr 25 to Aug 31
Short-billed Dowitcher *Limnodromus griseus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9480	Breeds elsewhere

NAME	BREEDING SEASON
Sooty Shearwater *Ardenna grisea* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/10417	Breeds elsewhere
Sooty Tern *Onychoprion fuscatus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/10695	Breeds Mar 10 to Jul 31
Sprague's Pipit *Anthus spragueii* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8964	Breeds elsewhere
Surf Scoter *Melanitta perspicillata* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/10463	Breeds elsewhere
Swallow-tailed Kite *Elanoides forficatus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8938	Breeds Mar 10 to Jun 30
Whimbrel *Numenius phaeopus hudsonicus* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/11991	Breeds elsewhere
White-winged Scoter *Melanitta fusca* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/10462	Breeds elsewhere
Willet *Tringa semipalmata* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/10669	Breeds Apr 20 to Aug 5
Wilson's Plover *Charadrius wilsonia* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9722	Breeds Apr 1 to Aug 20

NAME	BREEDING SEASON
Wilson's Storm-petrel *Oceanites oceanicus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/10416	Breeds elsewhere

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

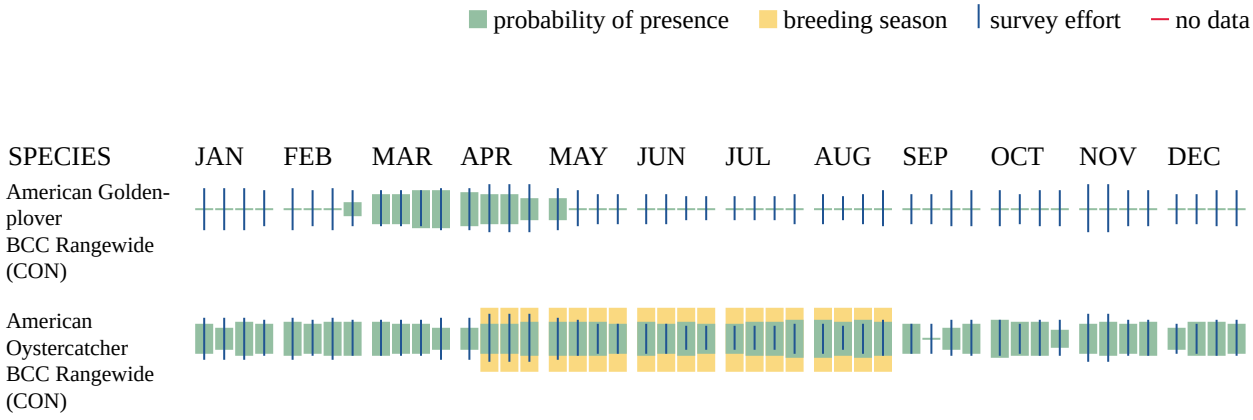
Probability of Presence (■)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (■)
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)
Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

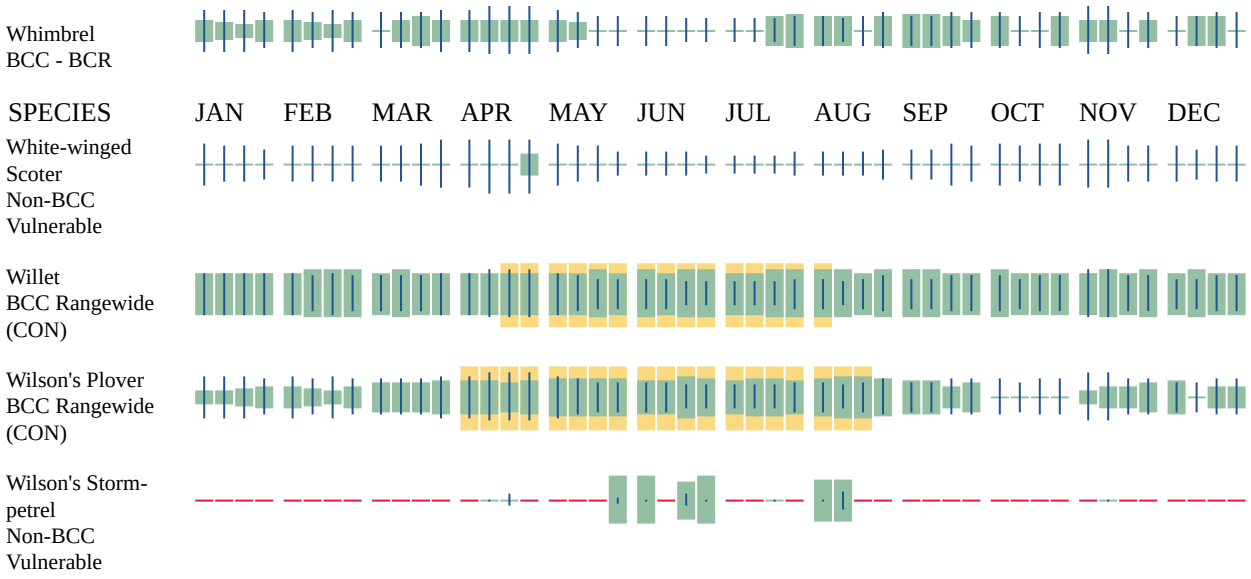
No Data (–)
A week is marked as having no data if there were no survey events for that week.




Audubon's Shearwater BCC Rangewide (CON)
Bald Eagle Non-BCC Vulnerable
Band-rumped Storm-petrel BCC Rangewide (CON)
Black Scoter Non-BCC Vulnerable
Black Skimmer BCC Rangewide (CON)
Black-legged Kittiwake Non-BCC Vulnerable
Brown Pelican Non-BCC Vulnerable
Chimney Swift BCC Rangewide (CON)
Common Loon Non-BCC Vulnerable
Cory's Shearwater BCC Rangewide (CON)
SPECIES
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
Dickcissel BCC - BCR
Double-crested Cormorant Non-BCC Vulnerable
Forster's Tern BCC - BCR
Great Shearwater Non-BCC Vulnerable
Gull-billed Tern BCC Rangewide (CON)


Hudsonian Godwit
BCC Rangewide
(CON)
King Rail
BCC Rangewide
(CON)
Least Tern
BCC Rangewide
(CON)
Lesser Yellowlegs
BCC Rangewide
(CON)
Long-billed Curlew
BCC - BCR
Magnificent
Frigatebird
BCC - BCR
Manx Shearwater
Non-BCC
Vulnerable
SPECIES
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
Marbled Godwit
BCC Rangewide
(CON)
Painted Bunting
BCC - BCR
Pectoral Sandpiper
BCC Rangewide
(CON)
Pomarine Jaeger
Non-BCC
Vulnerable
Prairie Loggerhead
Shrike
BCC - BCR
Prothonotary
Warbler
BCC Rangewide
(CON)
Red Knot
BCC Rangewide
(CON)
Red Phalarope
Non-BCC
Vulnerable
Red-breasted
Merganser


Non-BCC
Vulnerable
Red-headed
Woodpecker
BCC Rangewide
(CON)
Red-necked
Phalarope
Non-BCC
Vulnerable
Reddish Egret
BCC Rangewide
(CON)
SPECIES
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
Ring-billed Gull
Non-BCC
Vulnerable
Roseate Tern
Non-BCC
Vulnerable
Royal Tern
Non-BCC
Vulnerable
Ruddy Turnstone
BCC - BCR
Sandwich Tern
BCC - BCR
Short-billed
Dowitcher
BCC Rangewide
(CON)
Sooty Shearwater
Non-BCC
Vulnerable
Sooty Tern
Non-BCC
Vulnerable
Sprague's Pipit
BCC Rangewide
(CON)
Surf Scoter
Non-BCC
Vulnerable
Swallow-tailed Kite
BCC Rangewide
(CON)



Additional information can be found using the following links:

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

COASTAL BARRIERS

Projects within the John H. Chafee Coastal Barrier Resources System (CBRS) may be subject to the restrictions on Federal expenditures and financial assistance and the consultation requirements of the Coastal Barrier Resources Act (CBRA) (16 U.S.C. 3501 et seq.). For more information, please contact the local Ecological Services Field Office or visit the CBRA Consultations website. The CBRA website provides tools such as a flow chart to help determine whether consultation is required and a template to facilitate the consultation process.

SYSTEM UNIT (SU)

Most new Federal expenditures and financial assistance, including Federal flood insurance, are prohibited within System Units. ***Federally-funded projects within System Units require consultation with the Service.*** *Consultation is not required for projects using private, state, or local funds.*

OTHERWISE PROTECTED AREA (OPA)

OPAs are denoted with a "P" at the end of the unit number. The only prohibition within OPAs is on Federal flood insurance. ***CBRA consultation is not required for projects within OPAs.*** *However, agencies providing disaster assistance that is contingent upon a requirement to purchase flood insurance after the fact are advised to disclose the OPA designation and information on the restrictions on Federal flood insurance to the recipient prior to the commitments of funds.*

UNIT	NAME	TYPE	SYSTEM UNIT ESTABLISHMENT DATE	FLOOD INSURANCE PROHIBITION DATE
T12	Boca Chica	SU	10/18/1982	10/1/1983
T12	Boca Chica	SU	10/18/1982	10/1/1983
T12	Boca Chica	SU	10/18/1982	10/1/1983
T12	Boca Chica	SU	11/16/1990	11/16/1990
T12P	Boca Chica	OPA	N/A	11/16/1991

MARINE MAMMALS

Marine mammals are protected under the Marine Mammal Protection Act. Some are also protected under the Endangered Species Act[1] and the Convention on International Trade in Endangered Species of Wild Fauna and Flora[2].

The responsibilities for the protection, conservation, and management of marine mammals are shared by the U.S. Fish and Wildlife Service [responsible for otters, walruses, polar bears, manatees, and dugongs] and NOAA Fisheries[3] [responsible for seals, sea lions, whales, dolphins, and porpoises]. Marine mammals under the responsibility of NOAA Fisheries are **not** shown on this list; for additional information on those species please visit the Marine Mammals page of the NOAA Fisheries website.

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

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

NAME

West Indian Manatee *Trichechus manatus*
Species profile: https://ecos.fws.gov/ecp/species/4469

WETLANDS

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

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

WETLAND INFORMATION WAS NOT AVAILABLE WHEN THIS SPECIES LIST WAS GENERATED. PLEASE VISIT HTTPS://WWW.FWS.GOV/WETLANDS/DATA/MAPPER.HTML OR CONTACT THE FIELD OFFICE FOR FURTHER INFORMATION.

IPAC USER CONTACT INFORMATION

Agency: Private Entity
Name: Rhett Raibley
Address: 2201 Brookhollow Plaza Drive
Address Line 2: Suite 400
City: Arlington
State: TX
Zip: 76006
Email rhett.raibley@swca.com
Phone: 5015938553

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Federal Aviation Administration

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish And Wildlife Office
300 Ala Moana Boulevard, Box 50088
Honolulu, HI 96850-5000
Phone: (808) 792-9400 Fax: (808) 792-9580

In Reply Refer To: 07/08/2024 16:56:37 UTC
Project Code: 2024-0112597
Project Name: SpaceX Action Area NP, east of Hawaii

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened and endangered species, as well as designated critical habitat that may occur within the boundary of your proposed project and that may be affected by project related actions. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Please contact the Service's Pacific Islands Fish and Wildlife Office (PIFWO) at 808-792-9400 if you have any questions regarding your IPaC species list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may adversely affect threatened and endangered species and/or designated critical habitat.

Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a Biological

Evaluation, similar to a Biological Assessment, be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment or Biological Evaluation are described at 50 CFR 402.12.

Due to the significant number of listed species found on each island within PIFWO's regulatory jurisdiction, and the difficulty in accurately mapping ranges for species that we have limited information about, your species list may include more species than if you obtained the list directly from a Service biologist. We recommend you use the species links in IPaC to view the life history, habitat descriptions, and recommended avoidance and minimization measures to assist with your initial determination of whether the species or its habitat may occur within your project area. If appropriate habitat is present for a listed species, we recommend surveys be conducted to determine whether the species is also present. If no surveys are conducted, we err on the side of the species, by regulation, and assume the habitat is occupied. Updated avoidance and minimization measures for plants and animals, best management practices for work in or near aquatic environments, and invasive species biosecurity protocols can be found on the PIFWO website at: https://www.fws.gov/office/pacific-islands-fish-and-wildlife/library.

If a Federal agency determines, based on the Biological Assessment or Biological Evaluation, that a listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at: http://www.fws.gov/endangered/esa-library/index.

Non-federal entities can also use the IPaC generated species list to develop Habitat Conservation Plans (HCP) in accordance with section 10(a)(1)(B) of the Act. We recommend HCP applicants coordinate with the Service early during the HCP development process. For additional information on HCPs, the Habitat Conservation Planning handbook can be found at https://www.fws.gov/sites/default/files/documents/habitat-conservation-planning-handbook-entire.pdf.

Please be aware that wind energy projects should follow the Service’s wind energy guidelines (http://www.fws.gov/windenergy) for minimizing impacts to migratory birds. Listed birds and the Hawaiian hoary bat may also be affected by wind energy development and we recommend development of a Habitat Conservation Plan for those species, as described above. Guidance for minimizing impacts to migratory birds for projects including communications towers can be found at:

- http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers
- http://www.towerkill.com
- http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation actions that benefit threatened and endangered species into their project planning to further the purposes of the Act in accordance with section 7(a)(1). Please include the Consultation Tracking Number associated with your IPaC species list in any

request for consultation or correspondence about your project that you submit to our office. Please feel free to contact us at PIFWO_admin@fws.gov or 808-792-9400 if you need more current information or assistance regarding the potential impacts to federally listed species and federally designated critical habitat.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Bald & Golden Eagles
- Migratory Birds
- Wetlands

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Pacific Islands Fish And Wildlife Office
300 Ala Moana Boulevard, Box 50088
Honolulu, HI 96850-5000
(808) 792-9400

PROJECT SUMMARY

Project Code: 2024-0112597
Project Name: SpaceX Action Area NP, east of Hawaii
Project Type: Airport - Maintenance/Modification
Project Description: Action Area for SpaceX's increased cadence
Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@24.912230649999998,-135.8600463048473,14z

Counties:

ENDANGERED SPECIES ACT SPECIES

There is a total of 4 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

BIRDS

NAME | STATUS

Band-rumped Storm-petrel *Hydrobates castro* — Endangered
- Population: USA (HI)
- No critical habitat has been designated for this species.
- Species profile: https://ecos.fws.gov/ecp/species/1226
- General project design guidelines: https://ipac.ecosphere.fws.gov/project/DEQGT6KWARHKZFYGIZ3VISLCZE/documents/generated/6939.pdf

Hawaiian Petrel *Pterodroma sandwichensis* — Endangered
- No critical habitat has been designated for this species.
- Species profile: https://ecos.fws.gov/ecp/species/6746
- General project design guidelines: https://ipac.ecosphere.fws.gov/project/DEQGT6KWARHKZFYGIZ3VISLCZE/documents/generated/6939.pdf

Newell"s Shearwater *Puffinus newelli* — Threatened
- No critical habitat has been designated for this species.
- Species profile: https://ecos.fws.gov/ecp/species/2048
- General project design guidelines: https://ipac.ecosphere.fws.gov/project/DEQGT6KWARHKZFYGIZ3VISLCZE/documents/generated/6939.pdf

Short-tailed Albatross *Phoebastria (=Diomedea) albatrus* — Endangered
- No critical habitat has been designated for this species.
- Species profile: https://ecos.fws.gov/ecp/species/433

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

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

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

BALD & GOLDEN EAGLES

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act[1] and the Migratory Bird Treaty Act[2].

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats[3], should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

---

1. The Bald and Golden Eagle Protection Act of 1940.
2. The Migratory Birds Treaty Act of 1918.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

THERE ARE NO BALD AND GOLDEN EAGLES WITHIN THE VICINITY OF YOUR PROJECT AREA.

MIGRATORY BIRDS

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats[3] should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

---

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

THERE ARE NO FWS MIGRATORY BIRDS OF CONCERN WITHIN THE VICINITY OF YOUR PROJECT AREA.

WETLANDS

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

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

NO DATA AVAILABLE - THIS AREA (OR PORTIONS OF IT) HAS NOT BEEN SURVEYED BY THE NWI. FOR MORE INFORMATION, PLEASE CONTACT THE REGULATORY PROGRAM OF THE LOCAL U.S. ARMY CORPS OF ENGINEERS DISTRICT.

IPAC USER CONTACT INFORMATION

Agency: Private Entity
Name: Rhett Raibley
Address: 2201 Brookhollow Plaza Drive
Address Line 2: Suite 400
City: Arlington
State: TX
Zip: 76006
Email rhett.raibley@swca.com
Phone: 5015938553

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Federal Aviation Administration

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish And Wildlife Office
300 Ala Moana Boulevard, Box 50088
Honolulu, HI 96850-5000
Phone: (808) 792-9400 Fax: (808) 792-9580

In Reply Refer To: 07/08/2024 15:43:02 UTC
Project Code: 2024-0112499
Project Name: SpaceX Landing Area North Pacific, north of Hawaii

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened and endangered species, as well as designated critical habitat that may occur within the boundary of your proposed project and that may be affected by project related actions. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Please contact the Service's Pacific Islands Fish and Wildlife Office (PIFWO) at 808-792-9400 if you have any questions regarding your IPaC species list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may adversely affect threatened and endangered species and/or designated critical habitat.

Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a Biological

Evaluation, similar to a Biological Assessment, be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment or Biological Evaluation are described at 50 CFR 402.12.

Due to the significant number of listed species found on each island within PIFWO's regulatory jurisdiction, and the difficulty in accurately mapping ranges for species that we have limited information about, your species list may include more species than if you obtained the list directly from a Service biologist. We recommend you use the species links in IPaC to view the life history, habitat descriptions, and recommended avoidance and minimization measures to assist with your initial determination of whether the species or its habitat may occur within your project area. If appropriate habitat is present for a listed species, we recommend surveys be conducted to determine whether the species is also present. If no surveys are conducted, we err on the side of the species, by regulation, and assume the habitat is occupied. Updated avoidance and minimization measures for plants and animals, best management practices for work in or near aquatic environments, and invasive species biosecurity protocols can be found on the PIFWO website at: https://www.fws.gov/office/pacific-islands-fish-and-wildlife/library.

If a Federal agency determines, based on the Biological Assessment or Biological Evaluation, that a listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at: http://www.fws.gov/endangered/esa-library/index.

Non-federal entities can also use the IPaC generated species list to develop Habitat Conservation Plans (HCP) in accordance with section 10(a)(1)(B) of the Act. We recommend HCP applicants coordinate with the Service early during the HCP development process. For additional information on HCPs, the Habitat Conservation Planning handbook can be found at https://www.fws.gov/sites/default/files/documents/habitat-conservation-planning-handbook-entire.pdf.

Please be aware that wind energy projects should follow the Service’s wind energy guidelines (http://www.fws.gov/windenergy) for minimizing impacts to migratory birds. Listed birds and the Hawaiian hoary bat may also be affected by wind energy development and we recommend development of a Habitat Conservation Plan for those species, as described above. Guidance for minimizing impacts to migratory birds for projects including communications towers can be found at:

- http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers
- http://www.towerkill.com
- http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation actions that benefit threatened and endangered species into their project planning to further the purposes of the Act in accordance with section 7(a)(1). Please include the Consultation Tracking Number associated with your IPaC species list in any

request for consultation or correspondence about your project that you submit to our office. Please feel free to contact us at PIFWO_admin@fws.gov or 808-792-9400 if you need more current information or assistance regarding the potential impacts to federally listed species and federally designated critical habitat.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Bald & Golden Eagles
- Migratory Birds
- Wetlands

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

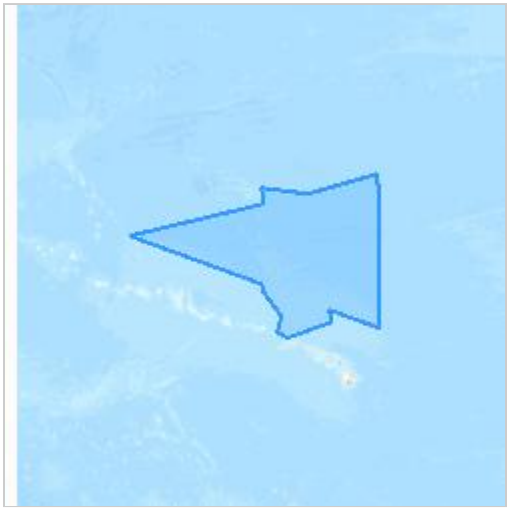
Pacific Islands Fish And Wildlife Office
300 Ala Moana Boulevard, Box 50088
Honolulu, HI 96850-5000
(808) 792-9400

PROJECT SUMMARY

Project Code: 2024-0112499
Project Name: SpaceX Landing Area North Pacific, north of Hawaii
Project Type: Airport - Maintenance/Modification
Project Description: This is the Action Area for landing operations for SpaceX's cadence increase.

Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@27.7032273,-160.12688717256756,14z



Counties:

ENDANGERED SPECIES ACT SPECIES

There is a total of 4 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

BIRDS

NAME	STATUS
Band-rumped Storm-petrel *Hydrobates castro*	Endangered
Population: USA (HI) No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1226 General project design guidelines: https://ipac.ecosphere.fws.gov/project/IFWAVJAXBNERTHIPLPMLHKFNAA/documents/generated/6939.pdf	
Hawaiian Petrel *Pterodroma sandwichensis*	Endangered
No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6746 General project design guidelines: https://ipac.ecosphere.fws.gov/project/IFWAVJAXBNERTHIPLPMLHKFNAA/documents/generated/6939.pdf	
Newell"s Shearwater *Puffinus newelli*	Threatened
No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/2048 General project design guidelines: https://ipac.ecosphere.fws.gov/project/IFWAVJAXBNERTHIPLPMLHKFNAA/documents/generated/6939.pdf	
Short-tailed Albatross *Phoebastria (=Diomedea) albatrus*	Endangered
No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/433	

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

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

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

BALD & GOLDEN EAGLES

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act[1] and the Migratory Bird Treaty Act[2].

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats[3], should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

---

1. The Bald and Golden Eagle Protection Act of 1940.
2. The Migratory Birds Treaty Act of 1918.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

THERE ARE NO BALD AND GOLDEN EAGLES WITHIN THE VICINITY OF YOUR PROJECT AREA.

MIGRATORY BIRDS

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats[3] should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

---

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the PROBABILITY OF PRESENCE SUMMARY below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bulwer's Petrel *Bulweria bulwerii* This is a Bird of Conservation Concern (BCC) throughout its range in Hawaii and the Pacific Islands. https://ecos.fws.gov/ecp/species/10579	Breeds May 1 to Sep 30

NAME	BREEDING SEASON
Sooty Tern *Onychoprion fuscatus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/10695	Breeds Mar 10 to Jul 31

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

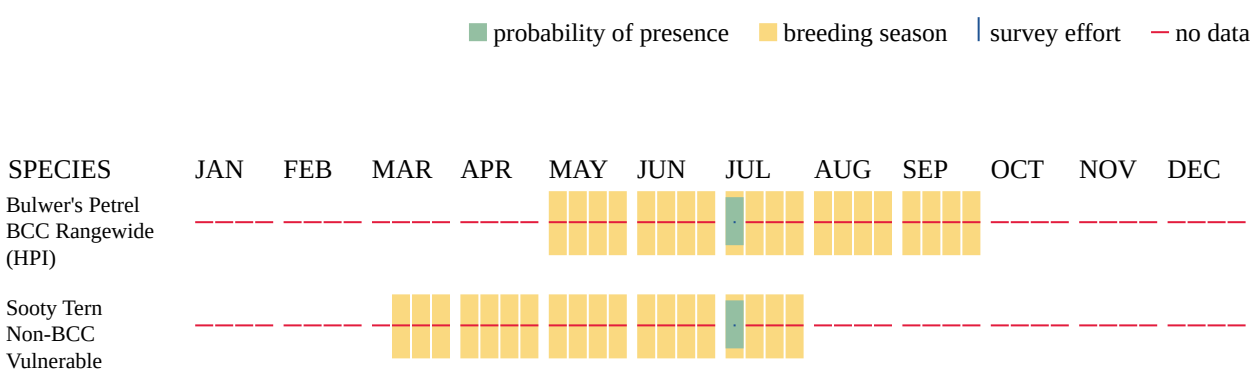
Probability of Presence (▪)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (▪)
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)
Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (–)
A week is marked as having no data if there were no survey events for that week.



Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management

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

WETLANDS

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

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

THERE ARE NO WETLANDS WITHIN YOUR PROJECT AREA.

IPAC USER CONTACT INFORMATION

Agency: Private Entity
Name: Rhett Raibley
Address: 2201 Brookhollow Plaza Drive
Address Line 2: Suite 400
City: Arlington
State: TX
Zip: 76006
Email rhett.raibley@swca.com
Phone: 5015938553

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Federal Aviation Administration

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish And Wildlife Office
300 Ala Moana Boulevard, Box 50088
Honolulu, HI 96850-5000
Phone: (808) 792-9400 Fax: (808) 792-9580

In Reply Refer To: 07/08/2024 15:59:59 UTC
Project Code: 2024-0112543
Project Name: SpaceX Landing Area NP, NW of Hawaii

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened and endangered species, as well as designated critical habitat that may occur within the boundary of your proposed project and that may be affected by project related actions. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Please contact the Service's Pacific Islands Fish and Wildlife Office (PIFWO) at 808-792-9400 if you have any questions regarding your IPaC species list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may adversely affect threatened and endangered species and/or designated critical habitat.

Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a Biological

Evaluation, similar to a Biological Assessment, be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment or Biological Evaluation are described at 50 CFR 402.12.

Due to the significant number of listed species found on each island within PIFWO's regulatory jurisdiction, and the difficulty in accurately mapping ranges for species that we have limited information about, your species list may include more species than if you obtained the list directly from a Service biologist. We recommend you use the species links in IPaC to view the life history, habitat descriptions, and recommended avoidance and minimization measures to assist with your initial determination of whether the species or its habitat may occur within your project area. If appropriate habitat is present for a listed species, we recommend surveys be conducted to determine whether the species is also present. If no surveys are conducted, we err on the side of the species, by regulation, and assume the habitat is occupied. Updated avoidance and minimization measures for plants and animals, best management practices for work in or near aquatic environments, and invasive species biosecurity protocols can be found on the PIFWO website at: https://www.fws.gov/office/pacific-islands-fish-and-wildlife/library.

If a Federal agency determines, based on the Biological Assessment or Biological Evaluation, that a listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at: http://www.fws.gov/endangered/esa-library/index.

Non-federal entities can also use the IPaC generated species list to develop Habitat Conservation Plans (HCP) in accordance with section 10(a)(1)(B) of the Act. We recommend HCP applicants coordinate with the Service early during the HCP development process. For additional information on HCPs, the Habitat Conservation Planning handbook can be found at https://www.fws.gov/sites/default/files/documents/habitat-conservation-planning-handbook-entire.pdf.

Please be aware that wind energy projects should follow the Service’s wind energy guidelines (http://www.fws.gov/windenergy) for minimizing impacts to migratory birds. Listed birds and the Hawaiian hoary bat may also be affected by wind energy development and we recommend development of a Habitat Conservation Plan for those species, as described above. Guidance for minimizing impacts to migratory birds for projects including communications towers can be found at:

- http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers
- http://www.towerkill.com
- http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation actions that benefit threatened and endangered species into their project planning to further the purposes of the Act in accordance with section 7(a)(1). Please include the Consultation Tracking Number associated with your IPaC species list in any

request for consultation or correspondence about your project that you submit to our office. Please feel free to contact us at PIFWO_admin@fws.gov or 808-792-9400 if you need more current information or assistance regarding the potential impacts to federally listed species and federally designated critical habitat.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Bald & Golden Eagles
- Migratory Birds
- Wetlands

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Pacific Islands Fish And Wildlife Office
300 Ala Moana Boulevard, Box 50088
Honolulu, HI 96850-5000
(808) 792-9400

PROJECT SUMMARY

Project Code: 2024-0112543
Project Name: SpaceX Landing Area NP, NW of Hawaii
Project Type: Airport - Maintenance/Modification
Project Description: Action Area for SpaceX's increased cadence
Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@28.747344650000002,-144.73018998978267,14z

Counties:

ENDANGERED SPECIES ACT SPECIES

There is a total of 4 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

BIRDS

NAME	STATUS
Band-rumped Storm-petrel *Hydrobates castro*	Endangered
Population: USA (HI) No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1226 General project design guidelines: https://ipac.ecosphere.fws.gov/project/G7DBRNIQTJDWLLANHS4RERTY6E/documents/generated/6939.pdf	
Hawaiian Petrel *Pterodroma sandwichensis*	Endangered
No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6746 General project design guidelines: https://ipac.ecosphere.fws.gov/project/G7DBRNIQTJDWLLANHS4RERTY6E/documents/generated/6939.pdf	
Newell"s Shearwater *Puffinus newelli*	Threatened
No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/2048 General project design guidelines: https://ipac.ecosphere.fws.gov/project/G7DBRNIQTJDWLLANHS4RERTY6E/documents/generated/6939.pdf	
Short-tailed Albatross *Phoebastria (=Diomedea) albatrus*	Endangered
No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/433	

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

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

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

BALD & GOLDEN EAGLES

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act[1] and the Migratory Bird Treaty Act[2].

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats[3], should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

---

1. The Bald and Golden Eagle Protection Act of 1940.
2. The Migratory Birds Treaty Act of 1918.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

THERE ARE NO BALD AND GOLDEN EAGLES WITHIN THE VICINITY OF YOUR PROJECT AREA.

MIGRATORY BIRDS

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats[3] should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

---

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

THERE ARE NO FWS MIGRATORY BIRDS OF CONCERN WITHIN THE VICINITY OF YOUR PROJECT AREA.

WETLANDS

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

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

NO DATA AVAILABLE - THIS AREA (OR PORTIONS OF IT) HAS NOT BEEN SURVEYED BY THE NWI. FOR MORE INFORMATION, PLEASE CONTACT THE REGULATORY PROGRAM OF THE LOCAL U.S. ARMY CORPS OF ENGINEERS DISTRICT.

IPAC USER CONTACT INFORMATION

Agency: Private Entity
Name: Rhett Raibley
Address: 2201 Brookhollow Plaza Drive
Address Line 2: Suite 400
City: Arlington
State: TX
Zip: 76006
Email rhett.raibley@swca.com
Phone: 5015938553

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Federal Aviation Administration

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish And Wildlife Office
300 Ala Moana Boulevard, Box 50088
Honolulu, HI 96850-5000
Phone: (808) 792-9400 Fax: (808) 792-9580

In Reply Refer To: 07/08/2024 17:15:15 UTC
Project Code: 2024-0112621
Project Name: SpaceX Action Area NP west of Hawaii

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened and endangered species, as well as designated critical habitat that may occur within the boundary of your proposed project and that may be affected by project related actions. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Please contact the Service's Pacific Islands Fish and Wildlife Office (PIFWO) at 808-792-9400 if you have any questions regarding your IPaC species list.

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- http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation actions that benefit threatened and endangered species into their project planning to further the purposes of the Act in accordance with section 7(a)(1). Please include the Consultation Tracking Number associated with your IPaC species list in any

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- USFWS National Wildlife Refuges and Fish Hatcheries
- Bald & Golden Eagles
- Migratory Birds
- Wetlands

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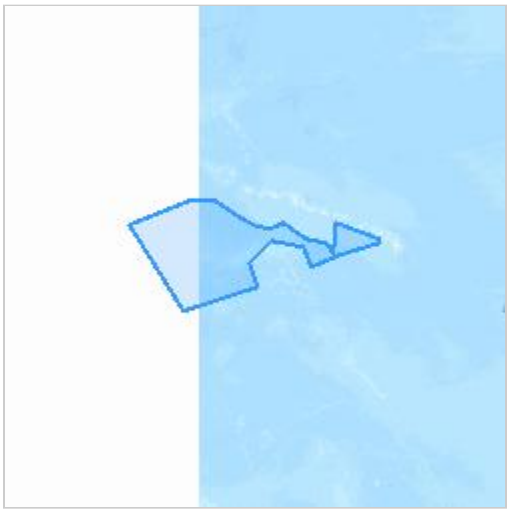
This species list is provided by:

Pacific Islands Fish And Wildlife Office
300 Ala Moana Boulevard, Box 50088
Honolulu, HI 96850-5000
(808) 792-9400

PROJECT SUMMARY

Project Code: 2024-0112621
Project Name: SpaceX Action Area NP west of Hawaii
Project Type: Airport - Maintenance/Modification
Project Description: Action Area for SpaceX's increased cadence
Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@18.14538445,-179.52973120058505,14z



Counties:

ENDANGERED SPECIES ACT SPECIES

There is a total of 4 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

BIRDS

NAME	STATUS
Band-rumped Storm-petrel *Hydrobates castro*	Endangered
Hawaiian Petrel *Pterodroma sandwichensis*	Endangered
Newell"s Shearwater *Puffinus newelli*	Threatened
Short-tailed Albatross *Phoebastria (=Diomedea) albatrus*	Endangered

Band-rumped Storm-petrel *Hydrobates castro*
- Population: USA (HI)
- No critical habitat has been designated for this species.
- Species profile: https://ecos.fws.gov/ecp/species/1226
- General project design guidelines: https://ipac.ecosphere.fws.gov/project/QSJOY7J3IRHKJHZKQHYG3XHJTU/documents/generated/6939.pdf

Hawaiian Petrel *Pterodroma sandwichensis*
- No critical habitat has been designated for this species.
- Species profile: https://ecos.fws.gov/ecp/species/6746
- General project design guidelines: https://ipac.ecosphere.fws.gov/project/QSJOY7J3IRHKJHZKQHYG3XHJTU/documents/generated/6939.pdf

Newell"s Shearwater *Puffinus newelli*
- No critical habitat has been designated for this species.
- Species profile: https://ecos.fws.gov/ecp/species/2048
- General project design guidelines: https://ipac.ecosphere.fws.gov/project/QSJOY7J3IRHKJHZKQHYG3XHJTU/documents/generated/6939.pdf

Short-tailed Albatross *Phoebastria (=Diomedea) albatrus*
- No critical habitat has been designated for this species.
- Species profile: https://ecos.fws.gov/ecp/species/433

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

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

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

BALD & GOLDEN EAGLES

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act[1] and the Migratory Bird Treaty Act[2].

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats[3], should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

---

1. The Bald and Golden Eagle Protection Act of 1940.
2. The Migratory Birds Treaty Act of 1918.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

THERE ARE NO BALD AND GOLDEN EAGLES WITHIN THE VICINITY OF YOUR PROJECT AREA.

MIGRATORY BIRDS

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats[3] should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

---

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

THERE ARE NO FWS MIGRATORY BIRDS OF CONCERN WITHIN THE VICINITY OF YOUR PROJECT AREA.

WETLANDS

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

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

THERE ARE NO WETLANDS WITHIN YOUR PROJECT AREA.

IPAC USER CONTACT INFORMATION

Agency:	Private Entity
Name:	Rhett Raibley
Address:	2201 Brookhollow Plaza Drive
Address Line 2:	Suite 400
City:	Arlington
State:	TX
Zip:	76006
Email	rhett.raibley@swca.com
Phone:	5015938553

U.S. Department of Transportation
Federal Aviation Administration

Office of Commercial Space Transportation

800 Independence Ave., SW.
Washington, DC 20591

December 20, 2024

Jason Estrella
Land Conservation Branch Manager
Texas Parks and Wildlife
4200 Smith School Rd
Austin, TX 78744
Submitted to: Jason.Estrella@tpwd.texas.gov

Re: Section 4(f) of the Department of Transportation Act Consultation, SpaceX Starship-Super Heavy Launch Operations, Boca Chica TX

Dear Jason:

The purpose of this letter is to notify you of the Federal Aviation Administration's (FAA's) initiation of a Section 4(f) consultation addressing the eligible properties in the study area under consideration for an application to modify Space Exploration Technologies Corporation's (SpaceX's) existing vehicle operator license. SpaceX has applied to the FAA to increase the number of licensed annual launches and landings at the Boca Chica vertical launch area (VLA) in Cameron County, Texas. Eligible properties under Texas Parks and Wildlife (TPWD) jurisdiction include Boca Chica State Park, Brazos Island State Park, and South Bay Coastal Preserve (see Attachment 1).

The affected environment and environmental impacts of Starship-Super Heavy operations at the Boca Chica Launch Site were analyzed in the 2022 Final Programmatic Environmental Assessment for the SpaceX Starship/Super Heavy Launch Vehicle Program at the SpaceX Boca Chica Launch Site in Cameron County, Texas (2022 PEA).[1] The FAA issued a Mitigated Finding of No Significant Impact (FONSI)/Record of Decision (ROD) based on the 2022 PEA on June 13, 2022. The 2022 analysis included consultation with TPWD regarding Section 4(f) properties in the study area and considered their comments and those of the public in making the final 4(f) determinations identified in the 2022 PEA.[2] At that time, FAA determined that the proposed action would not result in more than a minimal (i.e., *de minimis*) *physical use* of any Section 4(f) resources and would not constitute a *constructive use*. Mitigation measures were incorporated to avoid, minimize, compensate, or mitigate potential Section 4(f) concerns. SpaceX conducted six launch tests in 2023 and 2024 and analyzed the effects of each launch in comparison to anticipated effects, which have been considered in proposing the modifications and subsequent analyses. The FAA is in the process of preparing a Tiered Environmental Assessment to assess the potential environmental impacts of an increase in launch and landing cadence and changes to the Starship-Super Heavy vehicles.

---

[1] FAA. 2022. Final Programmatic Environmental Assessment for the SpaceX Starship/Super Heavy Launch Vehicle Program at the SpaceX Boca Chica Launch Site in Cameron County, Texas. Available at: https://www.faa.gov/space/stakeholder_engagement/spacex_starship. Accessed October 2023.

[2] TPWD concurrence letter received May 11, 2022.

Summary of Issues for Discussion

Increased number of orbital launches and landings:

a. The FAA seeks input as to whether an increased number of licensed launches and landings would substantially impair the activities, features, or attributes of the Section 4(f) properties under TPWD jurisdiction. Note that the increase in launches and landings are not anticipated to require any changes in contemplated access restriction hours.
b. FAA is also considering whether the increased number of orbital launches and landings would constitute a *constructive use* under Section 4(f) related to an increase in noise or diminishment of attributes that contribute to the enjoyment or quality of the Section 4(f) properties under TPWD jurisdiction because of the short-term and intermittent nature of the noise generated by launches and landings.
c. The FAA is including potential anomaly impacts in its Section 4(f) analysis although they are unlikely to occur.

The following sections of this letter include a summary of the proposed action, details of the changes to the proposed action from the previous analysis, pertinent regulatory background, and further information about the Section 4(f) determination issues.

Proposed Action

The FAA's proposed action is to modify SpaceX's vehicle operator license, which would allow SpaceX to conduct up to 25 orbital launches of the stacked Starship-Super Heavy vehicles from the VLA and up to 50 landings of the individual Starship or Super Heavy vehicles at the VLA annually. The modifications would not result in changes to estimated access restrictions.

Discussion of Proposed Modifications

Increased Mission Cadence: The FAA's proposed action is to modify SpaceX's vehicle operator license, which would allow SpaceX to conduct up to 25 orbital launches of the stacked Starship-Super Heavy vehicles from the VLA and up to 50 landings of the individual Starship or Super Heavy vehicles at the VLA annually. The number of annual launch events would increase by 150% and the number of annual landings would increase by 233% over the previously analyzed mission cadence.

SpaceX no longer anticipates performing sub-orbital launches of the Starship vehicle. Therefore, no Starship-only launches are proposed. The proportion of annual launches that involve the Super Heavy vehicle would double from 50% to 100%.

Decreased Total Duration of Static Fire Testing: SpaceX anticipates conducting static fire engine tests of the Starship and Super Heavy vehicles as described below:

- Starship Static fire engine tests: 90 total seconds of static fire per year
- Super Heavy static fire engine tests: 70 total seconds of static fire per year

In total, SpaceX estimates that it will conduct static fire tests for a combined total duration of 160 seconds per year, which is a 44% decrease from 285 seconds per year assessed in the 2022 PEA.

Regulatory Background

The FAA's procedural requirements for complying with Section 4(f) are set forth in Department of Transportation Order 5610.1C, Procedures for Considering Environmental Impacts. The FAA also considers Federal Highway Administration (FHWA) regulations (23 Code of Federal Regulations [CFR] part 774) and FHWA guidance (e.g., Section 4(f) Policy Paper) when assessing the potential for *use* of Section 4(f) properties. These requirements are not binding on the FAA; however, the FAA may use them as guidance to the extent relevant to FAA projects.

A *use* under Section 4(f) can occur when: 1) land from a Section 4(f) property is permanently incorporated into a transportation project; 2) there is a *temporary occupancy* of a Section 4(f) property; or 3) the transportation project's proximity to a Section 4(f) property results in impacts that would substantially impair the activities, feature, or attributes that qualify the property for protection under Section 4(f). The first two types of *use* are referred to as a *physical use*. The latter type of *use* is identified as *constructive use*.

Physical Use

A permanent incorporation would involve an actual physical taking of Section 4(f) property as part of a transportation project either as a purchase of land or a permanent easement.

Temporary occupancy occurs when a transportation project results in activities that require a temporary easement, right-of-entry, project construction, or another short-term arrangement involving a Section 4(f) property. A *temporary occupancy* is considered a Section 4(f) *use* unless all the conditions listed in Appendix B, Paragraph 2.2.1 of FAA Order 1050.1F are satisfied:

1. Duration must be temporary, i.e., less than the time needed for construction of the project, and there should be no change in ownership of the land;
2. Scope of the work must be minor, i.e., both the nature and the magnitude of the changes to the Section 4(f) property are minimal;
3. There are no anticipated permanent adverse physical impacts, nor will there be interference with the protected activities, features, or attributes of the property, on either a temporary or permanent basis;
4. The land being used must be fully restored, i.e., the property must be returned to a condition which is at least as good as that which existed prior to the project; and
5. There must be documented agreement of the official(s) with jurisdiction over the Section 4(f) resource regarding the above conditions.

A *physical use* may be considered *de minimis* if, after taking into account avoidance, minimization, mitigation, and enhancement measures, the result is either: 1) a determination that the project would not adversely affect the activities, features, or attributes qualifying a park, recreation area, or wildlife or waterfowl refuge for protection under Section 4(f); or 2) a Section 106 of the National Historic Preservation Act finding of no adverse effect or no historic properties affected.

A *de minimis* impact determination requires agency coordination and public involvement. For parks, recreation areas, and wildlife and waterfowl refuges, the officials with jurisdiction over the property must be informed of the FAA's intent to make a *de minimis* impact determination, after which the FAA must provide an opportunity for public review and comment. The public notice and opportunity for comment may be combined with similar public involvement efforts for the National Environmental Protection Act (NEPA) process. After considering any public comments and if the officials with jurisdiction concur in writing that the project would not adversely affect the activities, features, or attributes that make the property eligible for Section 4(f) protection, the FAA may finalize a *de minimis* impact determination. For historic sites under Section 106, the FAA must consult with the consulting parties identified in accordance with 36 CFR part 800 (Section 106's implementing regulations) and inform the officials with jurisdiction of the intent to make a *de minimis* impact determination. The officials with jurisdiction must concur in a finding of no adverse effect or no historic properties affected. Compliance with 36 CFR part 800 satisfies the public involvement and agency coordination requirement for *de minimis* findings for historic sites.[3]

Constructive Use

In order for a *constructive use* to occur, a transportation project must result in substantial impairment to the property's activities, features, or attributes to the extent that the value of the resource, in terms of its Section 4(f) purpose and significance, will be meaningfully reduced or lost. As noted in FHWA's Section 4(f) Tutorial,[4] "*[c]onstructive use* involves an indirect impact to the Section 4(f) property of such magnitude as to effectively act as a permanent incorporation." Per the FAA 1050.1F Desk Reference,[5] which provides guidance for FAA NEPA practitioners and is used to help FAA integrate applicable special purpose laws and requirements, a proximity-related impact's consequences must amount to "taking" a property or a portion of a property in order for a *constructive use* determination to be made.

A *de minimis* impact determination is not appropriate for *constructive use* of a Section 4(f) property because *constructive use* is defined as substantial impairment, and substantial impairment cannot be considered a *de minimis* impact.

Section 4(f) Determination Issues

The FAA is in the process of evaluating whether the changes to the proposed action would result in a *use* of Section 4(f) properties through permanent incorporation, *temporary occupancy*, or *constructive use*. There would be no physical use to a Section 4f property from this proposed project. A brief summary of the FAA's initial understanding of the proposed action's Section 4(f) impacts is presented in the following section. The FAA invites TPWD to provide further information to help the FAA make a final determination.

On September 2, 2021, TPWD concurred with FAA's Section 4(f) findings, provided that the mitigation measures already incorporated in the Programmatic Environmental Assessment as well as the terms of

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[3] The FAA will consult with the Texas Historical Commission to determine the potential impacts of the proposed action to historic properties under its jurisdiction, in compliance with Section 106. The FAA will use information from its Section 106 process to help inform its determinations regarding Section 4(f) and to define mitigation measures which will be enforceable on SpaceX as a term and condition of its FAA-issued permit(s) or license(s), if appropriate.

[4] Available online at: https://www.environment.fhwa.dot.gov/section4f/default.aspx.

[5] Available online at: https://www.faa.gov/about/office_org/headquarters_offices/apl/environ_policy_guidance/policy/faa_nepa_order/desk_ref/.

the Texas Parks and Wildlife Department's concurrence and Memorandum of Agreement with SpaceX were included in project plans, final environmental documents, and terms of SpaceX's permits and licenses.

The FAA has determined the data and analyses in the PEA and FONSI/ROD regarding effects on Section 4(f) properties remain relevant. Pertinent conditions and requirements of the prior analysis and approval, including Section 4(f) considerations previously agreed to with your agency, will be met in the current action.

Increased number of orbital launches and landings

The FAA seeks input as to whether an increased number of licensed launches and landings would substantially impair the activities, features, or attributes of the three properties. Issues of concern related to the total number and pattern of launches and landings focus on the potential for access restrictions and the potential for noise levels to substantially impair the activities, features, or attributes of the Boca Chica State Park, Brazos Island State Park, and South Bay Coastal Preserve, including impacts to historic properties.

The previous analysis evaluated a potential of up to 500 hours per year of access restrictions for licensed activities at the VLA and up to 300 hours for response activities in the event of anomalies. The current modifications would not change the anticipated number of access restriction hours and would conform to previously agreed upon mitigation regarding such issues as predictive scheduling and avoidance of specific holiday and date access restrictions.

A quiet, natural setting is a notable feature of both of the state parks and the Preserve. Updated noise modeling has been conducted to evaluate potential noise-related changes associated with static fire engine tests, launches, landings, and potential for structural damage. The results indicate that noise impacts would be comparable to those discussed in the 2022 PEA. The 2022 PEA contemplated the noise associated with Starship-Super Heavy orbital launches and landings, ultimately determining that no residents or members of the public would experience noise above Occupational Safety and Health Administration's (OSHA's) 115-dBA threshold[6] during an orbital launch and there was no significant risk of structural damage. When these operations are not occurring, the normal daily sound levels in the Section 4(f) properties would persist.

According to the land use compatibility guidelines in FAA's 14 CFR part 150, an increase of Day-night average sound level (DNL) of 1.5 dB or more for a noise sensitive area that is exposed to noise at or above the DNL 65 dB noise exposure level, or that will be exposed at or above the DNL 65 dB level due to a DNL 1.5 dB or greater increase would be considered a significant impact. Order 1050.1F also notes that special consideration needs to be given to the evaluation of the significance of noise impacts on noise sensitive areas within Section 4(f) properties. The DNL 65 dB contour for the Proposed Action is located within approximately 3.5 miles of the VLA entirely in areas that are unpopulated, except for Boca Chica Village. SpaceX would enforce the access restriction area during launch operations, as discussed in the 2022 PEA. Thus, no visitors would be present at noise sensitive areas within the 3.5-mile radius during launch operations to experience the elevated noise. Furthermore, the launch operations would be short-

[6] Chapter 11 of the FAA Order 1050.1F Desk Reference states the FAA should evaluate whether the Occupational Safety and Health Administration (OSHA) hearing damage criteria from 29 CFR 1910.95 and the National Academy of Sciences' 1977 guidelines for structural damage may be exceeded for a project. Guidelines on permissible noise exposure limits from OSHA are designed to protect human hearing from long-term, continuous exposures to high noise levels and aid in the prevention of noise-induced hearing loss.

term and temporary and spread out over time. Noise from activities such as construction at the VLA and increases to truck traffic are not anticipated to add meaningfully to the noise in the area and are thus not quantitatively assessed. Although the Section 4(f) properties would be located within the 65 CDNL contour for sonic booms from Super Heavy landings at the VLA, no members of the public would be present to experience the sonic booms. No harm to wildlife is anticipated due to the predicted sonic boom overpressure levels[7, 8].

The FAA made a finding of *adverse effect* for 17 historic properties (i.e., historic sites, objects, structures, and buildings), because they could experience visual, auditory, and vibration effects or falling debris from an anomaly directly striking the historic properties that could diminish their integrity. To resolve these adverse effects, the FAA, Texas State Historical Preservation Office, National Parks Service, USFWS, Texas Parks and Wildlife Department, Advisory Council on Historic Preservation, and SpaceX executed a Programmatic Agreement in April 2022[9] that stipulated the process for minimizing and mitigating adverse effects to historic properties. SpaceX would continue to mitigate impacts to cultural resources by implementing the mitigation measures established in the 2022 PEA and the 2022 Programmatic Agreement and would not cause any new access restrictions, visual impacts or changes to the original 10-mile APE are anticipated.

The FAA is considering whether the modifications to the proposed action would substantially diminish the attributes that contribute to the enjoyment or quality of Boca Chica State Park, Brazos Island State Park, and South Bay Coastal Preserve. Therefore, the FAA seeks input as to whether the noise generated by the proposed action would constitute a *constructive use*.

Anomalies

As described in detail in the 2022 PEA, a Starship/Super Heavy test operation or launch could cause something unexpected (referred to as an anomaly), which could result in the spreading of debris. Although anomalies are unlikely to occur, the FAA nonetheless provides the Section 4(f) analysis of anomaly impacts to enable fuller environmental review. While the number of orbital launches and landings would increase under the proposed action, the total duration of access restrictions would still not exceed 500 hours annually. As the number of launches increases, the reliability of the vehicle would increase, and the risk of an anomaly would be below what was described in the 2022 PEA. Therefore, SpaceX anticipates to continue the need for up to 300 hours per year of access restrictions, in addition to 500 hours for nominal operations.

In addition, an anomaly may result in parts of the launch vehicle or launchpad into Boca Chica State Park or Brazos Island State Park, therefore requiring entry into the state parks for anomaly related activities (e.g., debris removal). It is not anticipated that debris would impact the Preserve. The FAA has considered the anomaly-related activities and extended closure hours associated with anomalies for potential *temporary occupancy* under Section 4(f). SpaceX would continue to implement the measures

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[7] Bowles, A. E., F.T. Aubrey, and J.R. Jehl. 1991. The Effect of High Amplitude Impulsive Noise on Hatching Success. A Reanalysis of Sooty Tern Incident. Noise and Sonic Boom Impact Technology Program, OL-AC HSD/YAH Rept. No. HSD-TP-91-0006. Accessed July 2024.

[8] National Aeronautics and Space Administration (NASA). 2003. Sonic Booms. NASA Dryden Flight Research Center. Publication number FS-2003-11-016 DFRC. Available at: https://www.nasa.gov/wp-content/uploads/2021/09/120274main_fs-016-dfrc.pdf?emrc=f4b1ff. Accessed July 2024.

[9] Available online at: https://www.faa.gov/sites/faa.gov/files/space/stakeholder_engagement/spacex_starship/Appendix_C_National_Historic_Preservation_Act_Section_106_Consultation.pdf

specified in the Memorandum of Agreement with TPWD described in the 2022 PEA to mitigate and restore any impacts from anomalies. The MOA provides a protocol for SpaceX to respond to events, recover debris, and to implement, monitor, and adapt restoration efforts to restore impacts. By following the protocol outlined in the MOA, it is expected that any affected land will be restored and long-term impacts to the natural, cultural, and recreational values of the state parks would be avoided. Occupancy of the state parks would be short term (not more than 300 additional hours per year), and there would be no permanent or residual effects to the state parks lasting beyond the occupancy. Therefore, the FAA is considering whether the *temporary occupancy* of the state parks resulting from anomaly-related activities would constitute a *use* under Section 4(f).

Please provide input on the issues discussed above by January 31, 2025, to Ms. Amy Hanson, FAA Environmental Specialist, via email at Amy.Hanson@faa.gov. If you have questions or concerns, please contact Ms. Hanson at (847) 243-7609 or via email at Amy.Hanson@faa.gov.

Sincerely,

STACEY MOLINICH ZEE

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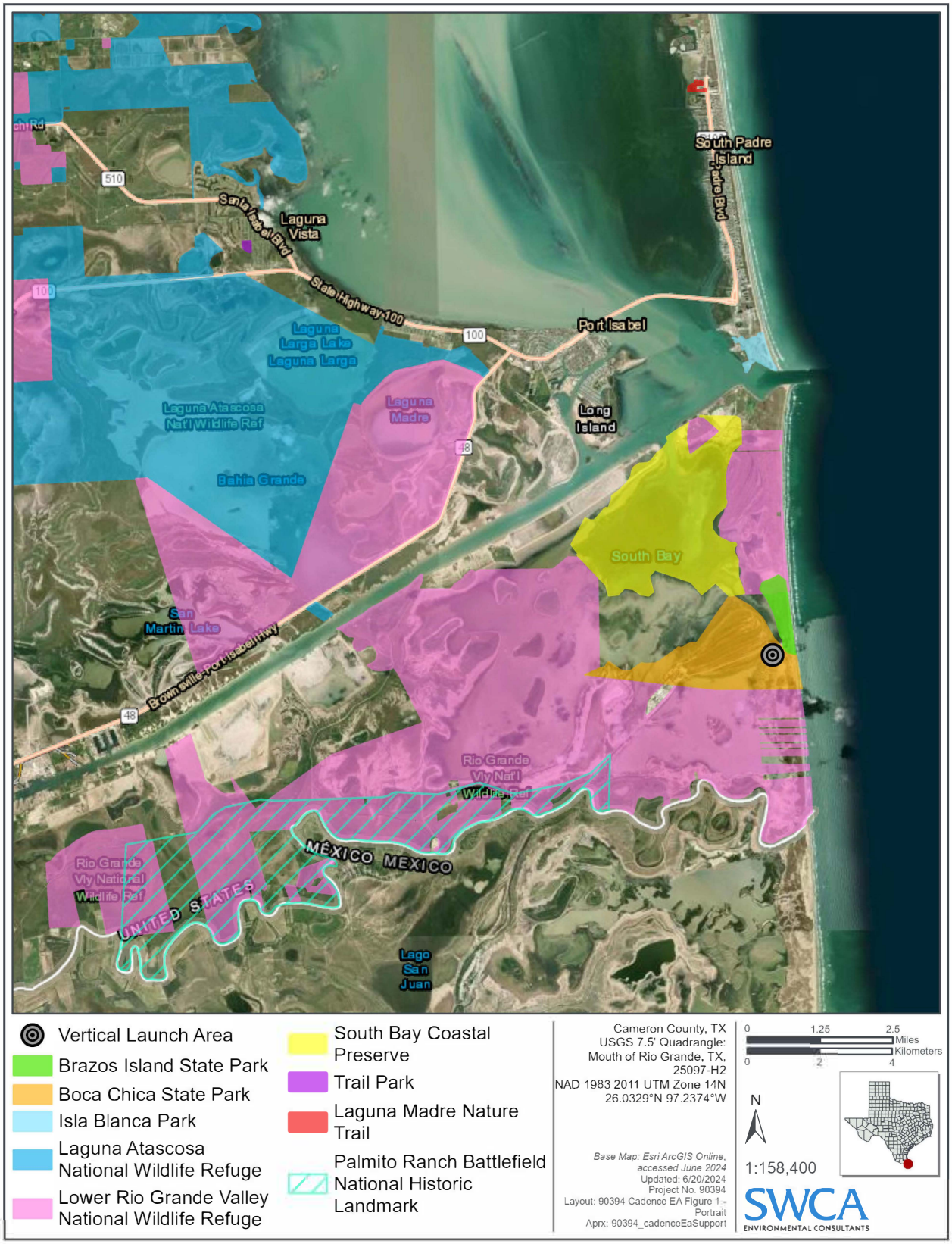
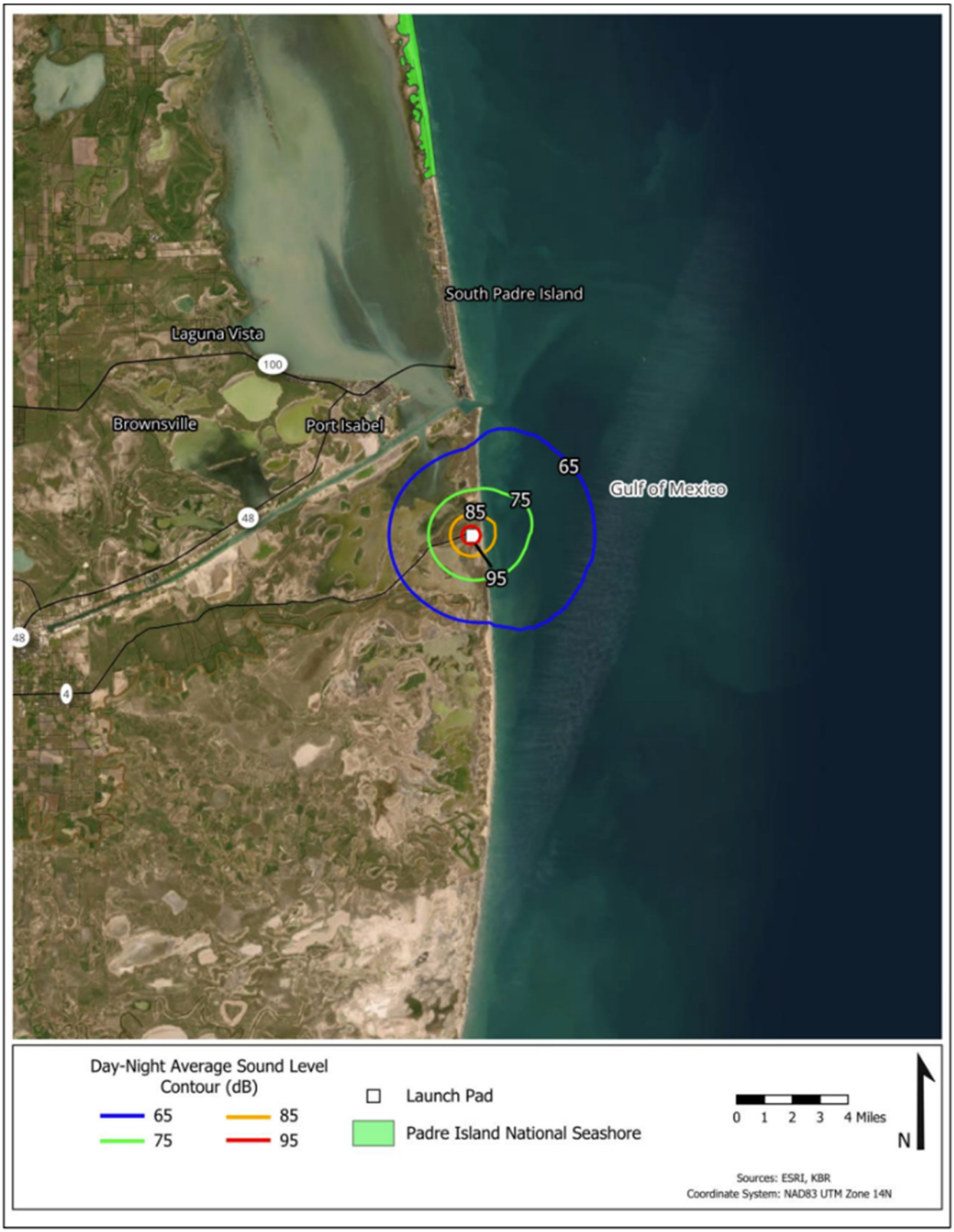
Date: 2024.12.20 13:47:02 -05'00'

Stacey M. Zee
Manager
Operations Support Branch

Attachment 1: Section 4(f) Properties Under TPWD Jurisdiction
Attachment 2: Annual Operations Day Night Average Sound Level (DNL)



Attachment 1. Section 4(f) Properties Under TPWD Jurisdiction – Boca Chica State Park, Brazos Island State Park, and South Bay Coastal Preserve.



Attachment 2. Annual Operations Day Night Average Sound Level (DNL)

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March 3, 2025

Ms. Amy Hanson
FAA Environmental Specialist
(847) 243-7609
Amy.Hanson@faa.gov

Re: Section 4(f) of the Department of Transportation Act Consultation, SpaceX Starship-Super Heavy Launch Operations, Boca Chica, TX

Dear Ms. Hanson:

The Texas Parks and Wildlife Department (TPWD) is in receipt of your letter addressed to Mr. Jason Estrella and dated December 20, 2024, that provides notice of the Federal Aviation Administration (FAA) initiation of Section 4(f) consultation on Space Exploration Technologies Corporation's (SpaceX) application to increase the number of licensed annual launches and landings at the Boca Chica Vertical Launch Area (VLA). The letter provided a summary of the FAA's initial understanding of the proposed actions' Section 4(f) impacts, along with a request for input from TPWD on the eligible properties of Boca Chica State Park, Brazos Island State Park, and South Bay Coastal Preserve to help the FAA make a final Section 4(f) determination.

As the FAA noted in its December 20, 2024, letter, TPWD previously concurred with the FAA's Section 4(f) findings in a May 11, 2022 letter (enclosed). TPWD anticipates the proposed SpaceX actions will have similar impacts as those actions evaluated by TPWD in its 2022 letter. Therefore, TPWD reaffirms that the proposed increase in activity will continue to have *a de minimis* impact on TPWD properties.

Thank you for soliciting the input of TPWD regarding potential impacts to the natural resources and public use of TPWD-owned properties at Boca Chica, and we look forward to continuing to work with the FAA regarding licensing due diligence requirements.

4200 SMITH SCHOOL ROAD
AUSTIN, TEXAS 78744-3291
512.389.4800
www.tpwd.texas.gov

If you have any questions regarding the contents of this letter, please do not hesitate to contact Mr. Reagan Faught by email at reagan.faught@tpwd.texas.gov or by phone at (361) 205-9382.

Sincerely,

David Yoskowitz, Ph.D.
Executive Director

DY:dh

Attachment

cc: Mr. Craig Bonds
Mr. James Murphy
Mr. Alan Cain
Ms. Laura Zebehazy
Mr. Robin Riechers
Dr. Zachary Olsen
Mr. Rodney Franklin
Mr. Justin Rhodes
Mr. Reagan Faught

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May 11, 2022

Ms. Stacey M. Zee
Federal Aviation Administration Environmental Specialist
800 Independence Ace, SW
Washington, D.C. 20591

Re: Section 4(f) of the Department of Transportation Act Consultation, SpaceX Starship/Super Heavy Launch Operations, Boca Chica, TX

Dear Ms. Zee:

The Texas Parks and Wildlife Department (TPWD) is in receipt of your letter addressed to Mr. Ted Hollingsworth and dated April 27, 2022. The letter requests concurrence with the determination of the Federal Aviation Administration (FAA) that if, as a result of the FAA's proposed action of issuing future permits or licenses to SpaceX for Starship/Super Heavy launch operations, an anomaly occurs that involves debris and debris-response activities within TPWD-owned lands, such an event would result in a *temporary occupancy* of the park, but the impacts would be *de minimis*.

As of the date of this letter, staff from both TPWD and Texas A&M University-Corpus Christi are working together on a research study as called for in the Memorandum of Agreement (MOA) between TPWD and SpaceX, in order to fulfill the requirement for mitigation of impacts to TPWD-owned lands that have occurred under FAA permits and licenses to-date. SpaceX has been kept apprised of progress on the scoping of this project. In the context of this MOA, TPWD concurs with the specific *de minimis* determination predicated on inclusion of the following special conditions in any permit or license involving testing or launching of rockets that might potentially result in debris and/or response activities impacting TPWD-owned lands.

1. Strict compliance with all terms and conditions of the Memorandum of Agreement executed September 2, 2021, between TPWD and SpaceX.
2. Completion and maintenance of bollard-and-cable traffic control fencing along State Highway 4 demarcating the boundaries of TPWD lands. SpaceX at its sole cost will survey the Highway 4 boundary and will leave two or three gaps in the western portion of the fence only as necessary to provide reasonable access to privately owned inholdings at access points recorded in the real property records of Cameron County. Signage will be placed at each gap with contact information for legitimate landowners to gain access to their property.

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3. SpaceX will take all necessary measures to make TPWD-owned lands at Boca Chica accessible to researchers and all TPWD and/or United States Fish and Wildlife Service (USFWS)-authorized personnel at all times except during ignition events.
4. SpaceX will cover the cost of a contract with TPWD and/or Texas A&M-Corpus Christi/Texas A&M system to develop specific protocols for test restoration of impacts to tidal/algal flats at Boca Chica resulting from the SN11 anomaly within 30 days of presentation of such a contract. The scope of the contract will include the cost of a principal investigator, one or two graduate students and all related equipment, materials, overhead, administrative, and publication costs.
5. In the event Texas A&M University is unable to provide the services outlined herein, TPWD staff will work in good faith to identify another academic institution or similarly qualified third party to undertake the proposed project and will keep SpaceX staff apprised of its progress.
6. During the first "restoration season" as recommended by and following the study referenced in the preceding paragraphs, SpaceX, at its sole expense, will hire a qualified environmental firm to undertake a test restoration per the recommendations of the study, covering a minimum of five (5) net acres of tidal/algal flats affected by the impacts of debris and debris retrieval following the SN11 anomaly. SpaceX will work cooperatively with TPWD to designate the specific footprint of the test restoration.
7. SpaceX, at its sole cost, will pay for monitoring the success of the test restoration relative to success criteria described in the protocols developed in the study. If no such protocols have been developed, success of the test restoration will be monitored relative to success criteria developed by the implementing environmental firm and agreed to by TPWD. A report on the progress of the restoration will be submitted to TPWD not less than 22 nor more than 26 months after implementation.
8. If the test restoration is determined to be successful, SpaceX, at its sole cost, will arrange the restoration of an additional 15 acres to be determined in consultation with TPWD and implemented no later than the restoration season following submission of the report refenced in paragraph # 7 above.
9. If the test restoration is determined to be unsuccessful, SpaceX, at its sole cost, will consult with the investigators and/or authors of the report referenced in paragraph #4 and #5 above and based on that input will repeat the measures in paragraphs #6, #7 and #8 above. These steps will be repeated until successful restoration of 20 acres is achieved. TPWD may waive this condition if it advises FAA in writing that all reasonable attempts to restore habitat result in more harm than good.
10. Once a successful restoration protocol is established, SpaceX will take steps to implement restoration of any new impacts that occur pursuant to activities permitted or licensed by the FAA immediately upon request by TPWD.

Thank you for soliciting the input of TPWD regarding measures to help protect natural resources and site operations on TPWD-owned land at Boca Chica. If you have any questions regarding these measures, please do not hesitate to contact Mr. Ted Hollingsworth at by email at ted.hollingsworth@tpwd.texas.gov or by phone at (512) 870-7939.

Sincerely,

Clayton Wolf
Chief Operating Officer

CW:dh

cc: Mr. Carter Smith
Mr. James Murphy
Ms. Andrea Lofye
Mr. John Silovsky
Mr. Rodney Franklin
Mr. Ted Hollingsworth
Ms. Laura Zebehazy

U.S. Department of Transportation
Federal Aviation Administration

Office of Commercial Space Transportation

800 Independence Ave., SW.
Washington, DC 20591

March 11, 2025

David Yoskowitz, Ph.D
Executive Director
Texas Parks and Wildlife Department
4200 Smith School Rd
Austin, TX 78744
Submitted to: David.Yoskowitz@tpwd.texas.gov

Re: Section 4(f) of the Department of Transportation Act Consultation, SpaceX Starship-Super Heavy Launch Operations, Boca Chica TX

Dear David Yoskowitz:

The Federal Aviation Administration (FAA) has received and reviewed your letter dated March 3, 2025, which responded to the FAA's December 20, 2024, initiation of consultation under Section 4(f) of the Department of Transportation Act in regard to an application under consideration by FAA to modify Space Exploration Technologies Corporation's (SpaceX's) existing vehicle operator license.

The Texas Parks and Wildlife Department (TPWD) reaffirmed their previous concurrence with the FAA's Section 4(f) finding that in the unlikely event of an anomaly, impacts resulting from anomaly related activities (e.g., debris removal) would be considered a temporary occupancy use of TPWD property, but that impacts from this use would have a *de minimis* impact. TPWD did not raise concerns about the FAA's other Section 4(f) findings outlined in its December 20, 2024 letter. SpaceX will continue to adhere to the *Memorandum of Agreement between Texas Parks and Wildlife Department and Space Exploration Technologies Corporation* (Agreement) dated September 2, 2021, as well as mitigation measures already incorporated in the Programmatic Environmental Analysis.

The FAA appreciates your continued coordination on this project. Please contact Ms. Amy Hanson, FAA Environmental Specialist, via email at Amy.Hanson@faa.gov or at (847) 243-7609 with any questions.

Sincerely,

STACEY MOLINICH ZEE
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Date: 2025.03.11 14:45:09 -04'00'

Stacey M. Zee
Manager
Operations Support Branch

cc: Reagan Faught