DRAFT ENVIRONMENTAL IMPACT STATEMENT

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

at the Kennedy Space Center, Merritt Island, Florida

Volume II, Appendix B.1, Part 3

August 2025

Federal Aviation Administration

THIS PAGE INTENTIONALLY LEFT BLANK.

TABLE OF CONTENTS

THIS PAGE INTENTIONALLY LEFT BLANK.

B.1.3 Responses to USFWS Comments on the Biological and Conference Assessment

Responses to USFWS 04/11/2025 Comments on LC-39A Starship Super Heavy BCA

FWS Log No. 2024-0058364

April 30, 2025

NOTE: Responses to USFWS are in italics below each item. A revised BCA reflecting these changes has also been provided.

Critical Items to Address

The below items are critical and need to be addressed prior to a complete consultation package being accepted by the US Fish and Wildlife Service. We have split these into each species.

Sea Turtles

1. 5.3.21 - Sea Turtle Critical Habitat (CH) – This includes a MALAA determination for loggerhead designated and green proposed CH, but table 6.1 on page 152 has MANLAA determinations. Please clarify and update. The Service agrees with a MALAA determination for the loggerhead designated CH and a No Destruction or Adverse Modification of green sea turtle proposed CH.

   Response: The determination is MALAA for loggerhead designated CH and No Destruction or Adverse Modification for green sea turtle proposed CH. BCA has been updated accordingly.

Southeastern Beach Mouse

1. 5.3.15 – The BCA states, "To avoid the potential for direct physical impacts to the southeastern beach mouse, any individuals identified during construction and operations would be relocated…" Surveying and trapping is needed to accurately identify and relocate SEBM. Please elaborate in detail the methods proposed to accomplish this activity and the potential relocation sites.

   Response: The referenced sentence has been replaced with the following text: "Construction projects with the potential to affect protected species require biological surveys prior to disturbance. If Southeastern beach mice or their burrows are observed during these surveys, NASA will contact the USFWS to determine if relocations are needed based on site conditions. Trapping would occur over three consecutive nights and a total of five nights using Sherman live traps set at 33-foot (10-meter) intervals throughout the vegetated portion of the proposed area to be disturbed by construction activities. Mice would be relocated to the dune east of LC-39A." Note: No beach mouse relocations are proposed during operations, so that language has been removed from the BCA.

Additional Items for Consideration and Clarification

The below items are not critical for the Service to deem a complete consultation package but would provide additional clarity to the consultation if adjustments to the Biological Assessment/Conference were made. Adjustments can be made to the document itself and resubmitted, in a Word document or through email correspondence.

1. Table 5-2 refers to sea turtle season as May to October. Please revise to be to May through October.

   Response: Change made.

2. Temporary work lighting is mentioned several times in table 5-2. Does this refer to approved lighting for various operational phases or temporary lighting such as light towers or construction light towers that would be used in addition to the installed lighting?

   Response: The following footnote has been added to Table 5-2 regarding lighting: "Temporary lighting may include the use of mobile light towers and/or temporary use of permanent lighting fixtures."

3. 5.3.20 Page 135 – Please update this section to include potential impacts from noise and vibration on sea turtle eggs and hatchlings present in nests. The section is only considering the impact of hatchlings and nesting females crawling to or from the ocean on the beach at night. Vibrations impacting nests is acknowledged on page 149.

   Response: Section has been updated as follows: "Although sea turtle nests in the Action Area are regularly exposed to vibration from launches, the magnitude of disturbance associated with the Super Heavy is likely to be greater, and the number of annual exposures to vibration would increase. There are currently no studies on the effects of noise-induced vibration on sea turtle nests, eggs, or hatchlings in the nest. Potential negative effects of ground vibrations on sea turtle eggs could range from minor decreases in hatchling fitness to congenital malformations to egg failure. Vibrations could result in physiological effects that interfere with the ability of hatchlings to reach the water (e.g., sensory disorientation). Vibrations also might collapse nests or solidify sand around nests, which could affect hatchling emergence. Shannon and others (1994) documented strong effects from vibrations on chicken embryonic development (e.g., congenital malformations) and mortality, as well as increasing mortality with increasing magnitude of exposure; they cited amplitude, frequency, amplitude transmission, and timing of the exposure as factors associated with negative effects to the chicken embryos. A study of loggerhead sea turtle nest relocations found that eggs relocated within the first 12 hours of deposition had a hatch success rate of 79 to 90 percent, while mid-incubation relocations resulted in a success rate of 53 percent (Ahles & Milton, 2016). The study results, along with the results of nest relocations in general, indicate that some amount of

movement (i.e., vibration) can be tolerated by sea turtle eggs. However, these results suggest that the timing of egg movement is likely to influence sea turtle hatch success rate and Shannon and others (1994) showed that the degree of effects to developing chicken embryos was affected by the timing of exposure. Given the degree of unknowns regarding vibration effects on sea turtle nests, eggs, and hatchlings in the nest, SpaceX will work with NASA and MINWR to determine an appropriate monitoring approach to evaluate potential vibration effects to sea turtle nests in the vicinity of LC-39A."

4. The incorporation of a conservation measure for annual training on impact of lighting on sea turtles and habitat for Federal agency and SpaceX staff.

   Response: 1) BCA already includes "the importance of dark beaches for sea turtles" as a topic in the natural resources training. 2) Information on current educational outreach activities that NASA will continue has been added to Chapter 1 of the BCA, including lighting impacts to sea turtles, and as a CM.

5. Refined estimates of the realistic number of closures for areas within the Test Access Restriction Area and Launch/Landing Restriction Area would be appreciated. This could be presented in a yearly phased table as found in the 2020-I-0549 Falcon Heavy consultation documents or a percentage of use per year over the course of the proposed Action.

   Response: As discussed during NASA/FAA/USFWS call on 4/15/25, there is too much uncertainty and too many variables at this time to produce a realistic estimate of closures. Modifications to the 2025 MOU for Prescribed Burning improve flexibility to work around closures. A description of these improvements has been added to the BCA (see response to #10 below).

6. We recommend including a conservation measure to monitor ocean landing platforms during day and night landings (using cameras or other surveillance methods) which allows for the identification of seabirds in and around the platform. This will assist in filling the information gap for the probability of seabirds in or around landing platforms being impacted.

   Response: No Starship or Super Heavy ocean landing platform designs have been finalized at this time, so NASA will not be including any bird monitoring of ocean landing platforms in this BCA. Concerns include the need for a constant stream of video that would need to be fed into a learning model that currently does not exist to analyze for presence/absence, and the potential difficulty in identifying birds to species given the distance from camera to bird.

7. Please describe the approximate number of times that refurbishment will occur at LC-39A versus the Roberts Road facility at KSC. This will assist the Service in quantifying the amount of transport time to and from LC-39A and the Roberts Road facility, which

may affect the ability of prescribed fire from occurring. Approximate numbers will be sufficient.

Response: The 2025 MOU for Prescribed Burning allows for burning at any time outside of restricted areas, to include restricted transport routes. KSC will assist with identifying the movement time and route so that prescribed burns can be scheduled for non-impacted units during transport periods. Refer to the response to comment #10 for additional information on the MOU.

8. Please provide the vibration study from BC SpaceX 2024. It would be helpful if the report described potential effects to wildlife.

   Response: Copies of vibration studies were provided to Brendan Meyers, USFWS, on 4/15/25.

9. Page 17 states "SpaceX has a requirement to surveil the splashdown area before committing to launch and will stand down in the event the area cannot be confirmed clear of vessel traffic." Please provide details on the vessels or aircraft used to surveil the splashdown area and the length of time needed for surveillance.

   Response: BCA Table 5-2 includes information on surveillance boats:

Boats (clearing, surveillance)	Up to 132 times a year	3 to 3.5 hours per static fire, launch, landing event	Any time of day or night

   The following information has been added to the BCA:

   "A number of spotter aircraft, including drones, and surveillance vessels (or boats) are used during launch activities to ensure that designated hazard areas are clear of non-participating crafts. Combinations of radar, visual spotter aircraft, surface surveillance, and law enforcement vessels, may be deployed prior to launch. Most fixed wing aircraft operate at altitudes of 15,000 ft (4,572 m) but may drop to 1,500 ft (457 m) to obtain a call sign visually from a non-participating vessel."

   Additional details are not known at this time but will be provided when available.

10. Please clarify and detail any operations where the interaction of hardware or operations with smoke from prescribed or wildfires have a negative interaction and would not be allowed. This should include all aspects of the proposed Action including construction and operation.

    Response: To address this and other fire-related comments, the following text and table have been added to Chapter 1 of the BCA between the KSC Monitoring Section and the Conservation Measures Section.

Prescribed Burning at KSC and MINWR

In accordance with the Non-Reimbursable Interagency Agreement Between the National Aeronautics and Space Administration, John F. Kennedy Space Center, and the U.S. Department of the Interior, Fish and Wildlife Service for Use and Management of Property at the NASA, KSC, known as the Merritt Island National Wildlife Refuge, the USFWS is responsible for conducting habitat and wildlife management activities at KSC, including prescribed burning, forest management, invasive and nuisance species management, water-level management, certain monitoring activities, and other programs deemed appropriate for fish and wildlife protection and enhancement (NASA and USFWS, 2024). The recently updated Memorandum of Understanding between the Space Launch Delta 45, United States Fish and Wildlife Service, and John F. Kennedy Space Center for Prescribed Burning on Merritt Island National Wildlife Refuge, John F. Kennedy Space Center, and Cape Canaveral Space Force Station, Florida, (hereafter called the MOU for Prescribed Burning) "establishes and defines a coordinated process through cooperative guidelines that allows USFWS to conduct prescribed burns on CCSFS and KSC while protecting personnel, infrastructure, and spaceflight hardware (SLD 45, USFWS, and KSC, 2025)."

Burn Planning and Preparation

Per the 2025 MOU for Prescribed Burning, USFWS burn preparation and planning responsibilities for fires at KSC/MINWR include:

- *Identification of target burn units, burn preparation needs, acreage, and habitat goals for the year.*
- *Completion and maintenance of burn preparations including disking, mowing, and/or mechanical cutting for burn opportunity availability.*
- *Monitoring soils and vegetation moisture and composition maximum burn potential to meet goals and objectives.*
- *Monitoring of range operations, launch schedule, and weather conditions to identify potential burn windows.*
- *Once burn window is identified, notification of parties and mission partners of targeted burn units, back up units, tactical plans, and timing of burn operations.*

Notification and Coordination in Advance of a Burn

At least three business days in advance of a desired burn operation, MINWR must submit a prescribed burn notification to KSC. For prescribed burns located on KSC/MINWR, KSC Spaceport Integration reviews the planned burn targets, checks on constraints, and reviews burn buffers and GEOSIMS to determine if the scheduled burn targets are viable candidates. Spaceport Integration then communicates burn plans to tenant partners, NASA departments on KSC, and mission partners on CCSFS at least three days prior to the planned burn. These groups are invited to participate in the 0800 Operational Status Check meeting, where further discussions occur regarding the specifics of a planned burn each day, including the day of the burn. Anyone is allowed to bring up a dissenting opinion about a burn; the Prescribed Burn Working Group works to address their concerns and resolve any operational barriers to prescribed burning. KSC Leadership believes this MOU will better support prescribed burning, as reflected in ***Table *, Burn***

***Restrictions Related to Launches, Spaceflight Hardware and Payload Transport/Mating, and Contamination-Sensitive Facilities/Launch Sites**, which provides definitions for critical days for launches and critical spaceflight hardware and payloads, as well as criteria for burning as related to the time until their transport/launch and the distance from smoke-sensitive facilities/launches. Note that in the 2025 MOU for Prescribed Burning, there are no prescribed burn restrictions related to non-critical payload transport or mating operations, and the burn buffer around smoke-sensitive facilities has been reduced to 0.5-mile, which greatly increases the opportunity to burn certain ecologically sensitive units to meet regulatory burn requirements.*

TABLE. Burn Restrictions Related to Launches, Spaceflight Hardware and Payload Transport/Mating, and Contamination-Sensitive Facilities/Launch Sites

	Critical Day for Launch Operations	Non-Critical Day for Launch Operations	Critical Payload Transport/ Mating Operations[1]	Active Contamination-Sensitive Payload Processing Facilities and Launch Sites
Definition	• Crewed launch • Mission with critical spaceflight hardware or payload (NSA, NRO, GPS, NOAA, NASA, USSF) • Launch vehicle without Certified Autonomous Flight Safety System (AFSS)	• Uncrewed mission • Commercial payload mission • Launch vehicle with Certified AFSS	• Transport/mating for missions including, but not limited to: NSA, NRO, GPS, NOAA, NASA, USSF	• Processing facility currently occupied by smoke-sensitive critical spaceflight hardware/ payload. • Launch complex with rocket containing critical spaceflight hardware/ payload on the pad in advance of launch.
Timing Restrictions	No prescribed burning within 12 hours of a targeted T-0 or launch window opening without the concurrence of the launch provider and their customer(s).	Burning is permitted through T-0.	Any burning conducted within 48 hours of critical payload transport/ mating operations will be conducted with favorable weather, wind directions will be closely monitored for current and post weather conditions for smoke production, and extensive mop-up will be completed in an effort not to place smoke/remnant smoke directly on payload route or mating operations facilities.	Prescribed burning restrictions may be implemented to mitigate real-time changes to an active payload processing or launch site's ability to protect against smoke or particulate contamination.
Distance Restrictions	Prescribed burn operations will be	Prescribed burn operations will be	No burning to be conducted within	PBP will not burn within a 0.5-mile radius

TABLE. Burn Restrictions Related to Launches, Spaceflight Hardware and Payload Transport/Mating, and Contamination-Sensitive Facilities/Launch Sites

	Critical Day for Launch Operations	Non-Critical Day for Launch Operations	Critical Payload Transport/ Mating Operations[1]	Active Contamination-Sensitive Payload Processing Facilities and Launch Sites
	restricted to areas outside scheduled Flight Caution Area (FCA) roadblocks with favorable weather conditions. Outside the secured perimeter of KSC, Prescribed Burn Practitioners (PBP) will be allowed to burn with favorable weather conditions.	restricted to areas outside scheduled FCA roadblocks with favorable weather conditions.	scheduled roadblock/ hazard areas if established for mating operations.	unless favorable weather conditions exist and the PBP receives concurrence from the processing facility/ launch customer.

Source: Table developed from information contained in the draft KSC/MINWR/CCSFS Prescribed Burning MOU. **Key:** FCA = Flight Caution Area; GPS = Global Positioning System; PBP = prescribed burn practitioner; NASA = National Aeronautics and Space Administration; NOAA = National Oceanic and Atmospheric Administration; NRO =National Reconnaissance Office; NSA = National Security Administration; PBP = Prescribed Burn Practitioners; T-0 = time at which a planned schedule of activties before a launch begins; USSF = U.S. Space Force.

Note:

1. There are no prescribed burn restrictions related to non-critical payload transport or mating operations.

Education and Agreements

Personnel from multiple KSC organizations continue efforts to educate NASA personnel, tenants, and other user groups on the why and how of prescribed fire. Spaceport Integration and the NASA Environmental Management Branch are the primary organizations disseminating fire information onsite, including general outreach as well as specific briefings to concerned organizations on how the subject burn is going to be conducted and the steps being taken to ensure that it is done safely with minimal impacts to missions and operations. Education efforts for these groups will continue, with a focus on the smoke prediction technologies KSC employs, as well as the importance of prescribed fire to reduce risks such as wildfires and failure to meet regulatory compliance requirements. Personnel from NASA, USFWS, and the USSF recently made a presentation entitled "Why We Burn" to over 200 attendees as part of the KSC Sustainability Speaker Series.

All new and renewed Space Act Agreements (which are written for commercial tenants) include language that tenants must cooperate with NASA and USFWS to coordinate prescribed burning activities at KSC. Tenants are responsible for constructing and upgrading facilities and providing the equipment and systems necessary to protect tenant property and flight hardware from smoke damage. Tenants must designate primary and alternate points of contact for burn coordination. Tenants shall not interfere in any way with the prescribed burning activities that occur on KSC property, including fire preparation activities.

Tenant agreements also include language regarding ESA Section 7 consultation requirements. By signing the lease, the tenant agrees to be fully responsible for meeting the requirements, terms, and conditions set forth in applicable BOs at the tenant's expense. The tenant must perform mitigations required by the BO to offset impacts to federally listed species and their habitats due to Tenant's activities.

11. The Service suggests that language be included in the proposed Action, preferably in Section 1.6 Conservation Measures, similar to the following: "NASA, USSF, SpaceX and other Federal agencies will coordinate to implement land management activities within the proposed test access restriction area and proposed launch/landing access restriction area. Land management activities include prescribed fire implementation and monitoring, maintenance of fire breaks, invasive species treatment and other land management techniques as needed. Activities will be implemented on an annual basis to a level that will maintain habitat within these areas for continued use by Federal threatened and endangered species." This language allows for a large degree of flexibility by the Federal agencies and SpaceX to coordinate and work on solutions for access to these areas to conduct appropriate land management for Federal threatened and endangered species.

    Response: In addition to the language added to the BCA for prescribed burning (See response to Comment #10), the following Conservation Measure has been added to the BCA: "Per the KSC/MINWR Interagency Agreement (NASA and USFWS, 2024) and within the constraints of sensitive payloads and mission operations described in the 2025 MOU for Prescribed Burning, NASA and MINWR will continue to conduct management on NASA property at a level that maintains habitat for continued use by federally listed species. Activities will include but not be limited to prescribed burning, fire break maintenance, and invasive and nuisance species control (see Section 1.6, Prescribed Burning at KSC and MINWR).

12. The below conservation measures are from a similar proposed Action with similar effects and geographic area. Would NASA be willing to include the below into the BCA? Some of them are similar to what is already in the current BCA, and those can be ignored. I lightly edited the example conservation measures to reflect the appropriate launch complex and Federal agencies.

    Proposed Conservation Measures

    To eliminate, avoid, minimize, and mitigate the effects on ESA-listed species and critical habitat, the following conservation measures would be implemented during the construction and operation phases of the Proposed Action. Conservation measures are defined as "actions to benefit or promote the recovery of listed species that are included by the Federal agency as an integral part of the Proposed Action.
    These actions will be taken by the Federal agency or applicant and serve to minimize or compensate for project effects on the species under review. These may include actions taken prior to the initiation of consultation, or actions which the Federal agency or applicant have committed to complete in a Biological Assessment (BA) or similar document" (USFWS and NMFS 1998). Some of the measures described in the sections that follow are required by other regulations that are applicable to the proposed construction and operations (for example, Clean Water Act).

Natural Resource Training

Response: BCA already includes training CMs.

NRT1 – SpaceX will generate natural resources training for employees and contractors that will include
the following:

- Instruction on implemented the conservation measures in this BCA and any terms and conditions
  issued under the associated biological opinion (BO), as well as potential penalties for noncompliance
- Guidance on wildlife encounters, photos of species and habitats
- Contact and reporting requirements for listed species observations, injury, or mortality
- Instructions on minimizing the spread of invasive plant species
- Notice of posted speed limits, designated parking areas, and road closures
- Wildfire prevention
- Proper disposal of litter, garbage, and construction site housekeeping

NRT2 – Conducting natural resources training for all onsite personnel annually or before a new
construction or operations activity is initiated or new initiated personnel are brought onsite.

General Construction Measures

These measures are applicable during the construction phase of the Proposed Action:

GC1 – SpaceX will design facilities and infrastructure at LC-39A such that lighting impacts on nesting sea turtles and hatchlings are minimized while meeting safety and security requirements. SpaceX will generate a Lighting Operation Manual (LOM) for LC-39A for implementing temporary and long-term lighting.

Response: The BCA already contains a CM regarding the LOM. The following is a slightly modified version that replaces the original wording: "To minimize adverse impacts from temporary and long-term lighting to federally listed species and designated critical habitat within the Action Area, SpaceX will update and follow the LC-39A LOM; the LOM will address applicable requirements for lighting associated with the Proposed Action, including measures for lighting minimization during sea turtle nesting season. SpaceX will submit an updated LC-39A LOM to NASA. NASA will coordinate review of the LOM with the USFWS-ES. The LOM must be approved by NASA and USFWS-ES prior to operation of the Proposed Action."

GC2 – SpaceX will follow the *Recommended Best Practices for Communication Tower Design, Siting, Construction, Operation, Maintenance, and Decommissioning* (USFWS 2021a) unless structural or safety would be compromised to minimize the potential

effects on the tricolored bat and listed bird species from lighting.

Response: The BCA includes the following updated CM for this topic: Red obstruction lighting for towers will comply with FAA Advisory Circular No. 70/7460-1M, Change 1 (AC 70/7460-1M Chg 1).

GC3 – SpaceX will limit vehicle operations outside of construction areas to designated paved and unpaved roads and parking areas.

Response: No new CM is necessary for this BCA as SpaceX does not have the authority to offroad at KSC and construction vehicles would generally be limited to LC-39A, which is primarily developed land.

GC4 – SpaceX will incorporate measures to discourage tricolored bats from roosting and establishing colonies where structure or safety is not compromised.

Response: BCA already includes the following CM: "To discourage protected birds and bats from roosting or establishing maternal colonies on LC-39A infrastructure, buildings, and equipment, SpaceX will incorporate measures such as visual fright devices."

GC5 – SpaceX will report any instances of ESA-listed species occurrence within construction activity areas to NASA and will not attempt to remove them.

Response: BCA already includes the following CM:
"Consistent with current SpaceX wildlife management at LC-39A, if SpaceX identifies a listed species during construction, SpaceX will report the occurrence to NASA EMB. NASA EMB will contact MINWR to respond and determine the appropriate next steps, which can include trapping, translocation, removing the bird nest or bat roost, and/or excluding bats from facilities according to best management practices (per cooperative agreement). SpaceX will not remove bats, maternity roosts, bird nests, or other federally listed species before MINWR has evaluated the situation."

GC6 – SpaceX will minimize impacts on adjacent natural habitats outside of construction areas by instructing contractors on the maintenance and use of heavy equipment:

- Regularly inspecting for insurance that hydraulic hoses and fittings are in good condition and that there are no petroleum leaks
- Parking vehicles and heavy equipment at least 25 feet away from wetlands and surface waters

Response: As all construction work will be limited to within the boundaries of LC-39A, which is primarily developed and has no natural wetlands, this type of measure is not necessary for this BCA. Additionally, spill prevention and permit requirement will be in place to avoid such impacts.

General Operation Measures

These measures are applicable during the operations of the Proposed Action:

GO1 – SpaceX will adhere to the *Prescribed Burn Memorandum of Understanding* (MOU), KCA-4205 Revision B (USSF, USFWS, and NASA 2019) unless superseded or revised so that prescribed burning on KSC and Merritt Island National Wildlife Refuge (MINWR) opportunities are maximized within constraints of sensitive payloads and mission operations.

Response: BCA CM updated to read: "Per the KSC/MINWR Interagency Agreement (NASA and USFWS, 2024) and within the constraints of sensitive payloads and mission operations described in the 2025 MOU for Prescribed Burning, NASA and MINWR will continue to conduct management activities on NASA property at a level that maintains habitat for continued use by federally listed species. Activities will include but not be limited to prescribed burning, fire break maintenance, and invasive and nuisance species control (see Section 1.6, Prescribed Burning at KSC and MINWR)."

GO2 – SpaceX will incorporate measures to discourage tricolored bats from roosting and establishing colonies where structure or safety are not compromised.

Response: BCA already includes the following CM: "To discourage protected birds and bats from roosting or establishing maternal colonies on LC-39A infrastructure, buildings, and equipment, SpaceX will incorporate measures such as visual fright devices."

GO3 – SpaceX will report any instances of ESA-listed species occurrence where they may conflict with LC-39A operations to NASA and will not attempt to remove them.

Response: Updated the CM in the BCA to also address operations: "Consistent with current SpaceX wildlife management at LC-39A, if SpaceX identifies a listed species in a location where it may conflict with LC-39A construction or operations at LC-39A, SpaceX will report the occurrence to NASA EMB. NASA EMB will contact MINWR to respond and determine the appropriate next steps, which can include trapping, translocation, removing the bird nest or bat roost, and/or excluding bats from facilities according to best management practices (per cooperative agreement). SpaceX will not remove bats, maternity roosts, bird nests, or other federally listed species before MINWR has evaluated the situation."

GO4 – SpaceX will install additional wildlife crossing awareness signage along northbound and southbound Phillips Parkway ROWs to increase wildlife awareness and reduce road mortality for species such as the indigo snake and southeastern beach mouse.

Response: BCA already contains a CM regarding wildlife crossing signs.

GO5 – SpaceX will immediately report any distressed, injured, or dead federally listed species to NASA. If launch-related mortality of a federally listed species is

documented, SpaceX will report it to the USFWS within 24 hours.

Response: BCA already contains the following CM: "NASA and SpaceX will document any incidents of injury or death of a federally listed species and report them to the USFWS-ES within 24 hours."

Species-Specific Measures

Southeastern Beach Mouse

SEBM1 – SpaceX will develop and implement a baseline and operational monitoring study plan to assess the abundance, distribution, fitness, and habitat suitability of the southeastern beach mouse in the vicinity of LC-39A. The monitoring plan will be developed in coordination with the USFWS and NASA. The monitoring plan components will include the following:

- Establish a control area for relative comparison of survey results.
- Conduct a baseline survey of southeastern beach mouse abundance and distribution before initiation of operations within beach habitats adjacent to LC-39A and within the control area.

  -Including annual abundance, distribution, fitness, and habitat suitability, including noise monitoring surveys during operations for a period to be determined, within beach habitats adjacent to LC-39A and within the control area. Habitat suitability should include an assessment of burrow collapse from vibrations.
- Establish re-initiation criteria.
- Complete annual reporting of survey results to NASA and the USFWS.

Response: NASA does not fully agree with the need to implement baseline monitoring for southeastern beach mice. MINWR, CNS, NASA, and USSF determined enough data had been gathered from nine years (2010 to 2018) of habitat occupancy studies to confirm the presence of southeastern beach mice on KSC and CNS and the suitability of the coastal dune habitat. Currently, SEBM surveys are project specific. NASA recently monitored SEBM in support of Biological Opinion, Universal Camera Site 12-Brevard (FWS Log #: 2024-0040669.

The following language has been added to the BCA: "If southeastern beach mouse monitoring is determined necessary per the Incidental Take Statement, NASA and SpaceX, in collaboration with USFWS-ES and SLD 45, will develop a monitoring plan to assess impacts to the abundance and distribution of southeastern beach mice in the vicinity of LC-39A. As part of an adaptive management approach, NASA, SpaceX, SLD 45, and USFWS-ES will meet annually to review monitoring results and determine next steps (e.g., continue or modify monitoring, reinitiate consultation, reduce or terminate monitoring)."

SEBM2 – SpaceX will implement noise and vibration monitoring in the vicinity of LC-39A such that site-specific operational conditions can be documented and reported. Monitoring for noise and vibration should extend radially outward from LC-39A to the edge of the action area.

Response: As written, NASA is not supportive of this CM—the objective of such monitoring is unclear, and noise/vibration monitoring in and of itself would not provide information about the species as there are little to no species impact thresholds to tie these sound levels to. Monitoring

needs to have a stated purpose and connection to species reactions/population impacts. It is not clear what additional data this measure would provide beyond the noise monitoring already being done for Starship in Texas. If the goal is to document site-specific conditions pre and post launch, with a focus on beach mice and beach mouse habitat impacts, NASA is open to discussions on cameras or pre and post surveys in support of adaptive management.

Florida Scrub-Jay

FSJ1 – Before construction, Florida scrub-jay surveys would be conducted throughout all suitable scrub-jay habitat to confirm no active nests of scrub-jays are within 300 feet of construction. Any nests encountered would be flagged, and no construction would be allowed within 300 feet until all birds have fledged.

Response: There is no suitable scrub-jay habitat within 300 ft of proposed construction at LC-39A.

FSJ2 – In conjunction with NASA, SpaceX will expand the existing Florida scrub-jay monitoring taking place on NASA and coordinate results reporting with KSC and MINWR. SpaceX's roles and responsibility for Florida scrub-jay monitoring will be developed through coordination with NASA and the USFWS.

Response: NASA does not fully agree with the need to implement baseline and operational monitoring for the Florida scrub-jay. NASA has over 20 years of scrub-jay monitoring data that already reflects a decrease in the population irrespective of launch cadence. NASA feels that current monitoring protocols are sufficient to assess potential changes in Florida scrub-jay distribution and abundance from the Proposed Action.

The following language has been added to the BCA: "Using data collected per current monitoring protocols, NASA and SpaceX will assess potential changes in the distribution and abundance of sea turtles, Florida scrub-jays, and manatees on NASA property. As part of an adaptive management approach, NASA, SpaceX, SLD 45, and USFWS-ES will meet annually to review monitoring results and determine next steps (e.g., continue or modify monitoring, reinitiate consultation, reduce or terminate monitoring).

FSJ3 – SpaceX will implement noise and vibration monitoring in the vicinity of LC-39A such that site-specific operational conditions can be documented and reported. Monitoring for noise and vibration should extend radially outward from LC-39A to the edge of the action area.

Response: See response to SEBM2.

Piping Plover and Rufa Red Knot

PP/RRK1 – SpaceX will develop and implement a baseline and operational piping plover and rufa red knot monitoring study plan to assess the presence of overwintering birds in the vicinity of LC-39A. The monitoring plan will be developed in coordination with the USFWS and NASA. The monitoring plan components will include the following:

- Conduct a baseline survey of piping plover and rufa red knot presence before initiation of operations within estuarine and shoreline habitats in the vicinity of LC-39A.
- Coordinate and incorporate survey results reporting with KSC and MINWR survey efforts and reporting.

- Complete annual reporting of survey results to NASA and the USFWS.

Response: NASA does not fully agree with the need to implement baseline and operational monitoring for shorebirds. Neither MINWR nor NASA conducts shorebird surveys. As stated in the BCA, the occurrence of overwintering piping plovers near LC-39A is rare and they don't breed within the Action Area; neither does the rufa red knot.

PP/RRK2 – SpaceX will implement noise and vibration monitoring in the vicinity of LC-39A such that site-specific operational conditions can be documented and reported. Monitoring for noise and vibration should extend radially outward from LC-39A to the edge of the action area.

Response: See response to SEBM2.

Eastern Indigo Snake

EIS1 – Appropriate educational plans would be provided to SpaceX construction personnel. Educational signs and posters would be displayed at LC-39A, providing contact information and work stoppage in the event of an eastern indigo snake sighting. If an eastern indigo snake is encountered during clearing, work in the vicinity of the snake (50 feet) would stop, and the snake would be allowed to move safely out of the LC-39A construction area of its own volition.

Response: BCA already contains a CM stating that the Proposed Action will follow the 2024 Standard Protection Measures for the Eastern Indigo Snake, which includes measures to protect the indigo snake.

EIS2 – To the extent possible, gopher tortoise burrows would not be disturbed if a minimum 25-foot (7.6-meter) buffer around the mouth of the burrow can remain to connect the burrow to foraging areas in accordance with FWC guidelines. Following FWC guidelines, no more than 90 days before and no fewer than 72 hours before any clearing or construction, a 100% pedestrian survey would be conducted to locate and flag or stake all burrows. Gopher tortoise burrows in areas to be cleared or areas for new construction would be excavated by qualified SpaceX contractors, and captured tortoises would be relocated in accordance with FWC guidelines to the NASA-approved recipient site, which may be on or off KSC. If an eastern indigo snake is present in a burrow to be excavated, the snake would be allowed to voluntarily leave the area before excavation continues. Excavated burrows would be collapsed to prevent the inadvertent entombment of eastern indigo snakes in construction areas.

Response: The BCA CM for the gopher tortoise/indigo snake surveys/relocation was updated as follows: "Any construction project at KSC with the potential to affect protected species requires a biological survey to be performed prior to disturbances. If a gopher tortoise burrow is discovered within the LC-39A area prior to construction, it will be scoped with an infrared burrow camera. Tortoises will be removed from the burrow either by bucket trapping or excavation with a backhoe. Any discovered indigo snakes will be allowed to leave the site prior to collapsing the burrow. If relocation is necessary, the snake will be relocated in accordance with MINWR protocols."

Sea Turtles

ST1 – SpaceX will design facilities and infrastructure at LC-39A such that lighting impacts on nesting sea turtles and hatchlings are minimized while meeting safety and security requirements. SpaceX will generate an LOM for LC-39A for implementing temporary and long-term lighting.

Response: The BCA already contains a CM regarding the update and implementation of the LC-39A LOM.

ST2 – Stormwater treatment measures consistent with the NASA Stormwater Pollution Prevention Plan (SWPPP) would be implemented. The SWPPP includes mitigation measures related to stormwater treatment and soil erosion. Construction and demolition would comply with the NASA SWPPP to prevent potential pollution discharges to stormwater.

Response: Per NASA and SpaceX direction, a similar CM was deleted from an earlier version of the LC39A BCA. These stormwater measures and plans will go forward as part of a separate permit process.

ST3 – SpaceX will maintain responsibility for compliance of lighting conservation measures by SpaceX personnel. As a best practice, SpaceX will install lighting in a downward configuration unless operationally constrained. Lighting installation will be directed away from the coastline to minimize exposure to sea turtles. Uplighting and side lighting will only be used in the event that a mission-critical operational need arises. Lighting installed will be shielded or covered and directed to shine away from large reflective surfaces.

Response: The BCA already contains a CM regarding the update and implementation of the LC-39A LOM.

ST4 – SpaceX will work with NASA to minimize interference with sea turtle nesting monitoring from May 1 to October 31.

Response: BCA already contains a CM regarding minimization of interference with monitoring of federally listed species: "NASA and MINWR (through cooperative agreement) will continue to regularly monitor sea turtles, Florida scrub-jays, and manatees on NASA property using current protocols (see Section 1.5, Kennedy Space Center Monitoring and Education Activities). SpaceX will continue to coordinate with NASA and MINWR to minimize interference from construction and operations at LC-39A with monitoring efforts for federally listed species."

ST5 – SpaceX will limit beach driving to all-terrain vehicles (ATVs) only and only for mission-essential activities or required monitoring. During sea turtle season, ATVs will use low-pressure tires and sea turtle-friendly lighting. Before sunset in front of sea turtle nests that have reached 46 days of incubation (60 days for leatherback nests), beachfront ruts will be minimized within a 30-foot-wide path from the nest to the waterline.

Response: This measure was removed from an earlier version of the LC39A BCA as SpaceX is not authorized to drive on KSC/CCSFS beaches.

New Sea Turtle Conservation Measure for KSC: *– SpaceX will work with NASA, MINWR, and USFWS-ES to develop a plan to implement noise and vibration monitoring at a sub-set of sea turtle nests in the vicinity of LC-39A such that site-specific operational conditions and any effects to sea turtle nests, eggs, and hatchlings can be documented and reported.*

West Indian Manatee

WIM1 – Stormwater treatment measures would be implemented. The SWPPP includes mitigation measures related to stormwater treatment and soil erosion.

Response: Per NASA and SpaceX direction, a similar CM was deleted from an earlier version of the LC39A BCA. These stormwater measures and plans will go forward as part of a separate permit process.

WIM2 – Boat and barge operations will follow standard manatee protection measures:

- Vessels will operate under no wake or idle speeds near docks or posted manatee areas (such as KSC turning basin).
- Boat speeds will be operated under 10 knots (11.5 miles per hour) outside of navigation channels where manatees are observed (that is, Port Canaveral and Indian River).
- Boats will maintain a minimum distance of 50 feet from observed manatees.
- Trained manatee observers will be present at the KSC dock during boat and barge arrival and departure.

Response: BCA already contains a more detailed list of CMs for manatee avoidance and protection.

Tricolored Bat

TCB1 – SpaceX would coordinate with NASA and the USFWS to determine any possible maternity roosts during construction.

Response: BCA already includes the following CMs:
"To discourage protected birds and bats from roosting or establishing maternal colonies on LC-39A infrastructure, buildings, and equipment, SpaceX will incorporate measures such as visual fright devices."
"Consistent with current SpaceX wildlife management at LC-39A, if SpaceX identifies a listed species during construction, SpaceX will report the occurrence to NASA EMB. NASA EMB will contact MINWR to respond and determine the appropriate next steps, which can include trapping, translocation, removing the bird nest or bat roost, and/or excluding bats from facilities according to best management practices (per cooperative agreement). SpaceX will not remove bats, maternity roosts, bird nests, or other federally listed species before MINWR has evaluated the situation."

B.1.4 USFWS Concurrence Letter

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Florida Ecological Services Field Office

IN REPLY REFER TO:
2024-0058364

June 6, 2025

Patrice Hall
Environmental Protection Specialist
Environmental Management Branch
Spaceport Integration and Services
Mail Code: SI-E3
Kennedy Space Center, FL 32899

Subject: Section 7 consultation for SpaceX Starship-Super Heavy Construction and Operations at Launch Complex 39A

Dear Ms. Hall:

This letter acknowledges your March 20, 2025, request for initiation of informal consultation and conference, pursuant to section 7(a)(2) of the Endangered Species Act of 1973, as amended (Act), and receipt of your biological and conference assessment (BCA) dated and received the same day. The National Aeronautics and Space Administration (NASA) is evaluating Space Exploration Technologies Corporation's (SpaceX's) proposal for operation of the Starship-Super Heavy at Launch Complex (LC)-39A at the NASA Kennedy Space Center (KSC). NASA is the lead agency for this proposed Action, which includes infrastructure construction, static fire tests, launches, landings, and daily operations at LC-39A; transport of supplies, personnel, and launch vehicles to LC-39A; expenditure of vehicles and components in the Atlantic, Pacific and Indian Oceans; landings on droneships in the Atlantic Ocean; and transport of supplies and vehicles via barge. SpaceX must obtain a vehicle operator license from the FAA for Starship-Super Heavy launch and landing operations at LC-39A. The requested informal consultation concerns the potential effects to the Anastasia Island beach mouse (*Peromyscus polionotus phasma*), Atlantic saltmarsh snake (*Nerodia clarkii taeniata*), Audubon's crested caracara (*Caracara plancus audubonii*), band-rumped storm petrel (*Hydrobates castro*), Bermuda petrel (*Pterodroma cahow*), black-capped petrel (*Pterodroma hasitata*; BCP), eastern black rail (*Laterallus jamaicensis ssp. jamaicensis*), eastern indigo snake (*Drymarchon couperi*), Everglade snail kite (*Rostrhamus sociabilis plumbeus*), Florida bonneted bat (*Eumops floridanus*), Florida grasshopper sparrow (*Ammodramus savannarum floridanus*), Hawaiian petrel (*Pterodroma sandwichensis*), Newell's shearwater (*Puffinus newelli*), piping plover (*Charadrius melodus*), red-cockaded woodpecker (*Dryobates borealis*), roseate tern (*Sterna dougallii dougallii*), rufa red knot (*Calidris canutus rufa*), short-tailed albatross (*Phoebastria (=Diomedea) albatrus*), wood stork (*Mycteria americana*), West Indian manatee (*Trichechus manatus*), and a conference on the monarch butterfly (*Danaus Plexippus*) and tri-colored bat (*Perimyotis subflavus*). NASA has determined the action may affect, but is not likely to adversely affect the above listed species and is not likely to jeopardize the proposed monarch butterfly and tri-colored bat.

7915 BAYMEADOWS WAY, #200
JACKSONVILLE, FL 32256
(352) 448-9151

1601 BALBOA AVENUE
PANAMA CITY, FL 32405
(352) 448-9151

777 37TH ST SUITE D-101
VERO BEACH, FL 32960
(352) 448-9151

The Service is currently conducting formal consultation on eastern indigo snake (*Drymarchon couperii*), Florida scrub-jay (*Aphelocoma coerulescens*), green sea turtle (*Chelonia mydas*), hawksbill sea turtle (*Eretmochelys imbricata*), Kemp's ridley sea turtle (*Lepidochelys kempii*), leatherback sea turtle (*Dermochelys coriacea*), loggerhead sea turtle (*Caretta caretta*), southeastern beach mouse (*Peromyscus polionotus niveiventris*) and the proposed green sea turtle critical habitat and loggerhead sea turtle critical habitat. The concurrence provided in this letter do not cover these species or critical habitat.

The Action consists of up to 44 annual launches from LC-39A, 44 Super Heavy booster static fire tests, 44 Starship static fire tests, and 44 Starship landings and 44 Super Heavy booster landings in an unknown combination between LC-39A and the Atlantic, Indian and Pacific Oceans.

Enclosed with your request was the BCA for the action. The U.S. Fish and Wildlife Service (Service) has reviewed this BA and provides the following comments pursuant to Section 7(a)(2) of the Act of 1973, as amended.

Action Area as defined in the BCA

The BCA included the following statement regarding the Action Area. "The Action Area includes: (1) LC-39A, (2) area surrounding LC-39A that would be exposed to traffic, launch plumes, noise, and sonic booms (construction, operational, and launch and landing noise), (3) area in the Atlantic Ocean where Super Heavy boosters and Starship vehicles might land or be expended, (4) area in the Pacific Ocean where Starship vehicles might land or be expended, and (5) area in the Indian Ocean where Starship vehicles might be expended." The Action Area will be further defined as the extent to 1 pound per square foot (psf) and the sound exposure level (SEL) to the extent of 100 decibels A-weighted (dBA) during operations. Figure 1 shows the extent of the modeled 100 dBA SEL and 1 psf. These area will encompass areas expected to be affected by construction activities, daily operations, heat and vapor plumes, lighting vehicle traffic, boat/barge traffic, and events with smaller noise and sonic boom footprints. Figure 2 shows the additional Starship contingency area defined in the BCA as the contingency landing area including an additional area from 1 nautical mile (nm) to 5 nm offshore for 50 miles north and south of LC-39A. Contingency landings would occur up to four times/year. The Starship contingency landing area encompasses noise and overpressure effects from Starship contingency landings. Noise and ASEL effects from Super Heavy Atlantic landings are encompassed within the 1 psf/100 dB ASEL contour surrounding LC-39A. The Atlantic landing area and Starship contingency landing area would encompass potential lighting and direct physical impacts associated with Atlantic landings and boat/barge traffic. Figure 3 shows the proposed Starship Landing Areas within the Atlantic, Indian and Pacific Ocean, and the Gulf of America (the Gulf).

Page 3

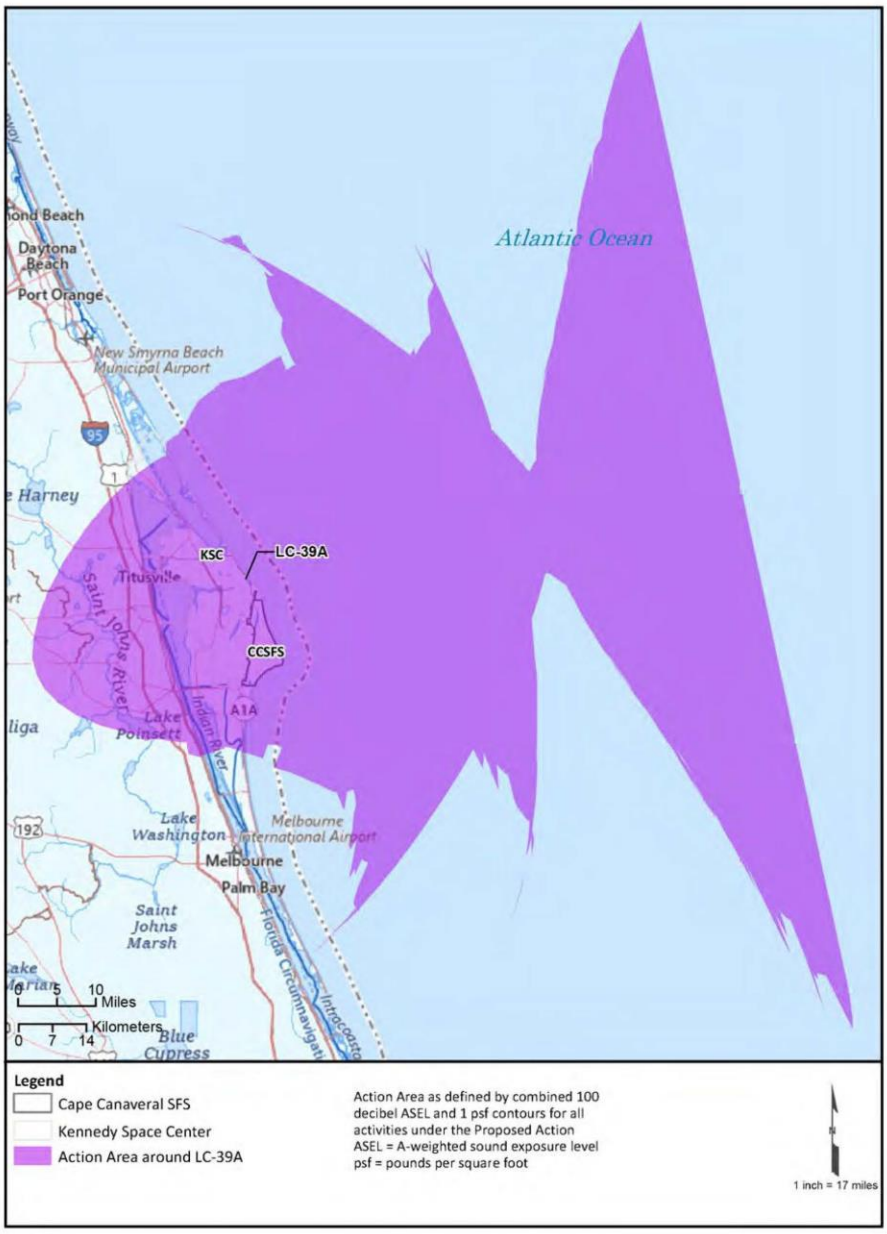

FIGURE 1: Action Area Defined by 100 dB ASEL and 1 PSF

Page 4

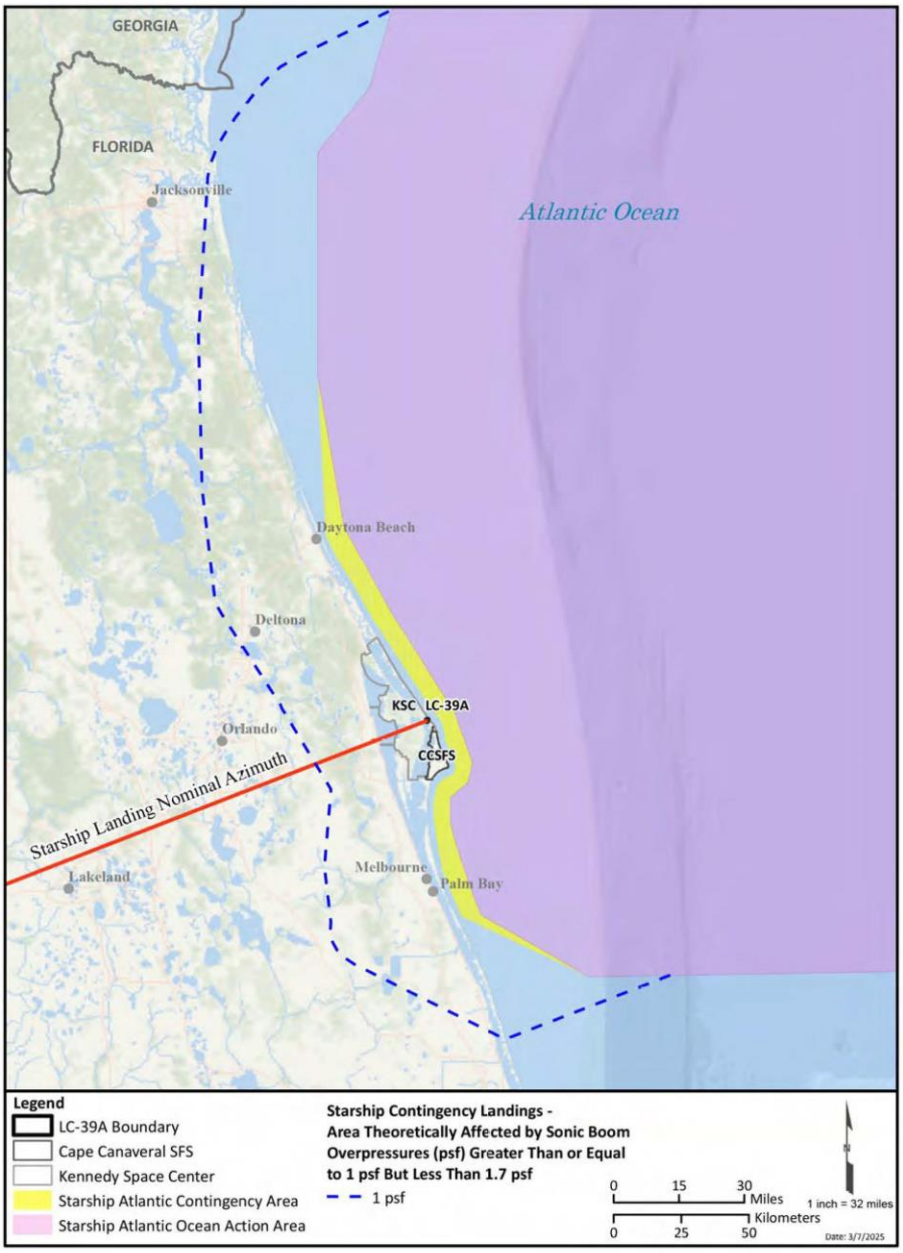

FIGURE 2: Starship Contingency Landing Area and 1 psf contour

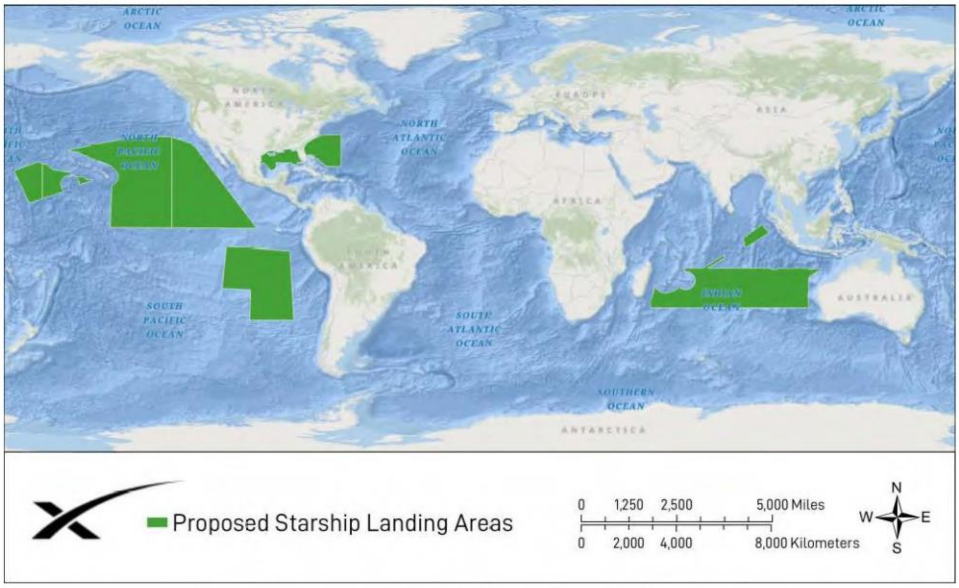

FIGURE 3: Proposed Global Water Starship Landing Areas

The following explains the concurrence for may affect, not likely to adversely affect to all species identified as such in the beginning of this letter.

Anastasia Island beach mouse

The Anastasia Island beach mouse (AIBM) was listed as endangered in 1989 (54 FR 20598). The historic range of the subspecies was from the Matanzas Inlet north to the northern end of the St. Augustine Inlet. The current main population of the subspecies is located on Anastasia Island and occupies the coastal dune system. The subspecies can breed year-round with an average litter size of four pups.

The proposed Action will have no effect on the AIBM from construction, lighting, vessel movement or additional vehicular traffic. The only effect from the proposed Action to AIBM will be exposure within the 1 psf overpressure sonic boom related to the Starship Contingency Landing Area (Figure 2). Though the AIBM might experience a startle response due to the overpressure events from landings in the contingency area, the low number of these events annually are not anticipated to alter breeding, feeding or sheltering for the subspecies. Therefore, the Service concurs with the NASA determination of may affect, but not likely to adversely affect the Anastasia Island beach mouse.

Atlantic salt marsh snake

The Atlantic salt marsh snake (ASMS) was listed as threatened in 1977 (42 FR 60743). Habitat for this species is confined to coastal salt marshes, mangrove swamps, tidal flats and shallow

tidal creeks and pools. When listed in 1977, it was thought that the range of the ASMS stretched from Volusia County to Indian River County, but recent surveys have resulted in detections only occurring in Volusia County. There are no population or demographic trends available at this time.

The proposed Action will have no effect on the ASMS from construction, lighting, vessel movement or additional vehicular traffic as the species does not occur within the areas that will experience effects from these portions of the Action. The only effect from the Action to ASMS will be exposure within the 1 psf overpressure sonic boom related to the Starship Contingency Landing Area (Figure 2). Though the ASMS might experience a startle response due to the overpressure events from landings in the contingency area, the low number of these events annually are not anticipated to alter breeding, feeding or sheltering for the species. Therefore, the Service concurs with the NASA determination of may affect, but not likely to adversely affect the Atlantic salt marsh snake.

Audubon's crested caracara

The Audubon's crested caracara (caracara) was listed as threatened in 1987 (52 FR 25229). This diurnal species exists as an isolated population within peninsular Florida and is a distinct population segment within the state. Caracara habitat consists of prairies with marshes and cabbage palm hammocks, but can be found in mixed upland hardwoods, improved pasture, pinelands, agricultural lands and urban areas. They have been documented foraging on carrion along roadways and roadsides. They most commonly nest in cabbage palms within open pastures, grasslands or prairies, but have been documented nesting in other structures. The species has been documented nesting in Brevard County and the Action Area, but no nests have been documented within the boundaries of KSC, MINWR, CANA or CCSFS. The species has been documented within the vicinity of LC-39B and along Phillips Parkway between KSC and CCSFS.

The species will experience affects from multiple pathways associated with the Action including sound, increased lighting and increased vehicular traffic. The species is expected to exhibit a startle response to sound from operations associated with the Action but has shown habituation to extreme and impulsive noise events at other sites. The species is expected to continue utilizing the area for foraging pre- and post-operations as it's main food source (carrion) will remain present and occur within the area. The species is not expected to be present in the heat plume (~0.2 miles from launch site) due to the low amount of foraging and nesting habitat and low numbers of sightings within the area. Additional lighting from the Action during construction and operations is not expected to adversely affect the species due to its high mobility, lack of known nesting sites within the area and low number of sightings. The above effects are expected to be insignificant, and the Service concurs with the NASA determination of may affect, but not likely to adversely affect the Audubon's crested caracara.

Band-rumped Storm-petrel

The band-rumped storm-petrel (BRSP) was listed as endangered in 2016 (81 FR 67786) within the Hawaii distinct population segment (DPS). The BRSP is a small seabird found throughout

the Pacific Ocean basin and nests in the Hawai'ian Islands. The species is long-lived (15 to 20 years), and adults spend the majority of their time foraging on the open ocean for small fish, squid, and crustaceans. Overall population numbers of BRSP are not know at this time, but it is estimated to have less than 300 nesting pairs. The species shows a strong attraction to light sources, including artificial lights.

Terrestrial based activities related to the Action will have no effect on the BRSP as the species is pelagic and does not nest, roost or loaf in the on-land portion of the Action Area. Starship-Super Heavy vehicles and launch debris from the vehicle upon re-entry could fall into the Pacific Ocean. The exact location of where the debris may fall is unknown, however it is unlikely that a booster or debris will strike a BRSP due to the low numbers of this species and vast extent of the Action Area within the Pacific Ocean. Super Heavy boosters are anticipated to land within the Pacific Ocean no more than twice per year. These landings will produce sonic boom overpressures similar to those produced by landings at LC-39A. The potential for adverse effects from landing operations is discountable due to the low concentration of individuals within the potential areas for landing and the ability of the species to move away from the area of impact. Therefore, the Service concurs with the NASA determination of may affect, but not likely to adversely affect the band-rumped storm-petrel.

Bermuda petrel

The Bermuda petrel (BP) was listed as endangered in 1970 (35 FR 8491) and is one of the rarest birds in the Atlantic Ocean. It is a pelagic seabird that breeds in the northeastern portion of the Bahamian Islands. Breeding pairs have increased from <20 in 1965 to >150 in 2023. They usually inhabit and forage over waters from the east coast of North America to the western European waters.

Terrestrial based activities related to the Action will have no effect on the BP as the species is pelagic and does not nest, roost or loaf in the on-land portion of the Action Area. Starship-Super Heavy vehicles and launch debris from the vehicle upon re-entry could fall into the Atlantic Ocean. The exact location of where the debris may fall is unknown, however it is unlikely that a booster or debris will strike a BP due to the low numbers of this species and vast extent of the Action Area within the Atlantic Ocean. Super Heavy boosters are anticipated to land on droneships within the Atlantic Ocean up to 18 times/year further than 5 nm from shore. These landings will produce sonic boom overpressures similar to those produced by landings at LC-39A. The potential for adverse effects from landing operations is discountable due to the low concentration of individuals within the potential areas for landing and the ability of the species to move away from the area of impact. Therefore, the Service concurs with the NASA determination of may affect, but not likely to adversely affect the Bermuda petrel.

Black-capped petrel

The black-capped petrel (BCP) was listed as endangered in 2023 (88 FR 89611) and is a pelagic seabird that comes ashore only to breed in the northern Caribbean. Regular, large concentrations of black-capped petrels can occur off the coast between Florida and North

Carolina. They usually inhabit and forage over waters with considerable depth (e.g., 200-2,000 meters), with more frequent shallow water occurrences off the coast of Florida. Black-capped petrel known nesting locations are on Dominica, Cuba, and Hispaniola.

Terrestrial based activities related to the Action will have no effect on the BCP as the species is pelagic and does not nest, roost or loaf in the on-land portion of the Action Area. Starship-Super Heavy vehicles and launch debris from the vehicle upon re-entry could fall into the Atlantic Ocean. The exact location of where the debris may fall is unknown, however it is unlikely that a booster or debris will strike a BCP due to the low numbers of this species and vast extent of the Action Area within the Atlantic Ocean. Super Heavy boosters are anticipated to land on droneships within the Atlantic Ocean up to 18 times/year further than 5 nm from shore. These landings will produce sonic boom overpressures similar to those produced by landings at LC-39A. The potential for adverse effects from landing operations is discountable due to the low concentration of individuals within the potential areas for landing and the ability of the species to move away from the area of impact. Therefore, the Service concurs with the NASA determination of may affect, but not likely to adversely affect the black-capped petrel.

Eastern black rail

The eastern black rail (EBRA) was listed as threatened in 2020 (85 FR 6374) and is a small, cryptic marsh bird found in salt, brackish and freshwater wetlands of the eastern United States. It is a subspecies of black rail. The Action will have no effect on the EBRA from vessel movement as the species does not occur within the marine environment. Additional vehicle traffic is not anticipated to adversely affect the species as it is not reasonably certain to occur within habitat where vehicular traffic will increase. Lighting effects are anticipated to be minimal during construction and operations due to the lack of habitat within the immediate and adjacent vicinity of LC-39A. Effects from the Action to EBRA will be exposure within the 1 psf overpressure sonic boom related to the Starship and exposure to sound from static fire tests, launches and landings of Starship and the Super Heavy booster (Figure 1). The species is not known to breed within the Action Area and foraging opportunities are anticipated to be limited near LC-39A. Though the EBRA might experience a startle response due to the overpressure events from landings and sound from static test fire, launches and landings, the low number of these events annually are not anticipated to alter breeding, feeding or sheltering for the species. Therefore, the Service concurs with the NASA determination of may affect, not likely to adversely affect the eastern black rail.

Everglade snail kite

The Everglade snail kite (EVSK) was originally listed under the Endangered Species Preservation Act in 1969 with critical habitat finalized in 1977 (42 FR 40685) and is a medium-sized hawk. It is found in freshwater marsh systems from Gainesville to the southern Everglades. The Action will have no effect on the EVSK from construction, lighting, or vessel movement as the species does not occur within the areas that will experience effects from these portions of the Action. Additional vehicle traffic is not anticipated to adversely affect the species as it is not reasonably certain to occur within habitat where vehicular traffic will increase. The only effects

from the Action to EVSK will be exposure within the 1 psf overpressure sonic boom related to the Starship and exposure to sound from static fire tests, launches and landings of Starship and the Super Heavy booster (Figure 1). The species has been observed within Merritt Island National Wildlife Refuge, Kennedy Space Center and Cape Canaveral Space Force Station as recently as 2025. The species is not known to breed within these lands and foraging opportunities are anticipated to be limited near LC-39A. Though the EVSK might experience a startle response due to the overpressure events from landings and sound from static test fire, launches and landings, the low number of these events annually are not anticipated to alter breeding, feeding or sheltering for the species. Therefore, the Service concurs with the NASA determination of may affect, not likely to adversely affect the Everglade snail kite.

Florida bonneted bat

The Florida bonneted bat (FBB) was listed as endangered in 2013 (78 FR 61003) and is a large bat species found in a variety of upland habitats within Central and South Florida. The Action will have no effect on the FBB from construction, lighting, vessel movement or additional vehicular traffic as the species does not occur within the areas that will experience effects from these portions of the Action. The only effect from the Action to FBB will be exposure within the 1 psf overpressure sonic boom related to the Starship (Figure 1). Though the FBB might experience a startle response due to the overpressure events from landings, the low number of these events annually (up to 44 per year) are not anticipated to alter breeding, feeding or sheltering for the species. Therefore, the Service concurs with the NASA determination of may affect, not likely to adversely affect the Florida bonneted bat

Florida grasshopper sparrow

The Florida grasshopper sparrow (FGSP) was listed as endangered in 1986 (51 FR 27492) and is a small grassland sparrow found in limited prairie habitat within central Florida. The Action will have no effect on the FGSP from construction, lighting, vessel movement or additional vehicular traffic as the species does not occur within the areas that will experience effects from these portions of the Action. The only effect from the Action to FGSP will be exposure within the 1 psf overpressure sonic boom related to the Starship (Figure 1). Though the FGSP might experience a startle response due to the overpressure events from landing, the low number of these events annually (up to 44 per year) are not anticipated to alter breeding, feeding or sheltering for the species. Therefore, the Service concurs with the NASA determination of may affect, not likely to adversely affect the Florida grasshopper sparrow.

Hawaiian petrel

The Hawaiian petrel (HP) was added to the endangered species list in 1967 (32 FR 4001). It is a pelagic seabird found in coastal waters along the Pacific Coast of the United States and in the vicinity of the Hawai'ian Islands. Breeding colonies are now found only in remote or high elevation areas on the islands of Hawai'I, Maui, Lana'i, O'ahu and Kuau'i.

Terrestrial based activities related to the Action will have no effect on the HP as the species is pelagic and does not nest, roost or loaf in the on-land portion of the Action Area. Starship-

Super Heavy vehicles and launch debris from the vehicle upon re-entry could fall into the Pacific Ocean. The exact location of where the debris may fall is unknown, however it is unlikely that a booster or debris will strike a HP due to the low numbers of this species and vast extent of the Action Area within the Pacific Ocean. These landings will produce sonic boom overpressures similar to those produced by landings at LC-39A. The potential for adverse effects from landing operations or debris is discountable due to the low concentration of individuals within the potential areas for landing and the ability of the species to move away from the area of impact. Therefore, the Service concurs with the NASA determination of may affect, but not likely to adversely affect the Hawaiian petrel.

Newell's shearwater

The Newell's shearwater (NS) was listed as endangered in 1975 (40 FR 44149). It is a pelagic seabird that breeds in the Pacific Ocean. Breeding has been constricted to mostly on the island of Hawai'i, Kaua'i and Maui. They forage over waters within the Hawai'ian Islands and further south.

Terrestrial based activities related to the Action will have no effect on the NS as the species is pelagic and does not nest, roost or loaf in the on-land portion of the Action Area. Starship-Super Heavy vehicles and launch debris from the vehicle upon re-entry could fall into the Pacific Ocean. The exact location of where the debris may fall is unknown, however it is unlikely that a booster or debris will strike a NS due to the low numbers of this species and vast extent of the Action Area within the Pacific Ocean. These landings will produce sonic boom overpressures similar to those produced by landings at LC-39A. The potential for adverse effects from landing operations or debris is discountable due to the low concentration of individuals within the potential areas for landing and the ability of the species to move away from the area of impact. Therefore, the Service concurs with the NASA determination of may affect, but not likely to adversely affect the Newell's shearwater.

Piping plover

The piping plover (PIPL) was listed as threatened within its migratory location of Florida in 1985 (50 FR 50726). This small shorebird does not nest within Florida and forages on sandy beaches, sand flats and areas adjacent to large inlets and passes. The species has been documented along the shoreline of CANA, CCSFS, KSC and MINW. Sightings along the shoreline of CCSFS, KSC and MINWR have been in low numbers, with most sightings being <5 individuals. There is no foraging or roosting habitat within the construction area of LC-39A, but habitat exists within 0.2 miles of the launch and landing pads.

The species will experience affects from multiple pathways associated with the Action including sound and increased lighting. Monitoring efforts of the species at Starbase and Boca Chica, Texas have not recorded dead or injured PIPL after launch or landing events. The species is expected to exhibit a startle response to sound and vibrations from operations and is not expected to be present in the heat plume due to the low amount of foraging and nesting habitat and low numbers of sightings within the area. The species is anticipated to move out of the potential heat plume prior to encountering temperatures above ambient. The species is expected to continue

utilizing foraging and roosting habitat within the Action Area pre- and post-operations. Additional lighting from the Action during construction and operations is not expected to adversely affect the species due the low number of individuals that would experience increased lighting and night-time lighting currently occurs at LC-39A for Falcon 9 and Falcon Heavy operations. The above effects are expected to be insignificant, and the Service concurs with the NASA determination of may affect, but not likely to adversely affect the piping plover.

Red-cockaded woodpecker

The red-cockaded woodpecker (RCW) was listed as endangered in 1970 (35 FR 16047) and reclassified as threatened in 2024 (89 FR 85294). It is a small woodpecker found pine flatwoods throughout the southeast including Florida. The Action will have no effect on the RCW from construction, lighting, vessel movement or additional vehicular traffic as the species does not occur within the areas that will experience effects from these portions of the Action. The only effect from the Action to FGSP will be exposure within the 1 psf overpressure sonic boom related to the Starship (Figure 1). Though the RCW might experience a startle response due to the overpressure events from landing, the low number of these events annually (up to 44 per year) are not anticipated to alter breeding, feeding or sheltering for the species. Therefore, the Service concurs with the NASA determination of may affect, not likely to adversely affect the red-cockaded woodpecker.

Roseate tern

The roseate tern was classified as endangered along the United States eastern seaboard from South Carolina north and threatened in all other locations, including Florida, in 1987 (52 FR 42064). The species may occur within the Atlantic Ocean portion of the Action Area but does not nest within the Action Area.

Terrestrial based activities related to the Action will have no effect on the roseate tern as the species is pelagic and does not nest, roost or loaf in the on-land portion of the Action Area. Starship-Super Heavy vehicles and launch debris from the vehicle upon re-entry could fall into the Atlantic Ocean. The exact location of where the debris may fall is unknown, however it is unlikely that a booster or debris will strike a roseate tern due to the low numbers of this species and vast extent of the Action Area within the Atlantic Ocean. Super Heavy boosters are anticipated to land on droneships within the Atlantic Ocean up to 18 times/year further than 5 nm from shore. These landings will produce sonic boom overpressures similar to those produced by landings at LC-39A. The potential for adverse effects from landing operations is discountable due to the low concentration of individuals within the potential areas for landing and the ability of the species to move away from the area of impact. Therefore, the Service concurs with the NASA determination of may affect, but not likely to adversely affect the roseate tern.

Rufa red knot

The rufa red knot (REKN) was listed as threatened within its migratory location of Florida in 2014 (79 FR 73705). This small shorebird does not nest within Florida and forages on estuarine

intertidal flats, ocean-front area, sand spits, shoals and sandbars. The species has been documented along the shoreline of CANA, CCSFS, KSC and MINW and the interior impoundments of KSC and MINWR. Sightings have been in low numbers, with most sightings being between 1-10 individuals. There is no foraging or roosting habitat within the construction area of LC-39A, but habitat exists within 0.2 miles of the launch and landing pads.

The species will experience affects from multiple pathways associated with the Action including sound and increased lighting. Monitoring efforts of the species at Starbase and Boca Chica, Texas have not recorded dead or injured REKN after launch or landing events. The species is expected to exhibit a startle response to sound and vibrations from operations and is not expected to be present in the heat plume due to the low amount of foraging and nesting habitat and low numbers of sightings within the area. The species is anticipated to move out of the potential heat plume prior to encountering temperatures above ambient. The species is expected to continue utilizing foraging and roosting habitat within the Action Area pre- and post-operations. Additional lighting from the Action during construction and operations is not expected to adversely affect the species due the low number of individuals that would experience increased lighting and night-time lighting currently occurs at LC-39A for Falcon 9 and Falcon Heavy operations. The above effects are expected to be insignificant, and the Service concurs with the NASA determination of may affect, but not likely to adversely affect the rufa red knot.

Short-tailed albatross

The short-tailed albatross (STAB) was listed as endangered in 2000 (65 FR 54808). It is a pelagic seabird that lives in the Pacific Ocean. Breeding colonies currently exist on Torishima Island, the Senkaku Islands and Ogasawara Islands. Foraging habitat has been identified within the Aleutian Islands.

Terrestrial based activities related to the Action will have no effect on the STAB as the species is pelagic and does not nest, roost or loaf in the on-land portion of the Action Area. Starship-Super Heavy vehicles and launch debris from the vehicle upon re-entry could fall into the Pacific Ocean. The exact location of where the debris may fall is unknown, however it is unlikely that a booster or debris will strike a SNAP due to the low numbers of this species and vast extent of the Action Area within the Pacific Ocean up to twice per year. These landings could produce sonic boom overpressures similar to those produced by landings at LC-39A. The potential for adverse effects from landing operations or debris is discountable due to the low concentration of individuals within the potential areas for landing and the ability of the species to move away from the area of impact. Therefore, the Service concurs with the NASA determination of may affect, but not likely to adversely affect the short-tailed albatross.

Wood stork

The wood stork (WOST) was listed as endangered in 1984 (49 FR 7332), downlisted to threatened in 2014 (79 FR 37077) and proposed for delisting in 2023 (88 FR 9830). The species are colonial breeders within landscapes containing sufficient wetland foraging habitats. Foraging habitats are generally wetlands such as tidal creeks, ephemeral ponds, shallow wetlands and

flood plains. The species has been documented within wetlands and other shallow water systems throughout CANA, CCSFS, KSC and MINWR, though no breeding colonies exist within these properties.

The species will experience affects from multiple pathways associated with the Action including sound, increased lighting and increased vehicular traffic. The species is expected to exhibit a startle response to sound from operations associated with the Action but has shown habituation to extreme and impulsive noise events at other sites. The species is expected to continue utilizing the area for foraging pre- and post-operations as its main food source (aquatic prey in shallow wetlands) will remain present and occur within the area. The species is not expected to be present in the heat plume (~0.2 miles from launch site) due to the low amount of foraging habitat and low numbers of sightings within the immediate area. Additional lighting from the Action during construction and operations is not expected to adversely affect the species due to its high mobility, lack of known nesting sites within the Action Area and low number of sightings. There will be no effect to WOST from vessel operations or landings within the marine environment. The above effects are expected to be insignificant and the Service concurs with the NASA determination of may affect, but not likely to adversely affect the wood stork.

West Indian manatee

The West Indian manatee (WIMA) was reclassified as threatened in 2017 (82 FR 16668). The species is also protected under the Marine Mammal Protection Act. The species has been documented within the marine environment throughout CANA, CCSFS, KSC and MINWR and within the Atlantic Ocean. The species does not occur within the Pacific or Indian Ocean.

The species forages on seagrass and other submerged aquatic vegetation and utilizes thermal refuges during the winter months. Construction activities are anticipated to have no effect on the WIMA as no in-water work is proposed. Increased vessel traffic (barges, drone ships, support vessels) during operations is anticipated to be approximately 188 additional vessel trips through waters inhabited by manatees annually within the Action Area. This increase in vessel traffic is not a significant increase in vessel traffic within Port Canaveral, the Banana River, the KSC Turning Basin, currently established shipping routes or areas where Super Heavy boosters and/or Starships might land transit in the nearshore Atlantic Ocean. Landings within the Contingency Area of the nearshore Atlantic Ocean are anticipated to have an insignificant effect as these events are anticipated to occur no more than four times annually and WIMA are not anticipated to be within the immediate vicinity of the landing. The Action includes conservation, avoidance and minimization measures within Section 1.7 of the Biological and Conference Assessment to further reduce effects to the WIMA.

The Starship-Super Heavy launch and landing pads would be located approximately 0.17 miles and 0.13 miles from manatee habitat and the launch heat plumes extends over 3.2 acres of manatee habitat southeast of LC-39A. Deluge water during launches would be captured and treated onsite, and the associated heat plume would be diverted upwards and is not anticipated to affect water temperatures. Per findings presented in the 2024 *Draft Tiered EA for SpaceX Starship/Super Heavy Vehicle Increased Cadence at the SpaceX Boca Chica Launch Site in Cameron County, Texas* (FAA, 2024), the amount of metal deposition from the launch vapor

plume is expected to be minimal and monitoring would be conducted to ensure levels do not exceed accepted levels.

Sound is primarily transferred from air to water in a narrow cone, and most sound from launch and landings is anticipated to be reflected off the water's surface; therefore, underwater noise would be detectable in only a small area. The species may be exposed to noise and/or overpressure when they surface to breathe or engage in other behaviors such as feeding and resting within the area directly adjacent to the launch and landing mounts. The potential for WIMA to be at the surface at the same time a static fire test, launch, or landing occurred would be low. The species could startle due to the intense sound from launches, landings or static fire tests but adverse affects are not anticipated due to most sound reflecting off the water surface and not transmitting through the water and launch/landing/test noise duration would be brief (seconds to minutes). Vibration from launches and landings may cause the species to briefly leave the area, but it is anticipated they would return after these events and continue foraging and utilizing the area between events.

The above effects are expected to be insignificant and the Service concurs with the NASA determination of may affect, but not likely to adversely affect the West Indian manatee.

The following explains the determinations of not likely to jeopardize for the monarch butterfly and tricolored bat.

Monarch butterfly

The monarch butterfly was proposed as threatened in 2024 (89 FR 100662). The species migrates long distances to overwintering sites in Mexico and California, however non-migratory populations occur in Florida. The species requires milkweed for breeding and larval feeding. The species has been documented within KSC and there is minimal habitat within the heat plume (~0.2 miles from launch site). Operations could temporarily disturb foraging and sheltering within this area of the heat plume, but the species is anticipated to continue utilizing this area before and after operations. Effects from sound are anticipated to be insignificant to caterpillars as they respond to sound between approximately 50 and 900 Hz and will resume foraging and movement post-operations. Adult monarch butterflies lack auditory-sensing structures and effects from sound are anticipated to be insignificant to adults. Based on the above the Service concurs with the NASA determination of not likely to jeopardize the monarch butterfly.

Tri-colored bat

The tricolored bat (TCB) was proposed as endangered for listing in 2022 (87 FR 56381) but has not been finalized at this time. This species is a small bat species found through the central and eastern United States. The species roosts in forested habitats where they roost in trees, primarily among leaves of live or recently dead deciduous hardwood trees, but may also be found in Spanish moss, pine trees, and occasionally human structures. The species has been documented through acoustic surveys within CCSFS, KSC and MINWR. There is no confirmed roosting habitat found within the construction area, but roosting and foraging habitat is found within the Action Area.

The species will experience affects from the Action including sound and increased lighting. Operations could temporarily disturb foraging and sheltering but TCB are anticipated to continue utilizing the Action Area before, during and after operations. The species is not expected to be present in the heat plume (~0.2 miles from launch site) due to the low amount of foraging habitat within this area and is anticipated to move from the area during operations. Additional lighting from the Action during construction and operations is not expected to adversely affect the species due to its high mobility, large amount of foraging and roosting habitat and temporary nature of both construction and operations. There will be no effect to TCB from vessel operations or landings within the marine environment. Based on the above the Service concurs with the NASA determination of not likely to jeopardize the tricolored bat.

The following explains the determinations of no adverse modification or destruction of proposed critical habitat.

Red knot critical habitat (proposed)

Rufa red knot critical habitat was proposed in 2021 (86 FR 37410) but has not been finalized at this time. The proposed physical and biological features essential to the conservation to the REKN do not include features related to sound, vibration or light. No construction or operational activities would occur within the REKN proposed critical habitat. Approximately 13,388 acres of proposed critical habitat will be exposed to effects from sound during launch or landing operations. The southern end of unit FL-2 would experience effects from increased lighting, sound and potentially vibration. Based on the above the Service concurs with the NASA determination of no adverse modification or destruction of proposed rufa red knot critical habitat.

This concludes informal consultation and conference on the Action as proposed. Reinitiation of consultation is required and shall be requested by the Federal agency, where discretionary Federal involvement or control over the action has been retained or is authorized by law and:

(1) If the amount or extent of taking specified in the incidental take statement is exceeded;
(2) If new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered;
(3) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion or written concurrence; or
(4) If a new species is listed or critical habitat designated that may be affected by the identified action.

Sincerely,

JOSE RIVERA Digitally signed by JOSE RIVERA Date: 2025.06.06 13:46:19 -04'00'

Jose Rivera
(Acting) Manager, Division of Environmental Review
Florida Ecological Services

Electronic CC:
Carmen Thompson, CANA
Amy Hanson, FAA
Eva Long, FAA
Stacey Zee, FAA
James Brooks, NASA
Don Dankert, NASA
Brian Pownall, SpaceX
Kim Tice, SpaceX
Keith Ramos, USFWS
Angy Chambers, USSF
Michael Blaylock, USSF

B.1.5 Addendum to the May 2025 Biological and Conference Assessment

Addendum to the May 2025 Biological and Conference Assessment for SpaceX Starship-Super Heavy Launch and Landing Operations at Launch Complex 39A at Kennedy Space Center, Merritt Island, Florida, Addressing an Expanded Range of Starship Return to Launch Site Trajectories

June 12, 2025

Action

Background

On March 20, 2025, the National Aeronautics and Space Administration (NASA) submitted to the United States Fish and Wildlife Service (USFWS) the *Final Biological and Conference Assessment* [BCA] *for SpaceX Starship-Super Heavy Launch and Landing Operations at Launch Complex-39A at the Kennedy Space Center* [KSC]*, Merritt Island, Florida* (Fish and Wildlife Service [FWS] Log Number 2024-0058364) (NASA, 2025a). On May 1, 2025, NASA submitted the *Revised Final Biological and Conference Assessment for SpaceX Starship-Super Heavy Launch and Landing Operations at Launch Complex-39A at the Kennedy Space Center, Merritt Island, Florida* to the USFWS to address the addition of a Starship Atlantic Ocean contingency landing area and items in the Request for Additional Information received from the USFWS on April 11, 2025; this revised BCA is hereafter referred to as the Starship-Super Heavy LC-39A Revised BCA (NASA, 2025b). In this *Addendum to the May 2025 Biological and Conference Assessment for SpaceX Starship-Super Heavy Launch and Landing Operations at Launch Complex 39A at Kennedy Space Center, Merritt Island, Florida*, comparisons to previous analyses refer exclusively to the Starship-Super Heavy LC-39A Revised BCA, as it superseded the original BCA submitted on March 20, 2025. The Starship-Super Heavy LC-39A Revised BCA and this addendum support Endangered Species Act Section 7 interagency consultation between the USFWS and NASA.

The Starship-Super Heavy LC-39A Revised BCA evaluated the effects to Endangered Species Act-listed species and critical habitat (designated and proposed) under USFWS jurisdiction caused by operation of the Starship-Super Heavy at LC-39A at KSC. The Proposed Action included infrastructure construction, static fire tests, launches, landings, and daily operations at LC-39A; transport of supplies, personnel, and launch vehicles to LC-39A; expenditure of vehicles and components in the ocean; landings on droneships in the ocean; and transport of supplies and vehicles via barge. SpaceX must obtain a vehicle operator license from the Federal Aviation Administration (FAA) for Starship-Super Heavy launch and landing operations at LC-39A. The FAA action is the issuance of the vehicle operator license and subsequent renewals or modifications that are within the scope of this BCA and addendum.

Update to Action

In June 2025, NASA developed this addendum to the Starship-Super Heavy LC-39A Revised BCA to evaluate an expanded range of Starship return to launch site (RTLS) trajectories (Figure 1). This addendum also updates the Action Area map, clarifies the range of trajectories for launches and Super Heavy RTLS landings, and makes corrections to select portions of the Starship-Super Heavy LC-39A Revised BCA (NASA, 2025b).

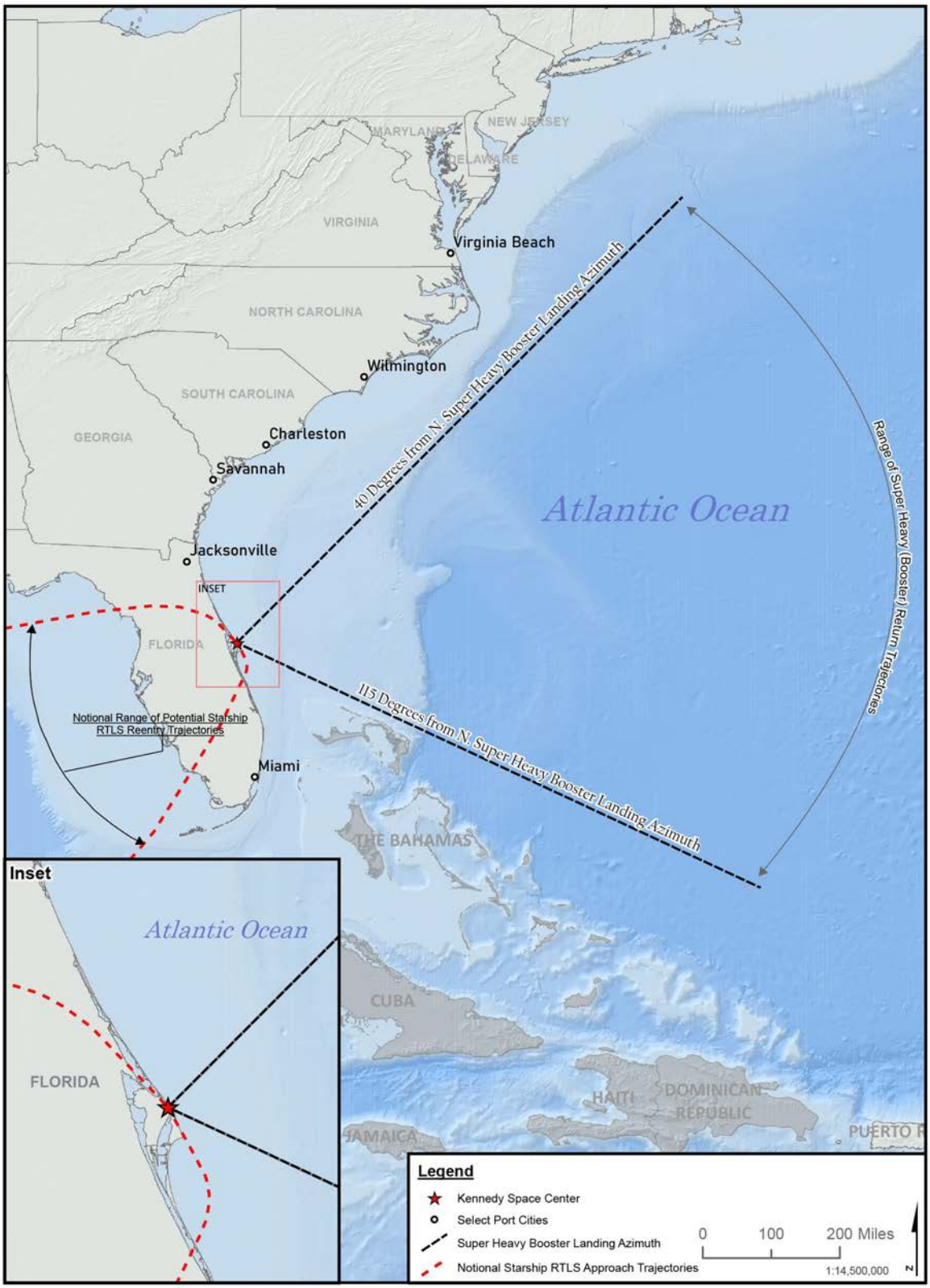

Figure 1. Range of RTLS Landing Trajectories for Starship and Super Heavy

Range of Starship RTLS Trajectories and Sonic Boom Footprints

Ground areas affected by sonic booms differ widely depending on the trajectory being followed, reflecting widely varying locations and headings of the supersonic portions of these trajectories. However, landing trajectory altitude, speed, and distance profiles are similar regardless of the horizontal flight path being followed, resulting in the size and shape of the sonic boom footprint also being similar for various inbound routings. In the Starship-Super Heavy LC-39A Revised BCA, the only proposed trajectory for Starship RTLS landings was the nominal heading. Figure 2 depicts the modeled sonic boom overpressure contours calculated for the Starship RTLS nominal trajectory. This addendum additionally examines effects associated with an expanded range of Starship RTLS landing trajectories (153 to 320 degrees).

For the purposes of analysis, the sonic boom footprints for launches on various trajectories are assumed to differ only in orientation relative to the landing pad. To reflect the entire Action Area for Starship RTLS landing overpressures exceeding 1 pound per square foot (psf), the modeled 1-psf contour for a Starship RTLS landing on the nominal heading was rotated clockwise and counterclockwise to 153- and 320-degree headings, respectively, using LC-39A as the pivot point. This is reflected in Figure 3. To evaluate potential sonic boom effects associated with the expanded range of Starship landing trajectories, a map of overpressure zones was created by rotating the 1-, 1.25-, 1.5-, and to 1.7-psf contours for Starship RTLS landings on the nominal heading clockwise and counterclockwise to 153- and 320-degree headings, respectively. This is reflected in Figure 2. These zones of overpressures from 1 psf to 1.7 psf would vary based upon the approach trajectory of the Starship.

Range of Super Heavy RTLS Trajectories and Sonic Boom Footprints

The Proposed Action in the Starship-Super Heavy LC-39A Revised BCA included Super Heavy RTLS trajectories from 40 to 115 degrees, with sonic boom modeling conducted for Super Heavy landings at nominal, 40-degree, and 115-degree trajectories. To reflect the entire Action Area for Super Heavy RTLS landing overpressures exceeding 1 psf, the 1-psf footprints for each of the three modeled headings (40 degrees, nominal, and 115 degrees) were connected as follows: the modeled 40-degree and 115-degree 1-psf footprints were rotated clockwise and counterclockwise, respectively, toward the nominal heading footprint, using LC-39A as the pivot point. This is reflected in Figure 3. The creation of overpressure zones was not necessary for Super Heavy landings since exact modeling results for the various psf levels at the outer extremes (40- and 115-degree headings) and the nominal heading were already available and used in calculations for Florida scrub-jays, southeastern beach mice, and sea turtles in Sections 5.3.5, 5.3.15, and 5.3.20, respectively, of the Starship-Super Heavy LC-39A Revised BCA (see Table 5-6, Table 5-10, and Table 5-13 in the Starship-Super Heavy LC-39A Revised BCA).

Range of Launch Trajectories and Sonic Boom Footprints

The Proposed Action in the Starship-Super Heavy LC-39A Revised BCA included launch trajectories from 40 to 115 degrees, but sonic boom modeling was only conducted for launches at the nominal trajectory. To reflect the entire Action Area for launch overpressures exceeding 1 psf, the modeled 1-psf footprint for launches on the nominal heading was rotated clockwise to the 115-degree heading and counterclockwise to the 40-degree heading, using LC-39A as the pivot point. This is reflected in Figure 3. None of the trajectories within the permitted range for launches (40 to 115 degrees) would result in sonic boom overpressures in excess of 1 psf on land, so the creation of launch overpressure zones was not necessary, and no new analyses were conducted for launches in this addendum.

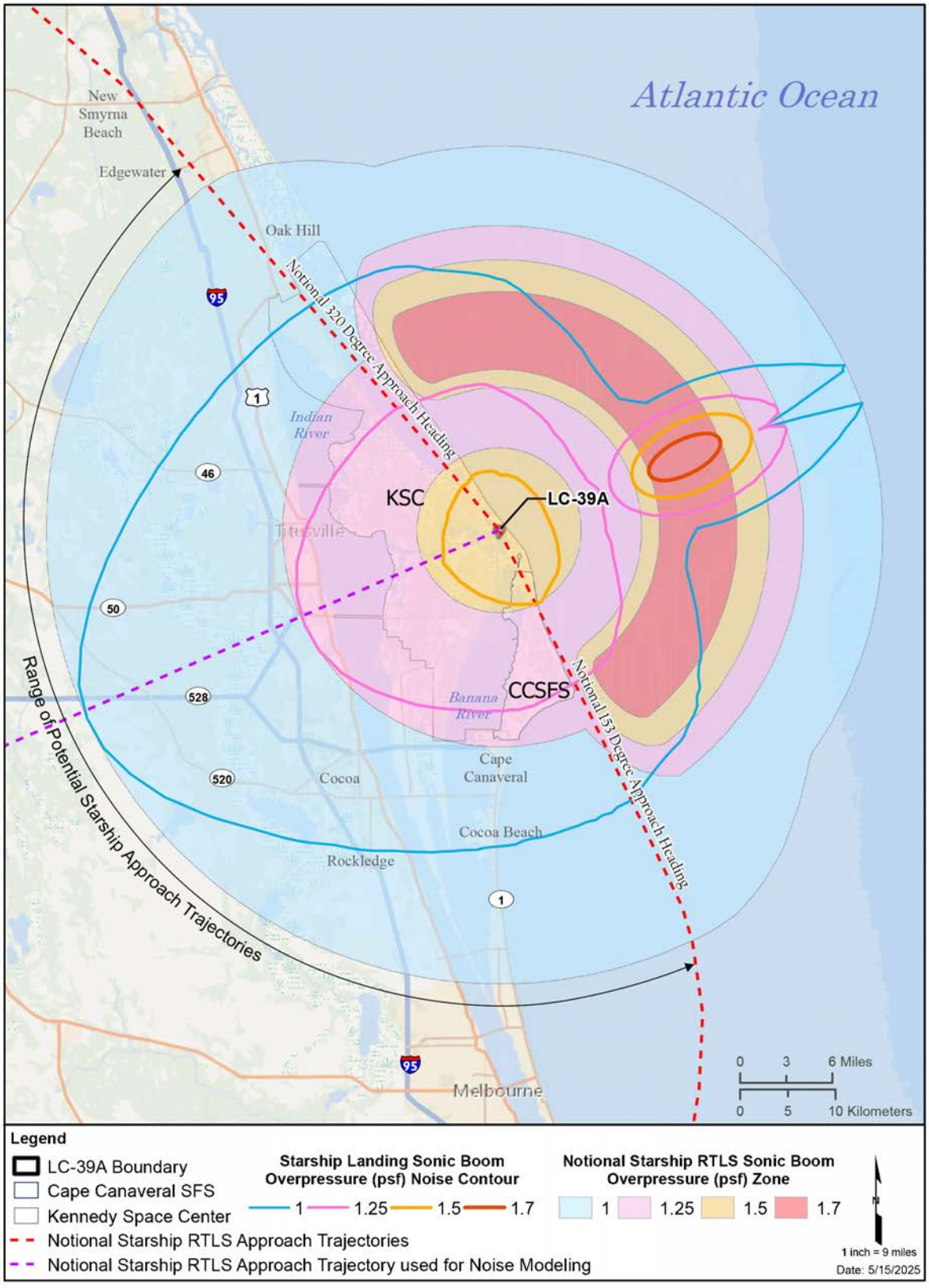

Figure 2. Notional Starship RTLS Approach Trajectories and Sonic Boom Overpressure Zones

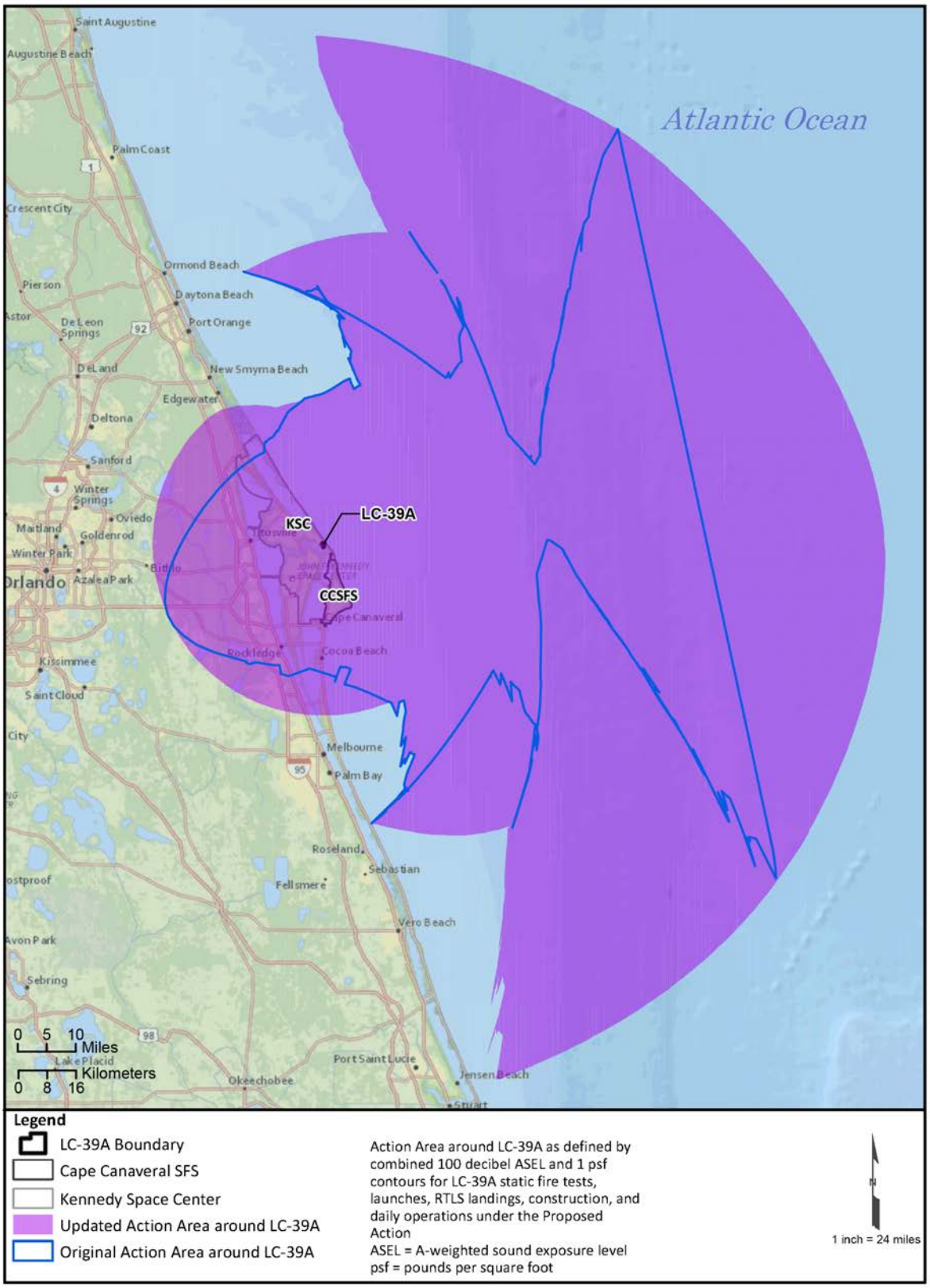

Figure 3. LC-39A and Surrounding Area: Original and Updated Combined 1 psf/100 dB ASEL Contour for the Proposed Action

Noise, Plume, and Light Extent

As discussed in the Starship-Super Heavy LC-39A Revised BCA, both launch and landing propulsion noise levels (e.g., A-weighted sound exposure level [ASEL]) would be highest when the vehicle is nearly vertical; this occurs during the initial portion of a launch when the vehicle is close to the ground and climbing or during the final portion of a landing when the vehicle is descending along a nearly vertical flight path. Propulsion noise levels are affected primarily by distance to the launch pad and whether the noise propagates over land or water.

The heading of a launch or landing has minimal effect on the propulsion ASEL noise levels. Thus, in the Starship-Super Heavy LC-39A Revised BCA, the ASEL noise contours for launches (Figure 5-3), Super Heavy RTLS landings (Figure 5-6), and Starship RTLS landings (Figure 5-7) on their respective nominal trajectories are considered representative of ASEL noise contours for the full range of permitted trajectories for launches, Super Heavy landings, and Starship landings, respectively. Therefore, propulsion ASEL noise is not discussed further in this addendum.

Additionally, variations in launch and Super Heavy and Starship RTLS landing trajectories would have a minimal effect on plume size and light extent due to the vertical nature of these events. The launch and landing plume areas in Figure 2-1 of the Starship-Super Heavy LC-39A Revised BCA are considered representative for all permitted launch and Super Heavy and Starship RTLS landing trajectories, respectively. Therefore, plume size and light extent are not discussed further in this addendum.

Summary

Table 1 summarizes and compares the range of trajectories and related consequences. Figure 3 shows the original Action Area for LC-39A and the surrounding area, as well as the updated Action Area reflecting the entirety of the area around LC-39A affected by the combined 1 psf/100 decibel (dB) ASEL (or sometimes denoted as "dBA SEL") contour associated with static fire tests, launches (40- to 115-degree trajectories), Super Heavy RTLS landings (40- to 115-degree trajectories), and Starship RTLS landings (153- to 320-degree trajectories).

Table 1. Summary and Comparison of Range of Trajectories and Related Consequences

Activity	Starship-Super Heavy LC-39A Revised BCA (May 1, 2025)	BCA Addendum (June 12, 2025)	Comparison of Consequences
Starship RTLS	Proposed Action includes only nominal trajectory.	Proposed Action includes expanded range of Starship RTLS trajectories (153 to 320 degrees).	Map of Area around LC-39A Affected by 1 psf/100 dB ASEL: Added 1-psf footprints associated with continuously variable Starship approaches ranging from 153 to 320 degrees Analysis: Additionally examined areas affected by new Starship approach trajectories
Super Heavy RTLS	Proposed Action includes trajectories ranging from 40 to 115 degrees.	No change.	Map of Area around LC-39A Affected by 1 psf/100 dB ASEL: Corrected map to show 1-psf footprints associated with continuously variable Super Heavy approaches ranging from 40 to 115 degrees

Table 1. Summary and Comparison of Range of Trajectories and Related Consequences

Activity	Starship-Super Heavy LC-39A Revised BCA (May 1, 2025)	BCA Addendum (June 12, 2025)	Comparison of Consequences
Launches	Proposed Action includes trajectories ranging from 40 to 115 degrees.	No change.	Map of Area around LC-39A Affected by 1 psf/100 dB ASEL: Corrected map to show 1-psf footprints associated with continuously variable launch trajectories ranging from 40 to 115 degrees

Notes: ASEL = A-weighted sound exposure level; BCA = Biological and Conference Assessment; dB = decibel(s); LC= Launch Complex; psf = pounds per square foot; RTLS = return to launch site.

Considered Species and Critical Habitat Areas

Official Species List and Effect Determinations Summary

The species and critical habitats previously considered in the Starship-Super Heavy LC-39A Revised BCA are listed in Table 2. For this addendum, NASA requested a new official species list on June 4, 2025, from the USFWS Information for Planning and Conservation (IPaC) database for the updated Action Area around LC-39A, which includes the areas affected by up to 1 psf and/or 100 dB ASEL from static fire tests, launches, and RTLS landings for Starships and Super Heavy boosters as shown in Figure 3. The official species list for the addendum identified the same species and critical habitats as the Starship-Super Heavy LC-39A Revised BCA, with the addition of the Kemp's ridley sea turtle (*Lepidochelys kempii*) (Attachment 1). Although not in the original IPaC list, the Kemp's ridley sea turtle was analyzed in the Starship-Super Heavy LC-39A Revised BCA. This addendum does not include any changes to Starship contingency ocean landings or to other landings in the Atlantic, Pacific, and Indian Oceans, so no other new IPaC reports were run. However, for completeness, all species considered in the Starship-Super Heavy LC-39A BCA are listed in Table 2. The analyses and rationale for the addendum effect determinations are provided in the following sections.

Table 2. Species and Critical Habitats: Effect Determinations

Species or Critical Habitat Area	Endangered Species Act Status	June 2025 Addendum: *Expanded Range of Starship RTLS Trajectories*	May 2025 Starship-Super Heavy LC-39A Revised BCA: *Construction and Original Mission Profile with Contingency Landings*	Updated Overall Effect Determination: *Construction and Updated Mission Profile (with Contingency Landings and Range of Starship RTLS Trajectories)*
Birds				
Audubon's crested caracara (*Caracara plancus audubonii*) [Florida DPS]	Threatened	Not Likely to Adversely Affect		
Band-rumped storm-petrel (*Hydrobates castro*) [Hawaii DPS]	Endangered	Not Present[1]	Not Likely to Adversely Affect	

Table 2. Species and Critical Habitats: Effect Determinations

Species or Critical Habitat Area	Endangered Species Act Status	June 2025 Addendum: *Expanded Range of Starship RTLS Trajectories*	May 2025 Starship-Super Heavy LC-39A Revised BCA: *Construction and Original Mission Profile with Contingency Landings*	Updated Overall Effect Determination: *Construction and Updated Mission Profile (with Contingency Landings and Range of Starship RTLS Trajectories)*
Bermuda petrel (*Pterodroma cahow*)	Endangered	Not Present[1]	Not Likely to Adversely Affect	
Black-capped petrel (*Pterodroma hasitata*)	Endangered	Not Likely to Adversely Affect		
Eastern black rail (*Laterallus jamaicensis jamaicensis*)	Threatened	Not Likely to Adversely Affect		
Everglade snail kite (*Rostrhamus sociabilis plumbeus*)	Endangered	Not Likely to Adversely Affect		
Florida grasshopper sparrow (*Ammodramus savannarum floridanus*)	Endangered	Not Present[1]	Not Likely to Adversely Affect	
Florida scrub-jay (*Aphelocoma coerulescens*)	Threatened	*Insignificant effects* - Not Likely to Adversely Affect	Likely to Adversely Affect	
Hawaiian petrel (*Pterodroma sandwhichensis*)	Endangered	Not Present[1]	Not Likely to Adversely Affect	
Newell's shearwater (*Puffinus newelli*)	Threatened	Not Present[1]	Not Likely to Adversely Affect	
Piping plover (*Charadrius melodus*)	Threatened	Not Likely to Adversely Affect		
Red-cockaded woodpecker (*Dryobates borealis)*	Threatened	Not Likely to Adversely Affect		
Roseate tern (*Sterna dougallii dougallii*)	Endangered	Not Present[1]	Not Likely to Adversely Affect	
Rufa red knot (*Calidris canutus rufa*)	Threatened	Not Likely to Adversely Affect		
Short-tailed albatross (*Phoebastria albatross*)	Endangered	Not Present[1]	Not Likely to Adversely Affect	
Whooping crane (*Grus americana*)	Threatened (NEP)	No Effect		
Wood stork (*Mycteria americana*)	Threatened (delisting proposed)	Not Likely to Adversely Affect		
Crustaceans				
Black Creek crayfish (*Procambarus pictus*)	Proposed Endangered	Not Present[1]	Not Likely to Adversely Affect	
Insects				
Monarch butterfly (*Danaus plexippus*)	Proposed Threatened	Not Likely to Jeopardize		

Table 2. Species and Critical Habitats: Effect Determinations

Species or Critical Habitat Area	Endangered Species Act Status	June 2025 Addendum: *Expanded Range of Starship RTLS Trajectories*	May 2025 Starship-Super Heavy LC-39A Revised BCA: *Construction and Original Mission Profile with Contingency Landings*	Updated Overall Effect Determination: *Construction and Updated Mission Profile (with Contingency Landings and Range of Starship RTLS Trajectories)*
Mammals				
Anastasia Island beach mouse (*Peromyscus polionotus phasma*)	Endangered	Not Present[1]	Not Likely to Adversely Affect	
Florida bonneted bat (*Eumops floridanus*)	Endangered	Not Present[1]	Not Likely to Adversely Affect	
Florida panther (*Puma [= Felis] concolor coryi*)	Endangered	No Effect		
Puma (*Puma [= Felis] concolor,* all subspecies except *coryi*)	Threatened (S/A)	No Effect		
Southeastern beach mouse (*Peromyscus polionotus niveiventris*)	Threatened	*Insignificant effects* - Not Likely to Adversely Affect	Likely to Adversely Affect	
Tricolored bat (*Perimyotis sublavus*)	Proposed Endangered	Not Likely to Jeopardize		
West Indian manatee (*Trichechus manatus*)	Threatened	Not Likely to Adversely Affect		
Reptiles				
American alligator (*Alligator mississippiensis*)	Threatened (S/A)	No Effect		
American crocodile (*Crocodylus acutus*)	Threatened	No Effect		
Atlantic salt marsh snake (*Nerodia clarkia taeniata*)	Threatened	Not Likely to Adversely Affect		
Eastern indigo snake (*Drymarchon couperi*)	Threatened	*Insignificant effects* - Not Likely to Adversely Affect	Likely to Adversely Affect	
Green sea turtle (*Chelonia mydas*) [North Atlantic Ocean DPS]	Threatened	*Insignificant effects* - Not Likely to Adversely Affect	Likely to Adversely Affect	
Hawksbill sea turtle (*Eretmochelys imbricata*)	Endangered	*Insignificant effects* - Not Likely to Adversely Affect	Likely to Adversely Affect	
Kemp's ridley sea turtle (*Lepidochelys kempii*)	Endangered	*Insignificant effects* - Not Likely to Adversely Affect	Likely to Adversely Affect	
Leatherback sea turtle (*Dermochelys coriacea*)	Endangered	*Insignificant effects* - Not Likely to Adversely Affect	Likely to Adversely Affect	

Table 2. Species and Critical Habitats: Effect Determinations

Species or Critical Habitat Area	Endangered Species Act Status	June 2025 Addendum: *Expanded Range of Starship RTLS Trajectories*	May 2025 Starship-Super Heavy LC-39A Revised BCA: *Construction and Original Mission Profile with Contingency Landings*	Updated Overall Effect Determination: *Construction and Updated Mission Profile (with Contingency Landings and Range of Starship RTLS Trajectories)*
Loggerhead sea turtle (*Caretta caretta*) [Northwest Atlantic Ocean DPS]	Threatened	*Insignificant effects* - Not Likely to Adversely Affect	Likely to Adversely Affect	
Critical Habitat				
Piping plover	Final	Not Present[1]	Not Likely to Adversely Affect	
Rufa red knot	Proposed	No Effect		
Florida bonneted bat	Final	Not Present[1]	Not Likely to Adversely Affect	
West Indian manatee	Final and Proposed	No Effect		
Green sea turtle	Proposed	No Destruction or Adverse Modification		
Loggerhead sea turtle	Final	Not Likely to Adversely Affect	Likely to Adversely Affect	
Plants				
Plants (Starship-Super Heavy LC-39A Revised BCA provides full list of IPaC plants)	Threatened, Endangered	No Effect		

Notes: ASEL = A-weighted sound exposure level; BCA = Biological and Conference Assessment; dB = decibels; DPS = Distinct Population Segment; LC = Launch Complex; IPaC = Information for Planning and Consultation; NEP = non-essential experimental population; psf = pounds per square foot; RTLS = return to launch site; S/A = Similarity of Appearance; USFWS = United States Fish and Wildlife Service.

[1.] Species labeled as Not Present were not identified in the official species list obtained from the USFWS IPaC system on June 4, 2025, for the updated 1 psf/100 dB ASEL contour, which includes the expanded range of trajectories.

No Effect Determinations

The following species and critical habitats were not present on the updated IPaC list run for this addendum and are not expected to occur within the updated Action Area for the 1 psf/100 dB ASEL contour: band-rumped storm-petrel, Bermuda petrel, Hawaiian petrel, Newell's shearwater, roseate tern, short-tailed albatross, Black Creek crayfish, Florida grasshopper sparrow, Anastasia Island beach mouse, Florida bonneted bat, Florida bonneted bat critical habitat, and piping plover critical habitat (see Table 2 and Attachment 1). Therefore, the expanded range of trajectories would have no effect on them, and their overall effect determinations remain the same as those listed in the Starship-Super Heavy LC-39A Revised BCA.

Although identified in the updated IPaC list as potentially occurring within the updated Action Area for the 1 psf/100 dB ASEL contour, there have been no changes in listing status for the following species and the updated range of trajectories would have no effect on them: whooping crane, puma, Florida panther, American alligator, American crocodile, rufa red knot proposed critical habitat, and West Indian manatee

critical habitat (proposed and designated) (see Table 2 and Attachment 1). Thus, the overall determinations for these animal species and critical habitats remain the same as those listed in the Starship-Super Heavy LC-39A Revised BCA (i.e., **No Effect**). The effect determination for all listed plants identified in the IPaC reports also remains as **No Effect**.

Species Assessments

Commonalities Across Species

Environmental Baseline

Since the completion of the Starship-Super Heavy LC-39A Revised BCA on May 1, 2025, there has been no change in the listing status of any of the species considered in the BCA, and there have been no new USFWS assessments, reviews, recovery plans, Federal Register publications, or published updates in the literature regarding the distribution, habitat needs, or biology of any of these species.

Effects of the Action

The types and spatial extents of relevant effects are based on the analyses in the Starship-Super Heavy LC-39A Revised BCA; they have been updated where appropriate with new information. Potential effects from plumes, light, and noise were adequately addressed by analyses conducted in the Starship-Super Heavy LC-39A Revised BCA, as summarized previously in the Update to Action section. The Species Assessments section focuses on potential effects on federally listed species and proposed and designated critical habitat from sonic boom overpressures associated with the expanded range of Starship landing trajectories.

Overpressures associated with the expanded range of Starship RTLS trajectories would affect additional portions of the Atlantic Ocean; KSC; Merritt Island National Wildlife Refuge (MINWR); Canaveral National Seashore (CANA); Cape Canaveral Space Force Station (CCSFS); and Brevard, Volusia, Seminole, Orange, and Osceola Counties compared to the areas affected by the Starship nominal approach that was modeled and analyzed in the Starship-Super Heavy LC-39A Revised BCA (Figure 2). However, the highest overpressures of 1.7 psf are expected to be limited to the Atlantic Ocean (Figure 2). While there would be an increase in the area affected by sonic booms from Starship RTLS landings, there would be fewer exposures in any one area due to the range of trajectories. At a predicted maximum of 1.7 psf, the sonic booms generated by Starship landings would be much less intense than booms generated by Super Heavy booster landings (up to over 20 psf).

Cumulative Effects

No projects were identified that meet the criteria of being both reasonably foreseeable and exclusively a State or private activity that did not require any type of Federal permit. Therefore, according to the definition of cumulative effects in 50 Code of Federal Regulations §402.02, there would be no cumulative effects to the Florida scrub-jay, southeastern beach mouse, eastern indigo snake, or any sea turtle species within the Action Area beyond those analyzed in the Starship-Super Heavy LC-39A Revised BCA and this addendum.

Audubon's Crested Caracara, Black-Capped Petrel, Eastern Black Rail, Everglade Snail Kite, Red-Cockaded Woodpecker, and Wood Stork

The expanded range of Starship RTLS trajectories would expose additional areas to sonic booms of up to 1.7 psf where these bird species may occur. As discussed in the Starship-Super Heavy LC-39A Revised BCA, such events may cause temporary disturbance and stress due to interrupted foraging, roosting, or breeding. Breeding activity has not been documented in the Action Area for the caracara, black rail, Everglade snail kite, or red-cockaded woodpecker, and no wood stork colonies are present within the Action Area. It is unknown how various overpressure levels may affect the hearing ability of these bird species, but NASA expects that any individuals in the vicinity would exhibit a startle response (e.g., take flight), returning to normal behavior shortly thereafter. The effort required for a disturbed bird to fly to another area to forage or rest would be minimal, and any effects associated with dispersal are expected to be insignificant.

Although individuals present at the time of a landing could be disturbed by the sonic boom depending on their proximity, any temporary alterations in feeding and sheltering would not significantly disrupt normal behavioral patterns. Overall effects to the crested caracara, black-capped petrel, eastern black rail, Everglade snail kite, red-cockaded woodpecker, and wood stork from the Proposed Action would be considered insignificant. Thus, NASA has made the determination of **may affect, not likely to adversely affect,** for the Proposed Action and the overall Proposed Action (as described in the Starship-Super Heavy LC-39A Revised BCA) with respect to the crested caracara, black-capped petrel, eastern black rail, Everglade snail kite, red-cockaded woodpecker, and wood stork.

Florida Scrub-Jay

The overpressures associated with the expanded range of Starship RTLS trajectories would affect small additional portions of Brevard, Volusia, Seminole, Orange, and Osceola Counties where Florida scrub-jays may occur. The Florida scrub-jay has been documented nesting, foraging, and roosting within the Action Area, with core habitat located 1.3 miles from the landing pad at LC-39A. As discussed in the Starship-Super Heavy LC-39A Revised BCA, sonic booms may startle birds, potentially resulting in interruption of foraging, breeding, nesting, or roosting, or could cause a Florida scrub-jay to flush from the nest, leaving eggs or young vulnerable to predation or dehydration. In some cases, adults may damage eggs during their startle response. Individuals that flush from a protected or concealed area may be more vulnerable to predation. However, Florida scrub-jays in these areas likely already experience low-level overpressures from other landings at KSC and CCSFS. With the use of varied trajectories, there would be fewer exposures in any one area, and overpressures greater than 1.7 psf would not be expected to reach land. Effects from Starship landing sonic booms are expected to be insignificant.

Table 5-6 in the Starship-Super Heavy LC-39A Revised BCA presented the acres of core Florida scrub-jay habitat at KSC, MINWR, CANA, and CCSFS exposed to sonic boom overpressures associated with Starship RTLS landings at the nominal heading; this was the only trajectory modeled for Starship RTLS

landings. With the expansion of the range of Starship RTLS landings, additional analyses were conducted for the acres of core habitat within the predicted overpressure contours for Starship RTLS landings at the outermost trajectories of 153 degrees and 320 degrees. Table 3 now includes the acres of core Florida scrub-jay habitat exposed to Starship landing overpressures for each of the three approach trajectories. Using the Starship landing at 320 degrees as the representative trajectory, up to 29,609 acres of core Florida scrub-jay habitat at KSC, MINWR, CANA, and CCSFS may be exposed to overpressures of 1 to 1.7 psf.

Table 3. Updated Florida Scrub-Jay Core Habitat at KSC, MINWR, CANA, and CCSFS Exposed to Greater than 1 psf Overpressure from the Proposed Action at LC-39A

Events at LC-39A	Acres affected[1]					
	1-2 psf	2-4 psf	4-6 psf	6-10 psf	10-20 psf	>20 psf
Starship-Super Heavy launch	Sonic boom over the Atlantic Ocean does not affect land.					
Starship static fire test	No sonic boom occurs.					
Super Heavy static fire test						
Super Heavy landing: 40 degrees	21	2,420	7,304	8,303	4,519	167
Super Heavy landing: nominal	0	1,220	7,562	10,342	2,761	94
Super Heavy landing: 115 degrees	0	24	6,437	9,927	5,461	131
Starship landing: 153 degrees	27,387	0	0	0	0	0
Starship landing: nominal	23,954	0	0	0	0	0
Starship landing: 320 degrees	29,609	0	0	0	0	0

Notes: > = greater than; BCA = Biological and Conference Assessment; CANA = Canaveral National Seashore; CCSFS = Cape Canaveral Space Force Station; KSC = Kennedy Space Center; LC = Launch Complex; MINWR = Merritt Island National Wildlife Refuge; psf = pounds per square foot.

[1.] Data for Florida scrub-jay core habitat outside of KSC, MINWR, CANA, and CCSFS were not available at the time of BCA development.

Figure 4 shows the notional Starship RTLS sonic boom overpressure zone in relation to core Florida scrub-jay habitat at KSC, MINWR, CANA, and CCSFS. Individuals present at the time of landings could be disturbed by sonic booms depending on their proximity, with potential for alterations in breeding, feeding, and sheltering. Such disturbance from low overpressure sonic booms is not reasonably certain to cause a substantial reduction in the fitness of individual Florida scrub-jays on a daily or annual basis, and effects are considered insignificant. Thus, NASA has made the determination of **may affect, not likely to adversely affect**, for the Florida scrub-jay for Starship RTLS landing sonic booms. For the overall Proposed Action, NASA maintains the determination of **may affect, likely to adversely affect**, for the Florida scrub-jay, as described in the Starship-Super Heavy LC-39A Revised BCA.

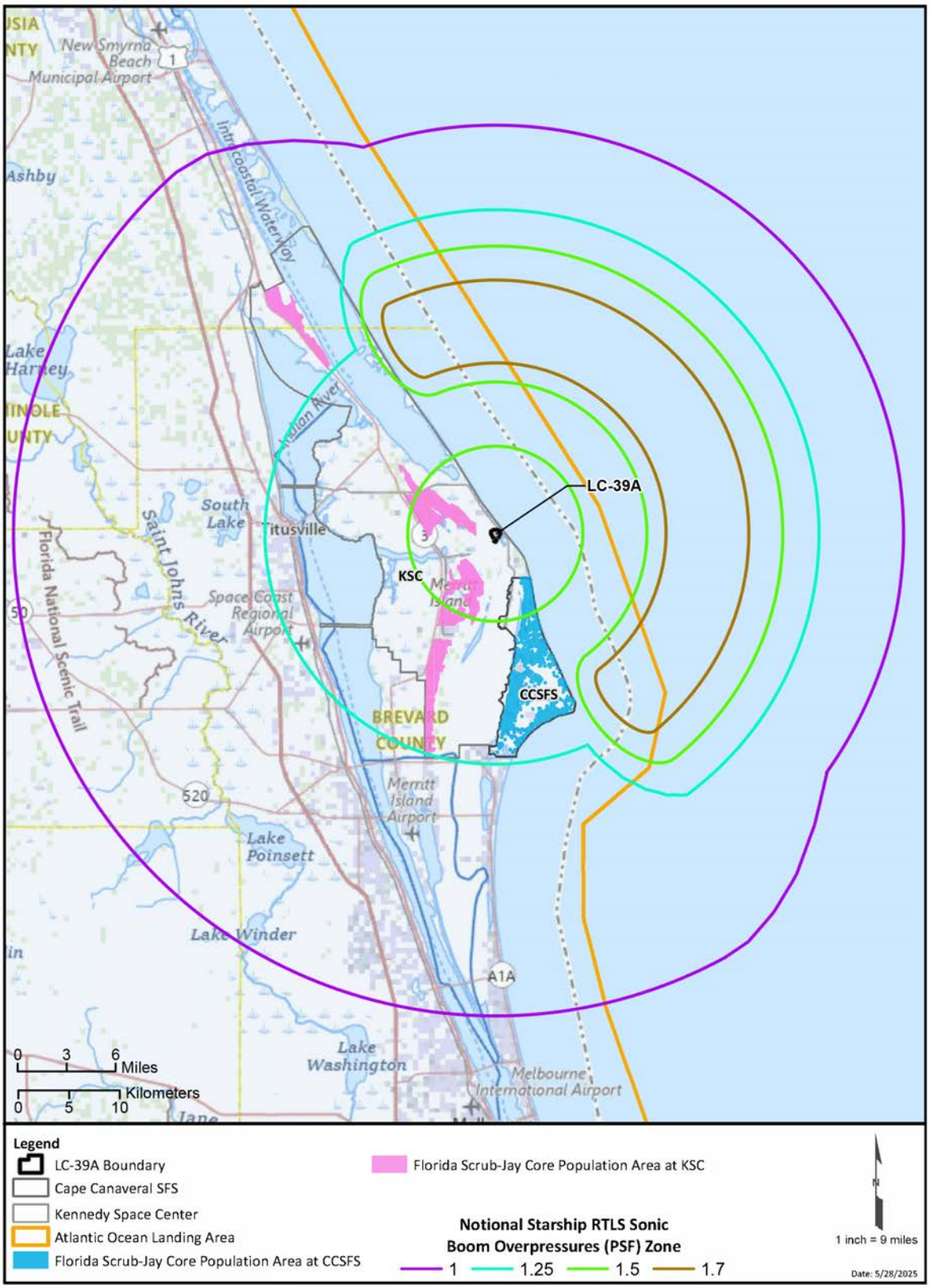

Figure 4. Florida Scrub-Jay Core Habitat in Relation to Notional Starship RTLS Sonic Boom Overpressure Zones

Piping Plover and Rufa Red Knot

The expanded range of Starship RTLS approaches would expose additional areas to sonic booms of up to 1.7 psf where piping plovers and red knots are known to overwinter; these species do not breed within the Action Area. As discussed in the previous section for crested caracaras and other bird species, such events may cause temporary disturbance and stress due to interrupted foraging and roosting. It is unknown how various overpressure levels may affect their hearing ability, but NASA expects that any individuals in the vicinity would exhibit a startle response, returning to normal behavior shortly thereafter. The effort required for a disturbed bird to fly to another area to forage or rest would be minimal, and any effects associated with dispersal are expected to be insignificant.

Overwintering red knots and the occasional piping plover have been documented in the Action Area. Although individuals present at the time of a landing could be disturbed by the sonic boom depending on their proximity, any temporary alterations in feeding and sheltering would not significantly disrupt normal behavioral patterns. Overall effects to the red knot and piping plover from the Proposed Action would be considered insignificant. Thus, NASA has made the determination of **may affect, not likely to adversely affect**, for Starship RTLS landing sonic booms and for the overall Proposed Action (as described in the Starship-Super Heavy LC-39A Revised BCA) with respect to the piping plover and rufa red knot.

Monarch Butterfly

The monarch butterfly is present within the Action Area and may be exposed to sonic booms from landings. The potential effects to butterflies from sonic booms are unknown, but activity in their proximity may cause them to move to other areas for feeding, breeding, or sheltering. Such movements would not significantly disrupt normal monarch behavioral patterns. Overall effects to monarch butterflies from the Proposed Action would be considered insignificant. NASA has made the determination of **not likely to jeopardize** for Starship landings and the overall Proposed Action (as described in the Starship-Super Heavy LC-39A Revised BCA) with respect to the proposed monarch butterfly.

Southeastern Beach Mouse

The southeastern beach mouse has been documented within the Action Area, and the overpressures associated with the expanded range of Starship RTLS trajectories (less than 1.7 psf) would affect small additional portions of Brevard and Volusia Counties with potential beach mouse habitat. As discussed in the Starship-Super Heavy LC-39A Revised BCA, sonic booms associated with landings may disturb southeastern beach mice, and in some cases may make them more vulnerable to predation. Although retreat to their burrows may reduce exposure to sonic booms, such retreat may reduce breeding success, foraging efficiency, and rest and feeding time, particularly when the disturbances are at night, since the southeastern beach mouse is nocturnal. However, southeastern beach mice in these areas likely already experience low-level overpressures from other landings at KSC and CCSFS. With the use of varied Starship landing trajectories, there would be fewer exposures in any one area, and overpressures greater than 1.7 psf from Starship landings would not be expected to reach land. Effects from Starship landing sonic booms are expected to be insignificant.

Table 5-10 in the Starship-Super Heavy LC-39A Revised BCA presented the acres of potential southeastern beach mouse habitat at KSC, MINWR, CANA, and CCSFS exposed to sonic boom overpressures associated

with Starship RTLS landings at the nominal heading; this was the only trajectory modeled for Starship RTLS landings. With the expansion of the range of Starship RTLS landings, additional analyses were conducted for the acres of potential habitat within the overpressure contours for Starship RTLS landings at the outermost trajectories of 153 degrees and 320 degrees. Table 4 now includes the acres of potential southeastern beach mouse habitat exposed to Starship landing overpressures for each of the three approach trajectories. Figure 5 shows the notional Starship RTLS sonic boom overpressure zone in relation to southeastern beach mouse potential habitat at KSC, MINWR, CANA, and CCSFS.

Table 4. Updated Southeastern Beach Mouse Potential Habitat at KSC, MINWR, CANA, and CCSFS Exposed to Greater than 1 psf Overpressure from the Proposed Action at LC-39A

Events at LC-39A	Acres affected[1]					
	1-2 psf	2-4 psf	4-6 psf	6-10 psf	10-20 psf	>20 psf
Starship-Super Heavy launch	Sonic boom over the Atlantic Ocean does not affect land					
Starship static fire test	No sonic boom occurs.					
Super Heavy static fire test						
Super Heavy landing: 40 degrees	5	1,728	8,098	4,868	870	100
Super Heavy landing: nominal	6	236	9,036	5,423	733	82
Super Heavy landing: 115 degrees	76	325	6,843	6,948	1,244	137
Starship landing: 153 degrees	15,827	0	0	0	0	0
Starship landing: nominal	15,655	0	0	0	0	0
Starship landing: 320 degrees	14,851	0	0	0	0	0

Notes: > = greater than; BCA = Biological and Conference Assessment; CANA = Canaveral National Seashore; CCSFS = Cape Canaveral Space Force Station; KSC = Kennedy Space Center; LC = Launch Complex; MINWR = Merritt Island National Wildlife Refuge; psf = pounds per square foot.

[1.] Data for potential southeastern beach mouse habitat outside of KSC, MINWR, CANA, and CCSFS were not available at the time of BCA development.

Table 5-11 in the Starship-Super Heavy LC-39A Revised BCA presented estimated numbers of southeastern beach mice at KSC, MINWR, CANA, and CCSFS potentially exposed to greater than 1 psf and/or 100 dB ASEL from the Proposed Action, using density estimates of 1.2 to 3.6 mice per acre in inland and beach habitats, respectively. For the estimated 15,655 acres affected by a Starship RTLS landing at a nominal heading, it was estimated in the Starship-Super Heavy LC-39A Revised BCA that 18,786 to 56,358 beach mice would potentially be exposed to between 1 psf and 1.7 psf per event. Per Table 4, a Starship RTLS at the 153-degree trajectory may expose an additional 172 acres of potential beach mouse habitat; thus, this trajectory should be used as the representative trajectory for Starship RTLS landings. Resulting calculations produce a new estimate of 18,992 to 56,977 beach mice potentially exposed to between 1 psf and 1.7 psf per Starship RTLS landing.

Individuals present at the time of landings could be disturbed by sonic booms depending on their proximity, with potential for alterations in breeding, feeding, and sheltering. However, such disturbance from low overpressure sonic booms is not reasonably certain to cause a substantial reduction in the fitness of individual southeastern beach mice on a daily or annual basis, and effects are considered insignificant. Thus, NASA has made the determination of **may affect, not likely to adversely affect**, for Starship landing sonic booms. For the overall Proposed Action, NASA maintains the determination of **may affect, likely to adversely affect**, with respect to the southeastern beach mouse, as described in the Starship-Super Heavy LC-39A Revised BCA.

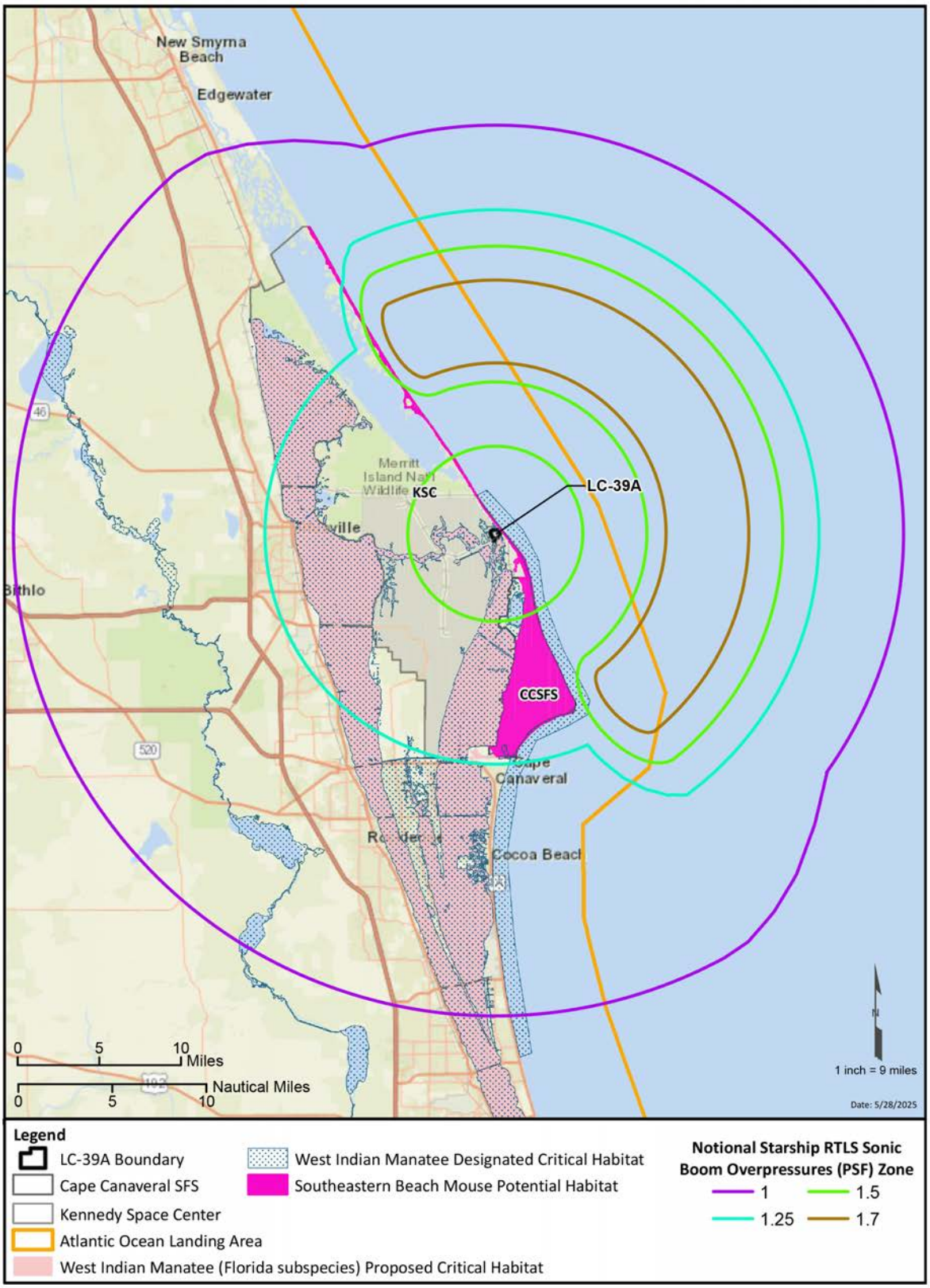

Figure 5. Southeastern Beach Mouse Potential Habitat in Relation to Notional Starship RTLS Sonic Boom Overpressure Zones

Tricolored Bat

The tricolored bat is present within the Action Area. It is unknown how various overpressure levels may affect the echolocation ability of bats. Individuals present at the time of landings could be disturbed by sonic booms depending on their proximity, with temporary interruptions in feeding, breeding, and sheltering. However, the effort required for a disturbed bat to fly to another area to forage or rest would be minimal, and any effects associated with such dispersal are expected to be insignificant. Thus, NASA has made the determination of **not likely to jeopardize** for Starship landings and the overall Proposed Action (as described in the Starship-Super Heavy LC-39A Revised BCA) with respect to the proposed endangered tricolored bat.

West Indian Manatee

As discussed in the Starship-Super Heavy LC-39A Revised BCA, sonic boom harassment risk for submerged marine mammals is associated with an overpressure level substantially greater than levels that would be produced during Starship landings, so potential overpressure effects would be limited to animals at and very near the water surface. Manatees are known to occur within the Action Area, but the potential for an individual animal to be at the surface while a landing occurs would be low. Although individuals present at the time of landings could be disturbed by sonic booms depending on their proximity, any temporary alterations in feeding, breeding, and sheltering would be minor and insignificant. Thus, NASA has made the determination of **may affect, not likely to adversely affect**, for Starship landings and the overall Proposed Action (as described in the Starship-Super Heavy LC-39A Revised BCA) with respect to the West Indian manatee.

Atlantic Salt Marsh Snake

The Atlantic salt marsh snake may occur within a small portion of the area affected by up to 1.25 psf from Starship landing trajectories from the north. Any exposed individuals may temporarily alter feeding, breeding, or sheltering, but at this low psf level, sonic boom effects would be minor and insignificant. Thus, NASA has made the determination of **may affect, not likely to adversely affect**, for Starship landings and the overall Proposed Action (as described in the Starship-Super Heavy LC-39A Revised BCA) with respect to the Atlantic salt marsh snake.

Eastern Indigo Snake

Indigo snake sightings in Brevard and Volusia Counties are rare, but indigo snakes are likely to occur within the area affected by the expanded range of Starship RTLS trajectories. Section 5.3.19 of the Starship-Super Heavy LC-39A Revised BCA estimated that up to 846 indigo snakes at KSC, MINWR, CANA, and CCSFS could potentially be exposed to sonic booms associated with Starship and Super Heavy RTLS landings. This estimate assumed that all potential indigo snake habitat at KSC, MINWR, CANA, and CCSFS was maximally occupied and that the average home ranges cited by (Bauder et al.) in a 2016 Herpetologica journal apply to the Action Area. However, as so few indigo snakes have been documented at these Federal properties, it is unlikely that such high numbers are actually present. Since the sonic booms associated with launches do not reach land, they do not affect indigo snakes and are not discussed.

Most of the areas exposed to sonic booms associated with the expanded range of Starship RTLS trajectories are within KSC, MINWR, CANA, and CCSFS, but overpressures of up to 1.25 psf would affect additional portions of Brevard and Volusia Counties (Figure 2). Potential indigo snake acreages were not available for these new areas, so calculations of the additional number of indigo snakes potentially affected could not be made. However, with a proposed maximum of 44 Starship RTLS landings annually, the expanded range of trajectories would reduce the exposure of any one area to repeated sonic booms. Although indigo snakes exposed to such sonic booms may experience an elevated stress response, exposures would be infrequent and psf levels are not expected to exceed 1.25 psf.

Individuals present at the time of Starship landings could be disturbed by sonic booms depending on their proximity, but any temporary alterations in feeding, breeding, or sheltering would not significantly disrupt normal indigo snake behavioral patterns. Such disturbance from occasional, low overpressure sonic booms is not reasonably certain to cause a substantial reduction in the fitness of individual eastern indigo snakes on a daily or annual basis; effects are considered insignificant. Thus, NASA has made the determination of **may affect, not likely to adversely affect**, for Starship landings. For the overall Proposed Action, NASA maintains the determination of **may affect, likely to adversely affect**, with respect to the eastern indigo snake, as described in the Starship-Super Heavy LC-39A Revised BCA.

Sea Turtles and Critical Habitat

Sea turtle nesting has been recorded in the Action Area, including within the areas affected by sonic booms from the expanded range of Starship RTLS landings. Nighttime landings from May to October are the primary concern for effects on sea turtles within the Action Area. Under the updated Proposed Action expanding the range of Starship RTLS trajectories, the number of Starship night landings would remain the same (i.e., up to 22 annually). A portion of these would occur during sea turtle nesting season. It is unknown whether nighttime sonic booms of less than 1.7 psf would deter females from nesting (i.e., false crawls) or interrupt nesting. However, per Section 4.3.23 of the Starship-Super Heavy LC-39A Revised BCA, analysis of sea turtle crawl observations recorded immediately adjacent to LC 39 A (kilometer 30) from both before and after Falcon 9 program occupancy showed no discernable effects to sea turtle nesting from operations at Pad A. Thus, effects to sea turtles from low-level overpressures associated with Starship landings are considered insignificant.

Table 5-13 in the Starship-Super Heavy LC-39A Revised BCA presented the miles of sea turtle nesting beaches and nesting critical habitat at KSC, MINWR, CANA, and CCSFS exposed to sonic boom overpressures associated with Starship RTLS landings at the nominal heading; this was the only trajectory modeled for Starship RTLS landings. With the expansion of the range of Starship RTLS landings, additional analyses were conducted for the miles of sea turtle nesting beaches and nesting critical habitat within the overpressure contours for Starship RTLS landings at the outmost trajectories of 153 degrees and 320 degrees (Table 5). Figure 6 shows the notional Starship RTLS sonic boom overpressure zone in relation to sea turtle nesting beaches and nesting critical habitat.

Table 5. Updated Sea Turtle Nesting Beaches and Nesting Critical Habitat Exposed to Greater than 1 psf Overpressure from the Proposed Action at LC-39A

Events at LC-39A	Total miles of nesting beaches affected (miles of critical habitat affected)[1]					
	1-2 psf	2-4 psf	4-6 psf	6-10 psf	10-20 psf	>20 psf
Starship-Super Heavy launch	Sonic boom over the Atlantic Ocean does not affect land.					
Starship static fire test	No sonic boom					
Super Heavy static fire test						
Super Heavy landing: 40 degrees	0.2 (0.1)	8.8 (6.4)	10.3 (4.6)	8.2 (3.4)	6.7 (5)	3.2 (3.2)
Super Heavy landing: nominal	0.9 (0.1)	7.5 (5)	13.4 (3.4)	8.2 (3.1)	5.6 (4.5)	2.6 (2.6)
Super Heavy landing: 115 degrees	2.3 (2.2)	12.8 (4.2)	9.7 (3.4)	7.8 (3.4)	6.3 (3.9)	3.5 (3.5)
Starship landing: 153 degrees	49.8 (26.1)	0	0	0	0	0
Starship landing: nominal	42.5 (22.3)	0	0	0	0	0
Starship landing: 320 degrees	42.9 (30.1)	0	0	0	0	0

Notes: > = greater than; LC = Launch Complex; psf = pounds per square foot.

[1.] Loggerhead sea turtle nesting critical habitat (final) and green sea turtle nesting critical habitat (proposed) cover the same area.

With the expanded range of Starship RTLS landings, additional sea turtle nesting beach and critical habitat for nesting in Brevard and Volusia Counties would be exposed to overpressures of up to 1.7 psf (Figure 6). Using Starship landings on the 153-degree heading as the representative trajectory for sea turtle nesting beaches (which includes critical habitat), 49.8 miles of nesting beaches would be affected (Table 5).

Sea turtles may be present on the beach at the time of a Starship landing. While there is the possibility that an individual could be disturbed by the sonic boom depending on its proximity, sea turtle crawl observations recorded immediately adjacent to LC-39A from both before and after Falcon 9 program occupancy show no discernable effects to sea turtle nesting. Additionally, Starship booms would be infrequent and are expected to result in overpressures of less than 1.7 psf; effects to sea turtles from low-level overpressures associated with Starship landings are considered insignificant. Thus, for Starship RTLS landings, NASA has made the determination of **may affect, not likely to adversely affect**, for loggerhead, green, leatherback, hawksbill, and Kemp's ridley sea turtles; **may affect, not likely to adversely affect**, with respect to loggerhead critical habitat for nesting; and **no destruction or adverse modification** for green sea turtle proposed critical habitat. NASA maintains the determination for the overall Proposed Action of **may affect, likely to adversely affect**, with respect to loggerhead, green, leatherback, hawksbill, and Kemp's ridley sea turtles, as described in the Starship-Super Heavy LC-39A Revised BCA. NASA also maintains the determinations for the overall Proposed Action of **may affect, likely to adversely affect**, with respect to loggerhead critical habitat for nesting, and **no destruction or adverse modification** for green sea turtle proposed critical habitat (see Starship-Super Heavy LC-39A Revised BCA).

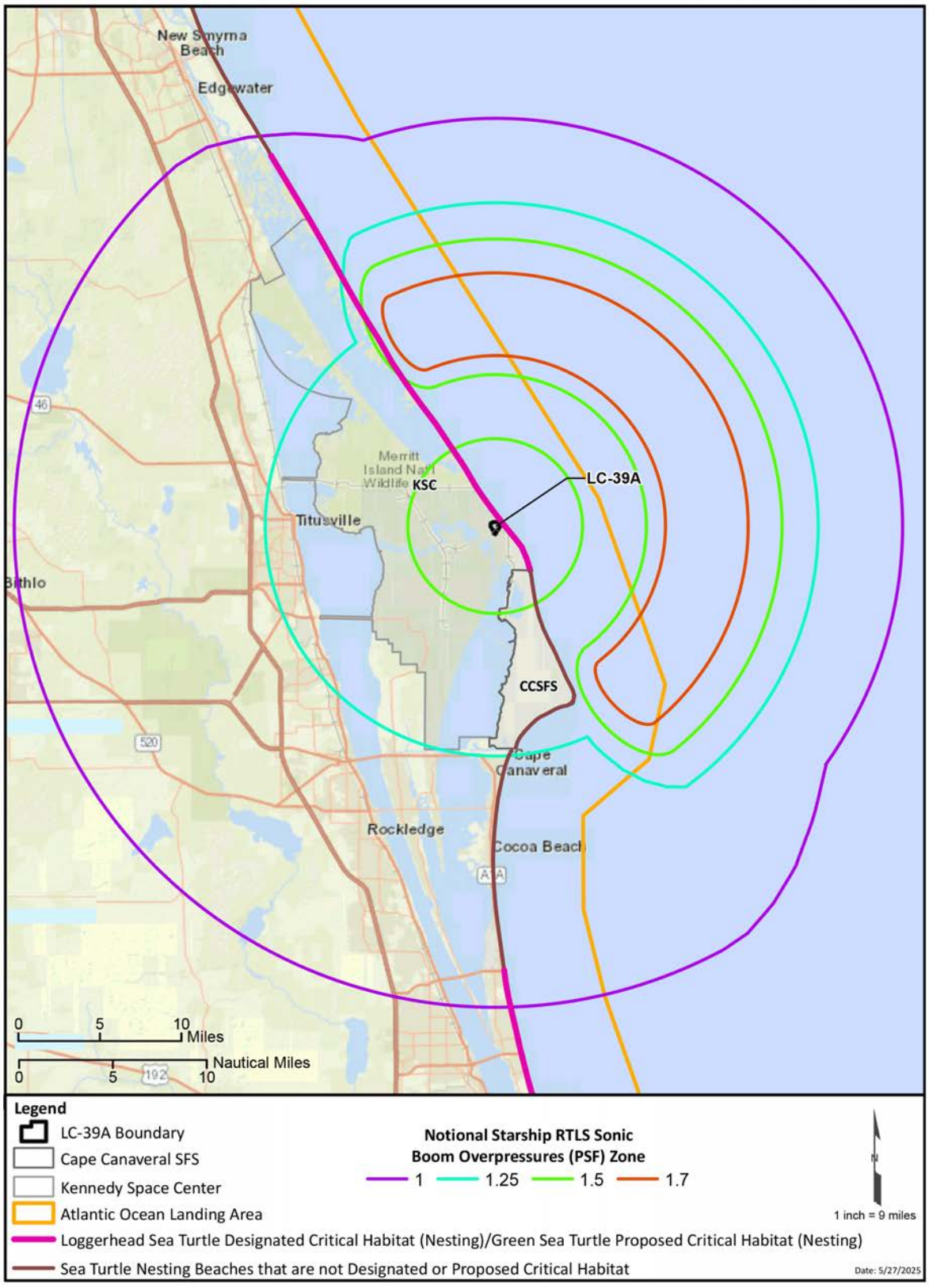

Figure 6. Sea Turtle Nesting Beaches and Nesting Critical Habitat in Relation to Notional Starship RTLS Sonic Boom Overpressure Zones

Corrections to Starship-Super Heavy LC-39A Revised BCA

Please note the following corrections to the Starship-Super Heavy LC-39A Revised BCA provided to the USFWS on May 1, 2025.

1. The Lead agency on the BCA cover page should be NASA not the FAA.
2. Figure 5-36, Sea Turtle Nesting Habitat in Relation to Launch (Nominal Heading) Sonic Boom Overpressure Contours, should have been deleted, as launch sonic booms are offshore and not expected to affect sea turtle nesting habitat. Additionally, this figure incorrectly shows the Starship landing sonic boom. Figure 5-40 is the correct figure to reference for the Starship nominal trajectory landing sonic boom.

References

Bauder et al. (2016). Bauder, J. M., D. R. Breininger, M. R. Bolt, M. L. Legare, C. L. Jenkins, B.B. Rothermel, & K. McGarigal. Seasonal variation in eastern indigo snake (Drymarchon couperi) movement patterns and space use in peninsular Florida at multiple temporal scales. *Herpetologica, 72*(3), 214-226.

NASA. (2025a). *Final Biological and Conference Assessment for SpaceX Starship-Super Heavy Launch and Landing Operations at Launch Complex-39A at the Kennedy Space Center, Merritt Island, Florida (FWS Log Number 2024-0058364).*

NASA. (2025b). *Revised Final Biological and Conference Assessment for SpaceX Starship-Super Heavy Launch and Landing Operations at Launch Complex-39A at the Kennedy Space Center, Merritt Island, Florida (FWS Log Number 2024-0058364).*

Attachment 1

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Florida Ecological Services Field Office
777 37th St
Suite D-101
Vero Beach, FL 32960-3559
Phone: (352) 448-9151 Fax: (772) 562-4288
Email Address: fw4flesregs@fws.gov
https://www.fws.gov/office/florida-ecological-services

In Reply Refer To: 06/04/2025 18:58:45 UTC
Project Code: 2025-0105538
Project Name: Updated KSC LC39A Starship Super Heavy 1 psf/100 dB ASEL

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.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. 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 include your Project Code, listed at the top of this letter, in all subsequent correspondence regarding this project.** 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.

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:

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

PROJECT SUMMARY

Project Code: 2025-0105538
Project Name: Updated KSC LC39A Starship Super Heavy 1 psf/100 dB ASEL
Project Type: Airport - New Construction
Project Description: Update to SpaceX Starship-Super Heavy Launch and Landing Operations at Launch Complex-39A (LC-39A) at the Kennedy Space Center (KSC), Merritt Island, Florida BCA (FWS Log Number 2024-0058364). Includes expanded range of Starship RTLS landing trajectories and associated sonic boom footprints. Also updates select maps.

Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@28.57767765,-80.04812966405463,14z

Counties: Florida

ENDANGERED SPECIES ACT SPECIES

There is a total of 33 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.

MAMMALS

NAME	STATUS
Florida Panther *Puma (=Felis) concolor coryi* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1763 General project design guidelines: https://ipac.ecosphere.fws.gov/project/SIAD7VT27BEVBFVXPTQRJWILME/documents/generated/7123.pdf	Endangered
Puma (=mountain Lion) *Puma (=Felis) concolor (all subsp. except coryi)* Population: FL No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6049	Similarity of Appearance (Threatened)
Southeastern Beach Mouse *Peromyscus polionotus niveiventris* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/3951	Threatened
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 overlaps 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/SIAD7VT27BEVBFVXPTQRJWILME/documents/generated/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
Crested Caracara (audubon's) [fl Dps] *Caracara plancus audubonii* Population: FL DPS No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/8250	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
Everglade Snail Kite *Rostrhamus sociabilis plumbeus* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/7713	Endangered

NAME	STATUS
Florida Scrub-jay *Aphelocoma coerulescens* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6174	Threatened
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 does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6039	Threatened
Red-cockaded Woodpecker *Dryobates borealis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/7614	Threatened
Rufa Red Knot *Calidris canutus rufa* There is **proposed** critical habitat for this species. Your location overlaps the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/1864	Threatened
Whooping Crane *Grus americana* Population: U.S.A. (AL, AR, CO, FL, GA, ID, IL, IN, IA, KY, LA, MI, MN, MS, MO, NC, NM, OH, SC, TN, UT, VA, WI, WV, western half of WY) No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/758	Experimental Population, Non-Essential
Wood Stork *Mycteria americana* Population: AL, FL, GA, MS, NC, SC No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/8477 General project design guidelines: https://ipac.ecosphere.fws.gov/project/SIAD7VT27BEVBFVXPTQRJWILME/documents/generated/6954.pdf	Threatened

REPTILES

NAME	STATUS
American Alligator *Alligator mississippiensis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/776	Similarity of Appearance (Threatened)
American Crocodile *Crocodylus acutus* Population: U.S.A. (FL) There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6604	Threatened
Atlantic Salt Marsh Snake *Nerodia clarkii taeniata* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/7729	Threatened
Eastern Indigo Snake *Drymarchon couperi* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/646	Threatened

NAME	STATUS
Green Sea Turtle *Chelonia mydas* Population: North Atlantic DPS There is **proposed** critical habitat for this species. Your location overlaps 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 overlaps the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/1110	Threatened

INSECTS

NAME	STATUS
Monarch Butterfly *Danaus plexippus* There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/9743	Proposed Threatened

FLOWERING PLANTS

NAME	STATUS
Beautiful Pawpaw *Deeringothamnus pulchellus* Population: No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4069	Endangered
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
Papery Whitlow-wort *Paronychia chartacea* Population: No critical habitat has been designated for this species.	Threatened

NAME	STATUS
Species profile: https://ecos.fws.gov/ecp/species/1465	
Pigeon Wings *Clitoria fragrans* Population: No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/991	Threatened
Pygmy Fringe-tree *Chionanthus pygmaeus* Population: No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1084	Endangered
Rugel's Pawpaw *Deeringothamnus rugelii* Population: No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/5355	Endangered
Sandlace *Polygonella myriophylla* Population: No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/5745	Endangered

CRITICAL HABITATS

There are 3 critical habitats wholly or partially within your project area under this office's jurisdiction.

NAME	STATUS
Green Sea Turtle *Chelonia mydas* https://ecos.fws.gov/ecp/species/6199#crithab	Proposed
Loggerhead Sea Turtle *Caretta caretta* https://ecos.fws.gov/ecp/species/1110#crithab	Final
Rufa Red Knot *Calidris canutus rufa* https://ecos.fws.gov/ecp/species/1864#crithab	Proposed

You should contact the local field office to determine whether critical habitat for the following species should be considered:

NAME	STATUS
West Indian Manatee *Trichechus manatus* https://ecos.fws.gov/ecp/species/4469#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
MERRITT ISLAND NATIONAL WILDLIFE REFUGE https://www.fws.gov/our-facilities?$keywords="%5C%22MERRITT+ISLAND+NATIONAL+WILDLIFE+REFUGE%5C%22"	130,215.858
ST. JOHNS NATIONAL WILDLIFE REFUGE https://www.fws.gov/our-facilities?$keywords="%5C%22ST.+JOHNS+NATIONAL+WILDLIFE+REFUGE%5C%22"	6,431.258

BALD & GOLDEN EAGLES

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

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)

BALD & GOLDEN EAGLES INFORMATION WAS NOT AVAILABLE WHEN THIS SPECIES LIST WAS GENERATED. PLEASE CONTACT THE FIELD OFFICE FOR FURTHER INFORMATION.

MIGRATORY BIRDS

The Migratory Bird Treaty Act (MBTA) [1] prohibits the take (including killing, capturing, selling, trading, and transport) of protected migratory bird species without prior authorization by the Department of Interior U.S. Fish and Wildlife Service (Service). The incidental take of migratory birds is the injury or death of birds that results from, but is not the purpose, of an activity. The Service interprets the MBTA to prohibit incidental take.

1. The Migratory Birds Treaty Act of 1918.

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

MIGRATORY BIRD INFORMATION WAS NOT AVAILABLE WHEN THIS SPECIES LIST WAS GENERATED. PLEASE CONTACT THE FIELD OFFICE FOR FURTHER INFORMATION.

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.

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
FL-07P	Canaveral	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.

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: Stephanie Hiers
Address: 203 Habersham Road
City: Thomasville
State: GA
Zip: 31792
Email hierss@leidos.com
Phone: 8508308335

LEAD AGENCY CONTACT INFORMATION

Lead Agency: National Aeronautics and Space Administration

THIS PAGE INTENTIONALLY LEFT BLANK.

From: Myers, Brendan T
To: Hall, Patrice (KSC-SIE30)
Cc: Putnam, Christopher; Rivera, Jose J; Katy Groom (Katy.Groom@spacex.com); brian.pownall; Brooks, James T. (KSC-SIE30); Long, Eva (FAA); Baker, Nicholas M (FAA); Hanson, Amy (FAA); Akstulewicz, Kevin D. [US-US]; Hiers, Stephanie D. [US-US]; Combs, Rick R. [US-US]; Dankert, Donald J. (KSC-SIE30); Ward, Carmen J. [US-US]
Subject: EXTERNAL: Re: [EXTERNAL] FWS Log No. 2024-0058364 Request to Initiate Formal Consultation Under Endangered Species Act, Section 7 for Starship-Super Heavy Launch and Landing Operations at Launch Complex-39A at the Kennedy Space Center (KSC)
Date: Monday, May 12, 2025 3:44:11 PM
Attachments: image001.png
image002.png

Good afternoon Patrice,

The USFWS has reviewed the provided revised BCA and does not have any additional questions or need for additional information. We have deemed a complete consultation package retroactive to May 5, 2025 when the revised consultation package was opened and review by the USFWS began. Below are timelines based on that date and we believe these dates are consistent with the ones provided to us on March 26, 2025. If the below dates are incorrect or additional discussion is needed, please do not hesitate to reach out.

Consultation package received: May 1, 2025
Consultation package review began and date used for a complete consultation package: May 5, 2025
90-day draft delivery: August 3, 2025
135-day final delivery: September 17, 2025

Thanks!

From: Hall, Patrice (KSC-SIE30)
Sent: Thursday, May 01, 2025 13:10
To: Myers, Brendan T
Subject: FW: [EXTERNAL] FWS Log No. 2024-0058364 Request to Initiate Formal Consultation Under Endangered Species Act, Section 7 for Starship-Super Heavy Launch and Landing Operations at Launch Complex-39A at the Kennedy Space Center (KSC)

The tracked changes version of the BCA is also provided in Box.
https://nasa-ext.box.com/s/abfuuymvol6igkozkql9n3zyrxdoz4yu

From: Hall, Patrice (KSC-SIE30)
Sent: Thursday, May 1, 2025 12:34 PM
To: Myers, Brendan T <brendan_myers@fws.gov>
Subject: RE: [EXTERNAL] FWS Log No. 2024-0058364 Request to Initiate Formal Consultation Under Endangered Species Act, Section 7 for Starship-Super Heavy Launch and Landing Operations at Launch Complex-39A at the Kennedy Space Center (KSC)

Thanks for letting us know. Sorry about the sick kid, hope he or she feels better soon and no one else catches it.

From: Myers, Brendan T <brendan_myers@fws.gov>
Sent: Thursday, May 1, 2025 12:31 PM
To: Hall, Patrice (KSC-SIE30) <laura.p.hall@nasa.gov>; FLESRegs, FW4 <FW4FLESRegs@fws.gov>
Cc: Long, Eva (FAA) <Eva.Long@faa.gov>; Baker, Nicholas M (FAA) <Nicholas.M.Baker@faa.gov>; Gillikin, Michael N <michael_gillikin@fws.gov>; Hiers, Stephanie D. [US-US] <STEPHANIE.D.HIERS@leidos.com>; Hanson, Amy (FAA) <Amy.Hanson@faa.gov>; Akstulewicz, Kevin D. [US-US] <kevin.d.akstulewicz@leidos.com>; Brooks, James T. (KSC-SIE30) <james.t.brooks-1@nasa.gov>; Dankert, Donald J. (KSC-SIE30) <donald.j.dankert@nasa.gov>; Brian Pownall <Brian.Pownall@spacex.com>; WARD, CARMEN J. (KSC-NEMCON)[Herndon Solutions Group] <carmen.j.ward@leidos.com>; Combs, Rick R. [US-US] <RONALD.R.COMBS@leidos.com>
Subject: Re: [EXTERNAL] FWS Log No. 2024-0058364 Request to Initiate Formal Consultation Under Endangered Species Act, Section 7 for Starship-Super Heavy Launch and Landing Operations at Launch Complex-39A at the Kennedy Space Center (KSC)

Good afternoon Patrice,

We have received the Revised SS-SH LC 39A BCA. I'm currently without my computer (sick kid; computer at work) and will download the document in the next few days.

Thanks!

Brendan Myers
U.S. Fish and Wildlife Service
Florida Ecological Services Office
Saint Petersburg, FL
Cell: 850-348-6560
Office: 904-402-2456
FLES Main Office: 352-448-9151

From: Hall, Patrice (KSC-SIE30) <laura.p.hall@nasa.gov>
Sent: Thursday, May 1, 2025 12:15:55 PM
To: FLESRegs, FW4 <FW4FLESRegs@fws.gov>; Myers, Brendan T <brendan_myers@fws.gov>
Cc: Long, Eva (FAA) <Eva.Long@faa.gov>; Baker, Nicholas M (FAA) <Nicholas.M.Baker@faa.gov>; Gillikin, Michael N <michael_gillikin@fws.gov>; Hiers, Stephanie D. [US-US] <STEPHANIE.D.HIERS@leidos.com>; Hanson, Amy (FAA) <Amy.Hanson@faa.gov>; Akstulewicz, Kevin D. [US-US] <kevin.d.akstulewicz@leidos.com>; Brooks, James T. (KSC-SIE30) <james.t.brooks-1@nasa.gov>; Dankert, Donald J. (KSC-SIE30) <donald.j.dankert@nasa.gov>; Brian Pownall <Brian.Pownall@spacex.com>; WARD, CARMEN J. (KSC-NEMCON)[Herndon Solutions Group]

<carmen.j.ward@leidos.com>; Combs, Rick R. [US-US] <RONALD.R.COMBS@leidos.com>
Subject: [EXTERNAL] FWS Log No. 2024-0058364 Request to Initiate Formal Consultation Under Endangered Species Act, Section 7 for Starship-Super Heavy Launch and Landing Operations at Launch Complex-39A at the Kennedy Space Center (KSC)

This email has been received from outside of DOI - Use caution before clicking on links, opening attachments, or responding.

Brendan,

The Revised Final BCA for Starship-Heavy Launch and Landing Operations at LC-39A is too large to send via email and is available in Box at :
https://nasa-ext.box.com/s/xql9whcllb18h4fhn27jfjqk65ov2wpm

The response to the BCA RFAI received on April 11 is attached to this email.

Please contact me with any questions or concerns.

Best Regards,
Patrice

Patrice Hall
Environmental Protection Specialist
Environmental Management Branch
Spaceport Integration and Services
Mail Code: SI-E3
Kennedy Space Center, FL 32899
Phone: 321.867.8430
Email: laura.p.hall@nasa.gov

From: Myers, Brendan T <brendan_myers@fws.gov>
Sent: Friday, April 11, 2025 10:15 AM
To: Hall, Patrice (KSC-SIE30) <laura.p.hall@nasa.gov>
Cc: Long, Eva (FAA) <Eva.Long@faa.gov>; Baker, Nicholas M (FAA) <Nicholas.M.Baker@faa.gov>; Gillikin, Michael N <michael_gillikin@fws.gov>; Hiers, Stephanie D. [US-US] <STEPHANIE.D.HIERS@leidos.com>; Hanson, Amy (FAA) <Amy.Hanson@faa.gov>; Akstulewicz, Kevin D. [US-US] <kevin.d.akstulewicz@leidos.com>; Brooks, James T. (KSC-SIE30) <james.t.brooks-1@nasa.gov>
Subject: Re: [EXTERNAL] Request to Initiate Formal Consultation Under Endangered Species Act, Section 7 for Starship-Super Heavy Launch and Landing Operations at Launch Complex-39A at the Kennedy Space Center (KSC)

Good morning Patrice,

Attached is an RAI for the Starship-Super Heavy Launch and Landing Operations at Launch Complex-39A at the Kennedy Space Center (KSC). We split the RAI into two sections. The first are critical items that need to be addressed and the second are items that are not critical to deeming a complete consultation package, but would assist in our analysis or make the process more efficient. We anticipate continuing conversations and clarification of some items within the BCA after a complete consultation package is received and the BO/CR is drafted.

The FWS Log No. for this project is 2024-0058364.

Please let me know if you have any questions or need to discuss further.

Thanks!

From: Hall, Patrice (KSC-SIE30) <laura.p.hall@nasa.gov>
Sent: Thursday, March 20, 2025 09:59
To: FLESRegs, FW4 <FW4FLESRegs@fws.gov>; Myers, Brendan T <brendan_myers@fws.gov>
Cc: Brooks, James T. (KSC-SIE30) <james.t.brooks-1@nasa.gov>; Baker, Nicholas M (FAA) <Nicholas.M.Baker@faa.gov>; Long, Eva (FAA) <Eva.Long@faa.gov>; Hanson, Amy (FAA) <Amy.Hanson@faa.gov>; KEVIN.D.AKSTULEWICZ@leidos.com <kevin.d.akstulewicz@leidos.com>; Hiers, Stephanie D. [US-US] <STEPHANIE.D.HIERS@leidos.com>
Subject: [EXTERNAL] Request to Initiate Formal Consultation Under Endangered Species Act, Section 7 for Starship-Super Heavy Launch and Landing Operations at Launch Complex-39A at the Kennedy Space Center (KSC)

Brendan,
The National Aeronautics and Space Administration (NASA) is evaluating the SpaceX proposal for Starship-Super Heavy Launch and Landing Operations at Launch Complex-39A at KSC. NASA and the Federal Aviation Administration (FAA) are evaluating the potential environmental effects of this action in an Environmental Impact Statement prepared pursuant to the National Environmental Policy Act.

In accordance with information required in 50 Code of Federal Regulations §402.14(c)(1), NASA is providing the Biological and Conference Assessment (BCA) which addresses potential effects on threatened and endangered species in the action area. NASA hereby requests initiation of formal consultation, pursuant to Section 7 of the Endangered Species Act (ESA). Effect determinations for the listed species and critical habitat in the action area are summarized in Table 6-1 of the BCA document.

The IPaC reports for the LC-39A Starship Super Heavy Operation BCA are in Appendix A of

the document. Due to IPaC file size limits it was necessary to split up the Atlantic Ocean landings area into North, South, and Contingency, and split up the Pacific Ocean landings area into East, West, North, and South. We did not include IPaC reports for the Indian Ocean and portions of the Pacific Ocean that did not contain any federally listed species under USFWS jurisdiction. Below are project codes for the eight resulting project areas.

Project Code: 2025-0070940
Project Name: KSC LC39A Starship Super Heavy 1 psf/100 dB ASEL

Project Code: 2025-0071217
Project Name: KSC LC39A Starship Super Heavy (Atlantic Landings-North)

Project Code: 2025-0071227
Project Name: KSC LC39A Starship Super Heavy (Atlantic Landings-South)

Project Code: 2025-0071207
Project Name: KSC LC39A Starship Super Heavy (Contingency Landing 1psf)

Project Code: 2025-0071320
Project Name: KSC LC39A Starship Super Heavy (Pacific Landings-West)

Project Code: 2025-0071325
Project Name: KSC LC39A Starship Super Heavy (Pacific Landings-North)

Project Code: 2025-0071330
Project Name: KSC LC39A Starship Super Heavy (Pacific Landings-East)

Project Code: 2025-0071339
Project Name: KSC LC39A Starship Super Heavy (Pacific Landings-South)

The BCA document is too large to transmit by email and is available in Box at:
https://nasa-ext.box.com/s/5bbgftgelcblnbov3siacoqewznmhz1k

Please contact me to discuss any questions or concerns.
Best Regards,
Patrice

Patrice Hall
Environmental Protection Specialist
Environmental Management Branch
Spaceport Integration and Services
Mail Code: SI-E3
Kennedy Space Center, FL 32899
Phone: 321.867.8430
Email: laura.p.hall@nasa.gov