

ENVIRONMENTAL IMPACT STATEMENT

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

at the Kennedy Space Center, Merritt Island, Florida

Final, Volume II, Appendix B.6, Part 2

January 2026



**Federal Aviation
Administration**

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Appendix B *Regulatory Consultations*

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

B.6 Endangered Species Act Section 7 Consultation (NMFS)

A Biological Assessment (BA) was submitted to NMFS on May 24, 2024.

On January 17, 2025, NMFS provided a Conference and Biological Opinion (CBO) on the effects of Starship-Super Heavy operations on endangered and threatened species under NMFS' jurisdiction, as well as critical habitat for those species, in the North Atlantic Ocean, Gulf of America, North Pacific Ocean, South Pacific Ocean, and Indian Ocean. The Federal Aviation Administration provided addendums to NMFS describing proposed modifications to Starship-Super Heavy operations at Launch Complex (LC)-39A, among other locations, on March 10, 2025, March 28, 2025, and April 1, 2025. The addendum submitted on April 1, 2025, supersedes the previous addendums and is included in the EIS appendix. On April 18, 2025, based on the addendum requests, NMFS provided a revised CBO on the effects of Starship-Super Heavy operations in the North Atlantic Ocean, Gulf of Mexico (non-U.S. waters), Gulf of America, North Pacific Ocean, South Pacific Ocean, and Indian Ocean. On September 16, 2025, based on the addition of Cape Canaveral Space Force Station as a launch site and new information on vehicle specifications and debris fields, NMFS provided a reinitiation of the CBO on the effects of Starship-Super Heavy operations in the North Atlantic Ocean, Gulf of Mexico (non-U.S. waters), Gulf of America, North Pacific Ocean, South Pacific Ocean, and Indian Ocean. This reinitiated CBO replaced the previous CBOs submitted on January 17, 2025, and April 18, 2025; thus, only the revised CBO is included in the EIS appendix.

B.6.2 Addendum 4 to January 2025 Conference and Biological Opinion



U.S. Department
of Transportation
**Federal Aviation
Administration**

Office of Commercial Space Transportation

800 Independence Ave., SW,
Washington, DC 20591

Addendum

April 1, 2025

Ms. Emily Chou
Office of Protected Resources
National Oceanic and Atmospheric Administration
Silver Spring, MD 20910

RE: Addendum to the Endangered Species Act Section 7 Conference and Biological Opinion on SpaceX Starship-Super Heavy Increased Launch Cadence and Operations in the North Atlantic Ocean, Gulf of America, North Pacific Ocean, South Pacific Ocean, and Indian Ocean Authorized by the Federal Aviation Administration

Dear Ms. Chou,

Since January 2025, SpaceX notified the Federal Aviation Administration (FAA) of modifications to the proposed action for Starship and Super Heavy operations at Boca Chica, Kennedy Space Center (KSC) Launch Complex 39-A (LC-39A) and Cape Canaveral Space Force Station Space (CCSFS) Launch Complex-37 (SLC-37):

- Revised the Gulf of America Landing Area in the proposed action area to include Starship landings (including potential overpressure events) in the Gulf of Mexico.
- Expanding the Gulf Action Area to 1 nautical mile or more from shore for a distance of 100 miles north and 100 miles south of Boca Chica. Figure 1 has been revised to reflect the change to the Gulf of America action area.
- Expanded the Atlantic Ocean Action Area from 5 nautical miles or more to 1 nautical mile or more from shore. This expansion of the action area applies to a distance of 50 miles north and 50 miles south from KSC LC-39A and CCSFS SLC-37 for Starship and Super Heavy landings. Figure 2 has been revised to reflect the change to the Atlantic Ocean Action Area and Figure 3 is the current Atlantic Action Area provided for reference.
- Requested date change for both Starship and Super Heavy expenditures from March 2025–October 2025 to March 2025 to October 2030 in all the action areas. The total number of Starship and Super Heavy expenditures across the launch program in each action area would not change.
- All of the action areas (North Atlantic Ocean, Gulf of America, North Pacific Ocean, South Pacific Ocean, and Indian Ocean) would have no more than 25 Starship and 25 Super Heavy in-flight breakups (no explosive event), from March 2025 to October 2030.

- All of the action areas would have no more than 20 Starship and 20 Super Heavy explosions (hard or soft water landing), from March 2025 to October 2030.
- All of the action areas would have no more than 25 soft water landing for Starship and Super Heavy where the vehicles tip over and sink (no explosion), from March 2025 to October 2030.

In the event of a Starship landing in the Gulf of America or Atlantic Ocean, SpaceX recovery personnel may deploy large buoys and chain to capture Starship or floating debris and tow it back to a port. Once near port, if needed, the recovery personnel will intentionally scuttle debris to prevent hazards to navigation to mariners. SpaceX would coordinate with the USCG to assess the potential for navigational hazards.

The same methodology used in the 2025 NMFS Conference and Biological Opinion on SpaceX Starship-Super Heavy Increased Launch Cadence and Operations in the North Atlantic Ocean, Gulf of America, North Pacific Ocean, South Pacific Ocean, and Indian Ocean (2025 NMFS BCO) was used to analyze the potential impacts of the proposed modifications. After descent through the atmosphere, some residual propellant would remain in the booster and ship (approximately 74 metric tons and 101 metric tons, respectively).

Four sets of predicted auditory effects on ESA-listed marine mammals and sea turtles were estimated in the near shore Gulf of America Landing Area in Tables 1 and 2 as well as the nearshore Atlantic Landing Area in Tables 3 and 4. The maximum density was used in the model to predict a maximum potential effect for each species. The average density for each ESA-listed marine mammal and sea turtle species was calculated by averaging all density values within each part of the Gulf of America and Atlantic Landing Areas and were used to predict effects with a higher likelihood of occurring than effects based on the maximum density.

Gulf of America

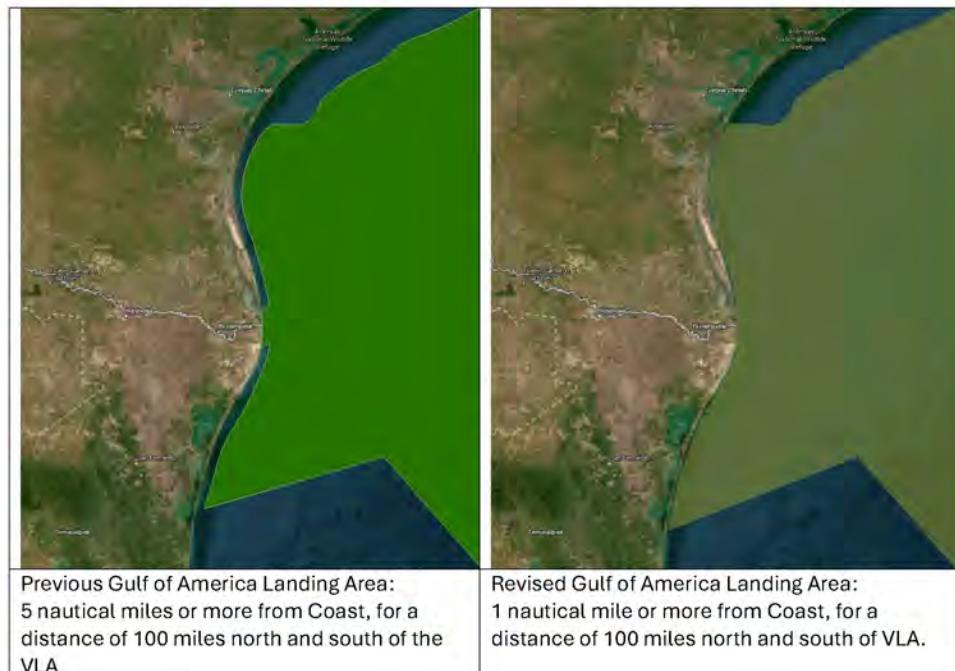
For Starship landings in the Gulf of America Landing Area, under the maximum outputs of the model, there were no auditory injury (AINJ) for any marine mammal or sea turtle. There were 2 temporary threshold shifts (TTS) for loggerhead sea turtles in the winter months. Using average densities yielded only 1 TTS take for the winter month. The highest loggerhead densities occur in nearshore waters off Alabama and southwest Florida limiting the potential for effects. Using TTS max outputs of the model, Kemp's ridley sea turtle takes were predicted for winter (2 takes) while the average density was predicted to have 1 TTS for winter. Kemp's ridley sea turtle densities are highest off the west coast of Florida and over the continental shelf along the northern Gulf of Mexico.

For Super Heavy in the Gulf of America Landing Area, using AINJ max outputs of the model, loggerhead sea turtle takes were predicted for winter (1 take). Using TTS max outputs of the model, loggerhead sea turtle takes were predicted for winter (3 takes). Using average densities, however, yielded no AINJ takes and 2 TTS take for the occurrences of loggerhead sea turtles. For Super Heavy in the Gulf of America using AINJ max outputs of the model, Kemp's ridley sea turtle takes were predicted for winter (1 take). Using TTS max outputs of the model, Kemp's ridley sea turtle takes

were predicted for winter (3 takes). Using average densities, however, yielded no AINJ takes and 2 TTS take for winter occurrences of the Kemp's ridley sea turtle.

References to the geographic extent of species' densities were based on spatially explicit density maps used in the 2025 NMFS BCO.

Figure 1. Comparison of Previous and Revised Gulf of America Landing Area



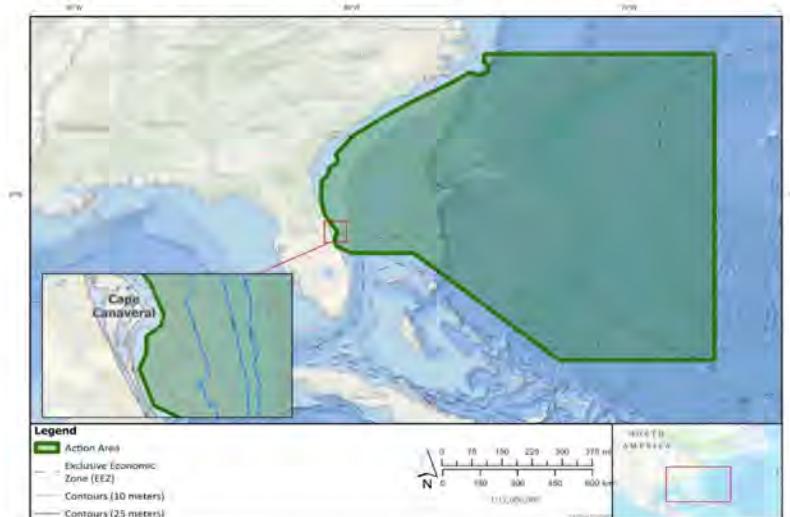
Atlantic Ocean

No takes were predicted in the Atlantic Landing Area for any species for landings of the Super Heavy booster or Starship.

The expanded Atlantic Ocean Action Area does not contain any additional ESA-listed species, but does include the North Atlantic Right Whale (NARW) critical habitat (see Figure 3). An analogous overpressure methodology used in the 2025 NMFS Conference and Biological Opinion on SpaceX Starship-Super Heavy Increased Launch Cadence and Operations in the North Atlantic Ocean, Gulf of America, North Pacific Ocean, South Pacific Ocean, and Indian Ocean (2025 NMFS BCO) was used to analyze the potential impacts of the proposed modifications. Please refer to the 2025 NMFS BCO for a detailed explanation of methods and assumptions.

Figure 2. Comparison of Previous and Revised Atlantic Ocean Action Area



Figure 3. Current Super Heavy Atlantic Ocean Action Area

Starship and Super Heavy nearshore sound pressure level (SPL) results for the expanded Atlantic Ocean Action Area for ESA-listed marine mammals and sea turtles are outlined in Table 3 and Table 4. Densities presented in the table were updated to reflect the nearshore species densities in the revised action area. The maximum density was used in the model to predict the maximum potential effect for each species. The average density for each ESA-listed marine mammal and sea turtle species was calculated by averaging all density values within each part of the action area and was used to predict effects with a higher likelihood of occurring than effects based on the maximum density. References to the geographic extent of species' densities were based on spatially explicit density maps used in the 2025 NMFS BCO and the Duke Marine Geospatial Ecology Laboratory¹. Given the predicted auditory injury and temporary threshold shifts would occur to less than 0.5 individuals of any ESA-listed species present within the Atlantic Ocean Action Area, FAA has determined the proposed project modifications *may affect, but are not likely to adversely affect* ESA-listed species (i.e., effects are expected to be discountable). This determination is consistent with those presented in the 2025 NMFS BCO for the Atlantic Ocean Action Area.

Designated critical habitat for NARW calving occurs within the revised Atlantic Ocean Action Area (shown in red in Figure 3). The yellow line in the figure is the revised boundary, and the green line represents the updated boundary of the action area. The essential physical and biological features for NARW critical calving habitat are: 1) calm sea surface conditions of Force 4 or less on the Beaufort Wind Scale; (2) sea surface temperatures from a minimum of 7 °C, and never more than 17 °C; and (3) water depths of 6 to 28 meters, where these features simultaneously co-occur over contiguous areas of at least 231 nm² of ocean waters during the months of November through April. Landing operations, including potential overpressure events, would only temporarily affect surface

¹ <https://seamap.env.duke.edu/models/Duke/EC/>

conditions and temperatures in the immediate vicinity of Starship and would not affect water depths. Conditions would return to normal shortly after the conclusion of operations and these operations are not expected to impact the habitat suitability of the area for NARW in the long term. As demonstrated in Table 2 and Table 3, direct injury or harassment to individual NARWs is not expected to occur. Therefore, the FAA concludes that landing operations in the expanded Atlantic Ocean Action Area *may affect, but is not likely to adversely affect* designated critical habitat for the NARW (i.e., effects are expected to be insignificant).

Table 1. Starship Near-shore Gulf of America SPL Results for ESA-listed Marine Mammals and Sea Turtles

Blast Inputs			INPUTS CALCS RESULTS									
			ESA SPL					Coefficients				
Species Data (Gulf of America Near-shore)			NMFS Thresholds (dB re 1uPa)		Harassment Area (km ²)		Max. Density Species Harassment		Ave. Density Species Harassment Results			
ESA Species	Type	Max. Density (per km ²)	AUD INJ	TTS	AUD INJ (km ²)	TTS (km ²)	AUD INJmax (km ²)	TTSmax (km ²)	Ave. Density (per km ²)	AUD INJave (km ²)	TTSave (km ²)	
Sperm Whale	HF	0.00000000	230	224	0.0184	0.0733	0.000000	0.000000	0.00000000	0.000000	0.000000	
Rice's Whale	LF	0.00186829	222	216	0.1162	0.4625	0.004341	0.017283	0.00063276	0.001470	0.005854	
Green Sea Turtle (Winter)	Turtle	0.02149959	232	226	0.0116	0.0463	0.004996	0.019889	0.00747668	0.001737	0.006916	
Loggerhead Sea Turtle (Winter)	Turtle	1.27618218	232	226	0.0116	0.0463	0.296544	1.180561	0.77418868	0.179897	0.716181	
Leatherback Turtle (Winter)	Turtle	0.01714700	232	226	0.0116	0.0463	0.003984	0.015862	0.00662576	0.001540	0.006129	
Hawksbill Sea Turtle (All Seasons)	Turtle	Unknown	232	226	0.0116	0.0463	Unknown	Unknown	Unknown	Unknown	Unknown	
Olive Ridley Sea Turtle (All Seasons)	Turtle	0.00000000	232	226	0.0116	0.0463	0.000000	0.000000	0.00000000	0.000000	0.000000	
Kemp's Ridley Sea Turtle (Winter)	Turtle	1.61851229	232	226	0.0116	0.0463	0.376090	1.497242	0.97804573	0.227266	0.904763	
Species Data (Gulf of America Near-shore)			NMFS Thresholds (dB re 1uPa)		Harassment Area (km ²)							
ESA Species	Type	Max. Density (per km ²)	AUD INJ	TTS	AUD INJ (km ²)	TTS (km ²)						
Fishes > 2g	Fish	Unknown	229	206	0.02318	4.63						
Fishes < 2g	Fish	Unknown	229	206	0.02318	4.63						

Table 2. Super Heavy Near-shore Gulf of America SPL Results for ESA-listed Marine Mammals and Sea Turtles

Blast Inputs		3.0m from Kingery Bulinash Calculator						Coefficients			
TNT Yield	3300							Transmission Loss	0.0326		
Pressure @ 1 meter (kPa)	17207.90							Impedance	1558528		
Water Peak Source Sound Level								Impedance Air	414.5		
Surface Pressure in Water (kPa)	34398.6										
Peak SPL dB (re 1 uPa)	270.7										
# of Flights	20.0										
INPUTS		CALCS		RESULTS				ESA SPL			
Species Data (Gulf of America Near-shore)			NMFS Thresholds (dB re 1uPa)		Harassment Area (km ²)		Max. Density Species Harassment		Ave. Density Species Harassment Results		
ESA Species	Type	Max. Density (per km ²)	AUD INJ	TTS	AUD INJ (km ²)	TTS (km ²)	AUD INJ/max (km ²)	TTSmax (km ²)	Ave. Density (per km ²)	AUD INJave (km ²)	TTSave (km ²)
Sperm Whale	HF	0.00000000	230	224	0.04	0.15	0.000000	0.000000	0.00000000	0.000000	0.000000
Rice's Whale	LF	0.00186829	222	216	0.23	0.93	0.008764	0.034890	0.00063276	0.002968	0.011817
Green Sea Turtle (Winter)	Turtle	0.02149959	232	226	0.02	0.09	0.010085	0.040151	0.00747668	0.003507	0.013963
Loggerhead Sea Turtle (Winter)	Turtle	1.27618218	232	226	0.02	0.09	0.598651	2.383272	0.77418868	0.363168	1.445798
Leatherback Turtle (Winter)	Turtle	0.01714700	232	226	0.02	0.09	0.008044	0.032022	0.00662576	0.003108	0.012374
Hawksbill Sea Turtle (All Seasons)	Turtle	Unknown	232	226	0.02	0.09	Unknown	Unknown	Unknown	Unknown	Unknown
Olive Ridley Sea Turtle (All Seasons)	Turtle	0.00000000	232	226	0.02	0.09	0.000000	0.000000	0.00000000	0.000000	0.000000
Kemp's Ridley Sea Turtle (Winter)	Turtle	1.61851229	232	226	0.02	0.09	0.759236	3.022574	0.97804573	0.458796	1.826502
Species Data (Gulf of America Near-shore)			NMFS Thresholds (dB re 1uPa)		Harassment Area (km ²)						
ESA Species	Type	Max. Density (per km)	AUD INJ	TTS	AUD INJ (km ²)	TTS (km ²)	AUD INJ/max (km ²)	TTSmax (km ²)	Ave. Density (per km ²)	AUD INJave (km ²)	TTSave (km ²)
Fishes > 2g	Fish	Unknown	229	206	0.05	9.34					
Fishes < 2g	Fish	Unknown	229	206	0.05	9.34					

Table 3. Starship Atlantic Ocean Near-shore SPL Results for ESA-listed Marine Mammals and Sea Turtles

Blast Inputs	
TNT Yield	4973.68
Pressure @ 1 meter (kPa)	12111.15
Water Peak Source Sound Level	
Surface Pressure in Water (kPa)	24210.2
Peak SPL dB (re 1 uPa)	267.7
# of Flights	20.0

4.5m from Kingery Bulmash Calculator

Coefficients	
Transmission Loss	0.0326
Impedance	1558528
Impedance Air	414.5

INPUTS CALCS RESULTS

Starship Atlantic 1-5km Nearshore Thresholds for ESA SPL

Species Data Near-shore (Atlantic Ocean)		NMFS Thresholds (dB re 1uPa)		Harassment Area (km ²)		Max. Density Species Harassment		Ave. Density Species Harassment Results			
ESA Species Data	Type	Max. Density (per km ²)	AUD INJ	TTS	AUD INJ (km ²)	TTS (km ²)	AUD INJmax (km ²)	TTSmax (km ²)	Ave. Density (per km ²)	AUD INJave (km ²)	TTSave (km ²)
Blue Whale	LF	0.00E+00	222	216	0.12	0.46	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fin Whale	LF	3.99E-06	222	216	0.12	0.46	9.27E-06	3.69E-05	1.83E-06	4.25E-06	1.69E-05
North Atlantic Right Whale	LF	1.04E-03	222	216	0.12	0.46	2.41E-03	9.59E-03	2.04E-04	4.75E-04	1.89E-03
Sei Whale	LF	0.00E+00	222	216	0.12	0.46	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sperm Whale	HF	4.37E-12	230	224	0.02	0.07	1.61E-12	6.41E-12	2.18E-12	8.03E-13	3.20E-12
Green Sea Turtle	Turtle	1.54E-02	232	226	0.01	0.05	3.57E-03	1.42E-02	6.65E-03	1.55E-03	6.15E-03
Loggerhead Sea Turtle	Turtle	1.31E-01	232	226	0.01	0.05	3.05E-02	1.21E-01	7.52E-02	1.75E-02	6.96E-02
Leatherback Turtle	Turtle	4.93E-03	232	226	0.01	0.05	1.15E-03	4.56E-03	3.65E-03	8.48E-04	3.38E-03
Hawksbill Sea Turtle	Turtle	Unknown	232	226	0.01	0.05	Unknown	Unknown	Unknown	Unknown	Unknown
Olive Ridley Sea Turtle	Turtle	0.00E+00	232	226	0.01	0.05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Kemp's Ridley Sea Turtle	Turtle	3.56E-03	232	226	0.01	0.05	8.27E-04	2.19E-03	8.10E-05	1.88E-05	7.49E-05

Species Data Near-shore (Atlantic Ocean)		NMFS Thresholds (dB re 1uPa)		Harassment Area (km ²)	
ESA Species	Type	Max. Density (per km ²)	AUD INJ	TTS	AUD INJ (km ²)
Fishes > 2g	Fish	Unknown	229	206	2.32E-02
Fishes < 2g	Fish	Unknown	229	206	2.32E-02

Table 4. Super Heavy Atlantic Ocean Near-shore SPL Results for ESA-listed Marine Mammals and Sea Turtles

Blast Inputs		3.0m from Kingery Bulmash Calculator				Coefficients					
TNT Yield	3300.00										
Pressure @ 1 meter (kPa)	17207.90										
Water Peak Source Sound Level											
Surface Pressure in Water (kPa)	34398.6										
Peak SPL dB (re 1 uPa)	270.7										
# of Flights	20.0										
INPUTS		CALCS		RESULTS							
Starship Atlantic 1-5km Nearshore Thresholds for											
Species Data Near-shore (Atlantic Ocean)			NMFS Thresholds (dB re 1 uPa)		Harassment Area		Max. Density Species		Ave. Density Species Harassment Results		
ESA Species Data	Type	Max. Density (per km ²)	AUD INJ	TTS	AUD INJ (km ²)	TTS (km ²)	AUD INJmax (km ²)	TTSmax (km ²)	Ave. Density (per km ²)	AUD INJave (km ²)	TTSave (km ²)
Blue Whale	LF	0.00E+00	222	216	0.2345	0.9338	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fin Whale	LF	3.99E-06	222	216	0.2345	0.9338	1.87E-05	7.45E-05	1.83E-06	8.58E-06	3.42E-05
North Atlantic Right Whale	LF	1.04E-03	222	216	0.2345	0.9338	4.86E-03	1.94E-02	2.04E-04	9.59E-04	3.82E-03
Sei Whale	LF	0.00E+00	222	216	0.2345	0.9338	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sperm Whale	HF	4.37E-12	230	224	0.0372	0.1480	3.25E-12	1.29E-11	2.18E-12	1.62E-12	6.45E-12
Green Sea Turtle	Turtle	1.54E-02	232	226	0.0235	0.0934	7.21E-03	2.87E-02	6.65E-03	3.12E-03	1.24E-02
Loggerhead Sea Turtle	Turtle	1.31E-01	232	226	0.0235	0.0934	6.15E-02	2.45E-01	7.52E-02	3.53E-02	1.41E-01
Leatherback Turtle	Turtle	4.93E-03	232	226	0.0235	0.0934	2.31E-03	9.21E-03	3.65E-03	1.71E-03	6.82E-03
Hawksbill Sea Turtle	Turtle	Unknown	232	226	0.0235	0.0934	Unknown	Unknown	Unknown	Unknown	Unknown
Olive Ridley Sea Turtle	Turtle	0.00E+00	232	226	0.0235	0.0934	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Kemp's Ridley Sea Turtle	Turtle	3.56E-03	232	226	0.0235	0.0934	1.67E-03	2.19E-03	8.10E-05	3.80E-05	1.51E-04
Species Data Near-shore (Atlantic Ocean)			NMFS Thresholds (dB re 1 uPa)		Harassment Area						
ESA Species	Type	Max. Density (per km ²)	AUD INJ	TTS	AUD INJ (km ²)	TTS (km ²)					
Fishes > 2g	Fish	Unknown	229	206	4.68E-02	9.34					
Fishes < 2g	Fish	Unknown	229	206	4.68E-02	9.34					

Figure 3. NARW Critical Habitat with Previous and Revised Atlantic Ocean Action Area



The Federal Avian Administration (FAA) requests your review and, if appropriate, written concurrence that these revisions will not adversely affect any species listed or proposed for listing under the Endangered Species Act or any designated or proposed critical habitats beyond those effects already evaluated in the 2025 NMFS BCO.

If you have questions or concerns regarding FAA's response, please contact Amy Hanson at (847) 243-7609 or via email at Amy.Hanson@faa.gov.

Sincerely,

Stacey M. Zee
Manager
Operations Support Branch