DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Part 219

[Docket No. 161109999–8999–01]

RIN 0648–BG44

Taking and Importing Marine Mammals; Taking Marine Mammals Incidental to Southeast Fisheries Science Center and Texas Parks and Wildlife Department Fisheries Research

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Proposed rule; request for comments.

SUMMARY: NMFS' Office of Protected Resources has received a request from NMFS' Southeast Fisheries Science Center (SEFSC) for authorization to take marine mammals incidental to fisheries research conducted in the Atlantic Ocean along the southeastern U.S. coast and select estuaries, the Gulf of Mexico and select estuaries, and the Caribbean Sea over the course of five years from the date of issuance. We have also received a request from the Texas Parks and Wildlife Department (TPWD) for authorization to take marine mammals incidental to fisheries research in Texas bay systems. Pursuant to the Marine Mammal Protection Act (MMPA), NMFS is requesting comments on its proposal to issue regulations to the SEFSC and, separately, TPWD, to incidentally take marine mammals during the specified activities. NMFS will consider public comments prior to making any final decision on the issuance of the requested MMPA authorizations and agency responses will be summarized in the final notice of our decision.

DATES: Comments and information must be received no later than March 29, 2019.

ADDRESSES: You may submit comments on this document, identified by NOAA–NMFS–2019–0016, by any of the following methods:

- *Electronic submission:* Submit all electronic public comments via the Federal e-Rulemaking Portal. Go to *www.regulations.gov/#!docketDetail;D=NOAA-NMFS-2019-0016,* click the ''Comment Now!'' icon, complete the required fields, and enter or attach your comments.
- *Mail:* Submit written comments to Jolie Harrison, Chief, Permits and Conservation Division, Office of Protected Resources, National Marine Fisheries Service, 1315 East-West Highway, Silver Spring, MD 20910.

Instructions: Comments sent by any other method, to any other address or individual, or received after the end of the comment period, may not be considered by NMFS. All comments received are a part of the public record and will generally be posted for public viewing on *www.regulations.gov* without change. All personal identifying information (*e.g.,* name, address), confidential business information, or otherwise sensitive information submitted voluntarily by the sender will be publicly accessible. NMFS will accept anonymous comments (enter ''N/A'' in the required fields if you wish to remain anonymous). Attachments to electronic comments will be accepted in Microsoft Word, Excel, or Adobe PDF file formats only.

FOR FURTHER INFORMATION CONTACT: Jaclyn Daly, Office of Protected Resources, NMFS, (301) 427–8401. Electronic copies of the application and supporting documents, as well as a list of the references cited in this document, may be obtained online at: *www.nmfs.noaa.gov/pr/permits/incidental/research.htm.* In case of problems accessing these documents, please call the contact listed above.

SUPPLEMENTARY INFORMATION:

Purpose and Need for Regulatory Action

This proposed rule, to be issued under the authority of the MMPA (16 U.S.C. 1361 *et seq.*), establishes a framework for authorizing the take of marine mammals incidental to fisheries-independent research conducted by the SEFSC (in the Atlantic Ocean and associated estuaries, Gulf of Mexico and associated estuaries, and Caribbean Sea) and TPWD (in Texas bays and estuaries). SEFSC and TPWD fisheries research has the potential to take marine mammals due to possible physical interaction with fishing gear (*e.g.,* trawls, gillnets, hook-and-line gear) andexposure to noise generated by SEFSC sonar devices (*e.g.,* echosounders, side-scan sonar). The SEFSC submitted an application to NMFS requesting five-year regulations and a letter of authorization (LOA) to take multiple species and stocks of marine mammals in the three specified research areas (Atlantic, Gulf of Mexico, and Caribbean). The SEFSC has requested take, by mortality, serious injury, and Level A harassment, incidental to the use of various types of fisheries research gear and Level B harassment incidental to the use of active acoustic survey sources. TPWD has requested take of dolphins from four stocks, by mortality or serious injury, incidental to gillnet fishing in Texas bays. For both applicants, the regulations would be valid from 2018 to 2023.

Legal Authority for the Proposed Action

Section 101(a)(5)(A) of the MMPA (16 U.S.C. 1371(a)(5)(A)) directs the Secretary of Commerce to allow, upon request, the incidental, but not intentional taking of small numbers of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region for up to five years if, after notice and public comment, the agency makes certain findings and issues regulations that set forth permissible methods of taking pursuant to that activity, as well as monitoring and reporting requirements.

Section 101(a)(5)(A) of the MMPA and the implementing regulations at 50 CFR part 216, subpart I provide the legal basis for issuing this proposed rule containing five-year regulations and Letters of Authorization. As directed by this legal authority, this proposed rule contains mitigation, monitoring, and reporting requirements.

Summary of Major Provisions Within the Proposed Regulations

Following is a summary of the major provisions for the SEFSC within the proposed rulemaking. The SEFSC is required to:

- Delay setting or haul in gear if marine mammal interaction may occur.
- Monitor prior to and during sets for signs of potential marine mammal interaction.
- Implement the ''move-on rule'' mitigation strategy during select surveys (note: this measure does not apply to bottlenose dolphins).
- Limit gear set times (varies based on gear type).
- Haul gear immediately if marine mammals may interact with gear.
- Utilize dedicated marine mammal observations during select surveys.
- Prohibit chumming.
- Continue investigation on the effectiveness of modifying lazy lines to reduce bottlenose dolphin entanglement risk.
- Establish and convene the South Carolina Department of Natural Resources (SCDNR) Working Group to better understand bottlenose dolphin entanglement events and apply effective mitigation strategies.

Following is a summary of the major provisions for the TPWD within the proposed rulemaking. The TPWD is required to:

• Set only new or fully repaired gill nets thereby eliminating holes.
• Set gillnets with minimal slack and a short marker buoy attached to the deep end of the net.
• Conduct dedicated marine mammal observations at least 15 minutes prior to setting nets and avoid setting nets if dolphins are observed at or approaching the sampling station.
• Minimize soak time by utilizing the ''last out/first in'' strategy for gillnets set in grids where marine mammals have been encountered within the last 5 years.
• Avoid fishing grids where dolphins have interacted with gear on more than one occasion or where multiple adjacent grids have had at least one dolphin encounter.
• Modify gillnets to avoid more than a 4 inch (in.) gap between float/lead line and net when net is set.

Background

Sections 101(a)(5)(A) and (D) of the MMPA (16 U.S.C. 1361 *et seq.*) direct the Secretary of Commerce (as delegated to NMFS) to allow, upon request, the incidental, but not intentional, taking of small numbers of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if certain findings are made and either regulations are issued or, if the taking is limited to harassment, a notice of a proposed authorization is provided to the public for review.

An authorization for incidental takings shall be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s), will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses (where relevant), and if the permissible methods of taking and requirements pertaining to the mitigation, monitoring and reporting of such takings are set forth.

NMFS has defined ''negligible impact'' in 50 CFR 216.103 as an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival. The MMPA states that the term ''take'' means to harass, hunt, capture, kill or attempt to harass, hunt, capture, or kill any marine mammal.

Except with respect to certain activities not pertinent here, the MMPA defines ''harassment'' as any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment); or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering (Level B harassment).

National Environmental Policy Act

To comply with the National Environmental Policy Act of 1969 (NEPA; 42 U.S.C. 4321 *et seq.*) and NOAA Administrative Order (NAO) 216–6A, NMFS must review our proposed action (*i.e.,* the issuance of an incidental harassment authorization) with respect to potential impacts on the human environment.

Accordingly, NMFS is preparing an Environmental Assessment (EA) to consider the environmental impacts associated with the issuance of the proposed regulations to SEFSC and TPWD. NMFS' *Draft Programmatic Environmental Assessment (PEA) for Fisheries and Ecosystem Research Conducted and Funded by the Southeast Fisheries Science Center* was made available for public comment from April 20 through May 20, 2016 (81 FR 23276). NMFS is modifying the draft EA to include TPWD gillnet fishing. We will review all comments submitted in response to this notice as we complete the NEPA process, prior to making a final decision on the incidental take authorization request.

Summary of Request

On May 4, 2015, NMFS Office of Protected Resources (OPR) received an application from the SEFSC for a rulemaking and associated 5-year Letter of Authorization (LOA) to take marine mammals incidental to fisheries research activities conducted by the SEFSC and 18 cooperating research partners in the Atlantic Ocean Research Area (ARA), Gulf of Mexico Research Area (GOMRA), and Caribbean Research Area (CRA). The SEFSC submitted a revised draft in October 2015, followed by another revision on April 6, 2016, which we deemed adequate and complete. On April 22, 2016 (81 FR 23677), we published a notice of receipt of the SEFSC's application in the **Federal Register**, requesting comments and information related to the SEFSC's request for thirty days. We received joint comments from The Humane Society of the United States and Whale and Dolphin Conservation, which we considered in development of this proposed rule and are available on the internet at: *www.nmfs.noaa.gov/pr/permits/incidental/research.htm.* The SEFSC request is for the take of 15 species of marine mammals by mortality, serious injury, and Level A harassment (hereafter referred as ''M/SI'' assuming worst case scenario) and 34 species of marine mammals by Level B harassment.

On July 29, 2015, NMFS received an application from TPWD requesting authorization for take of marine mammals incidental to fishery-independent monitoring activities in Texas. On January 6, 2017 (82 FR 1721), we published a notice of receipt of the TPWD's application in the **Federal Register**, requesting comments and information related to the TPWD's request for thirty days. We received comments from the Marine Mammal Commission and the Texas Chapter of the Coastal Conservation Association which we considered in the development of this proposed rule and are available on the internet at: *https://www.fisheries.noaa.gov/permit/incidental-take-authorizations-under-marine-mammal-protection-act.* In response to comments, TPWD submitted a subsequent application on May 11, 2017, which we deemed adequate and complete.

Description of the Specified Activity

SEFSC Overview

The SEFSC is the research arm of NMFS in the Southeast Region. The SEFSC plans, develops, and manages a multidisciplinary program of basic and applied research to generate the information necessary for the conservation and management of the region's living marine resources, including the region's marine and anadromous fish and invertebrate populations to ensure they remain at sustainable and healthy levels. The SEFSC collects a wide array of information necessary to evaluate the status of exploited fishery resources and the marine environment from fishery independent (*i.e.,* non-commercial or recreational fishing) platforms. Surveys are conducted from NOAA-owned and operated vessels, NOAA chartered vessels, or research partner-owned or chartered vessels in the state and Federal waters of the Atlantic Ocean south of Virginia, Gulf of Mexico, and Caribbean Sea. All work will occur within the Exclusive Economic Zone (EEZ) except two surveys which may occur outside the EEZ.

The SEFSC plans to administer, fund, or conduct 74 fishery-independent survey programs over the five-year period the proposed regulations would be effective (see Table 1–1 in the SEFSC's application). The SEFSC works with 18 Federal, state, or academic partners to conduct these surveys (see

Table 1–1 in SEFSC's application for a list of cooperating research partners). Of the 74 surveys, only 38 involve gear and equipment with the potential to take marine mammals. Gear types include towed trawl nets fished at various levels in the water column, seine nets, traps, longline and other hook and line gear. Surveys using any type of seine net (*e.g.,* gillnets), trawl net, or hook and line (*e.g.,* longlines) have the potential for marine mammal interaction (*e.g.,* entanglement, hooking) resulting in M/SI harassment. In addition, the SEFSC conducts hydrographic, oceanographic, and meteorological sampling concurrent with many of these surveys which requires the use of active acoustic devices (*e.g.,* side-scan sonar, echosounders). These active sonars result in elevated sound levels in the water column, resulting in the potential to behaviorally disturb marine mammals resulting in Level B harassment.

Many SEFSC surveys only occur at certain times of the year to align with the target species and age class being researched (see Table 1–1 in SEFSC's application); however, in general, the SEFSC conducts some type of sampling year round in various locations. Specific dates and duration of individual surveys are inherently uncertain because they are based on congressional funding levels, weather conditions, and ship contingencies. For example, some surveys are only conducted every two or three years or when funding is available. Timing of the surveys is a key element of their design. Oceanic and atmospheric conditions, as well as ship contingencies, often dictate survey schedules even for routinely-conducted surveys. In addition, cooperative research is designed to provide flexibility on a yearly basis in order to address issues as they arise. Some cooperative research projects last multiple years or may continue with modifications. Other projects only last one year and are not continued. Most cooperative research projects go through an annual competitive selection process to determine which projects should be funded based on proposals developed by many independent researchers and fishing industry participants. The exact location of survey effort also varies year to year (albeit in the same general area) because they are often based on randomized sampling designs. Year-round, in all research areas, there is one or more than one survey planned that has the potential to take marine mammals.

TPWD Overview

TPWD conducts a long-term standardized fishery-independent monitoring program to assess the relative abundance and size of finfish and shellfish in ten Texas bay systems using gillnets set perpendicular to the shoreline. Gill nets are set overnight during each spring and fall season for a total of four weeks per year. Bottlenose dolphins have the potential to become entangled in gillnet gear which can result in M/SI harassment.

Specified Geographic Region—SEFSC

The SEFSC conducts research in three research areas: The Atlantic Ocean from North Carolina to Florida and associated estuaries (ARA), the Gulf of Mexico and associated estuaries (GOMRA), and the Caribbean around Puerto Rico and the US Virgin Islands (CRA). Research surveys occur both inside and outside the U.S. Exclusive Economic Zone (EEZ), and sometimes span across multiple ecological, physical, and political boundaries (see Figure1–2 in the SEFSC's application for map). With respect to gear, Appendix B in the SEFSC Draft Programmatic Environmental Assessment (PEA) includes a table and figures showing the spatial and temporal distribution of fishing gears used during SEFSC research.

The three research areas fully or partially encompass four Large Marine Ecosystems (LMEs): The Northeast U.S. Continental Shelf LME (NE LME), the Southeast U.S. Continental Shelf LME (SE LME), the Gulf of Mexico LME, (GOM LME), and the Caribbean Sea LME (CS LME). LMEs are large areas of coastal ocean space, generally include greater than 200,000 square kilometers (km^2) of ocean surface area and are located in coastal waters where primary productivity is typically higher than in open ocean areas. LME physical boundaries are based on four ecological criteria: bathymetry, hydrography, productivity, and trophic relationships. NOAA has implemented a management approach designed to improve the long-term sustainability of LMEs and their resources by using practices that focus on ensuring the sustainability of the productive potential for ecosystem goods and services. Figure 2–1 in the SEFSC's application shows the location and boundaries of the three research areas with respect to LME boundaries. We note here that, while the SEFSC specified geographical region extends outside of the U.S. EEZ, into the Mexican EEZ (not including Mexican territorial waters), the MMPA's authority does not extend into foreign territorial waters. The following provides a brief introduction to the characteristics of each research area. Additional descriptive material concerning the geology, oceanography, and physical environment influencing species distribution within each of the research areas can be found in Chapter 3 of the Draft PEA.

Atlantic Research Area

The ARA constitutes more than 530,000 square miles (mi^2) from North Carolina to Florida. Three key features of the ARA include the NE LME (however SEFSC research is only conducted south of Virginia), SE LME, and Gulf Stream. The NE LME encompasses approximately 115,831 mi^2, and is structurally complex, with marked temperature changes, winds, river runoff, estuarine exchanges, tides and complex circulation regimes. The Shelf-Slope Front is associated with a southward flow of cold, fresh water from the Labrador Sea. The Mid-Shelf Front follows the 50-m isobath (Ullman and Cornillon 1999). The Nantucket Shoals Front hugs the namesake bank/shaols along 20–30-m isobaths. The Wilkinson Basin Front and Jordan Basin Front separate deep basins from Georges Bank and Browns Bank (Mavor and Bisagni 2001). The SE LME extends from the Straits of Florida to Cape Hatteras, North Carolina in the Atlantic Ocean. It is characterized by a temperate climate and has a surface area of about 300,000 km^2, of which 2.44 percent is protected. It contains 0.27 percent of the world's coral reefs and 18 estuaries and river systems. These estuarine and river systems, such as the Albemarle-Pamlico Sound (the second largest estuary in the nation) contain nearshore and barrier islands, fresh and estuarine waters, and extensive coastal marshes that provide unique habitats for living marine resources, including marine mammals (Aquarone 2009). Adjacent to the SE LME is the warm, saline, northward flowing Gulf Stream which is bounded by two fronts; the inshore Gulf Stream Front and the offshore Gulf Stream Front (see Figure 2–2). The inshore Gulf Stream Front extends over the upper continental slope and shelf break, approximately aligned with the 50-meter isobath (Atkinson and Menzel 1985), while the offshore Gulf Stream Front runs parallel to it approximately 100 kilometers offshore. The Gulf Stream forms a semi-permanent offshore deflection near a deepwater bank southeast of Charleston, South Carolina, called the 'Charleston Bump' at 31.5 degrees north. The Mid-Shelf Front is aligned approximately with the 35-to-40 meter isobaths. Other shelf fronts separate a mixture of water masses formed by wintertime cold air outbreaks, river discharge, tidal mixing and wind-induced coastal upwelling

(Pietrafesa et al. 1985, Belkin et al. 2009).

Gulf of Mexico Research Area

The GOMRA encompasses more than 800,000 mi². The SEFSC conducts fisheries research in portions of the GOM LME, a deep marginal sea bordered by Cuba, Mexico, and the U.S. It is the largest semi-enclosed coastal sea of the western Atlantic, encompassing more than 1.5 million km², of which 1.57 percent is protected, as well as 0.49 percent of the world's coral reefs and 0.02 percent of the world's sea mounts (Sea Around Us 2007). The continental shelf is very extensive, comprising about 30 percent of the total area and is topographically very diverse (Heileman and Rabalais 2009). Oceanic water enters this LME from the Yucatan channel and exits through the Straits of Florida, creating the Loop Current, a major oceanographic feature and part of the Gulf Stream System (Lohrenz et al. 1999) (see Figure 2–4). The LME is strongly influenced by freshwater input from rivers, particularly the Mississippi-Atchafalaya, which accounts for about two-thirds of the flows into the Gulf (Richards & McGowan 1989) while freshwater discharges from the Mississippi River estuary and rivers of the Florida Panhandle contribute to the development and maintenance of 6 major oceanic fronts. Similar to the ARA, the GOMRA includes forty-seven major estuaries, many of which support numerous recreational and commercial fisheries and are home to resident bottlenose dolphin stocks.

Caribbean Research Area

The CRA is the smallest of the SEFSC research areas (approximately 400,000 mi²) and includes portions of the CS LME. The CS LME is a tropic sea bounded by North America (South Florida), Central and South America, and the Antilles chain of islands. The LME has a surface area of about 3.3 million km², of which 3.89 percent is protected (Heileman and Mahon 2009). It contains 7.09 percent of the world's coral reefs and 1.35 percent of the world's sea mounts. The average depth is 2,200 meters, with the Cayman Trench being the deepest part at 7,100 meters. Most of the Caribbean islands are influenced by the nutrient-poor North Equatorial Current that enters the Caribbean Sea through the passages between the Lesser Antilles islands. Run-off from two of the largest river systems in the world, the Amazon and the Orinoco, as well as numerous other large rivers, dominates the north coast of South America (Muller-Karger 1993). Unlike the ARA and GOMRA, the SEFSC does not conduct research in estuarine waters within the CRA.

TPWD Specified Geographic Area

TPWD conducts fisheries research using gillnets in ten Texas bay systems: Laguna Madre, Corpus Christi Bay, Aransas Bay, San Antonio Bay, Matagorda Bay, East Matagorda Bay, Cedar Lakes, West Bay, Galveston Bay, and Sabine Lake (see Figure 1 and 2 in TPWD's application). These systems are wide and shallow with little tidal elevation change.

Detailed Description of Activities

SEFSC

The Federal government has a trust responsibility to protect living marine resources in waters of the U.S., also referred to as Federal waters. These waters generally lie 3 to 200 nautical miles (nm) from the shoreline. Those waters 3–12 nm offshore comprise territorial waters and those 12-to-200 nm offshore comprise the Exclusive Economic Zone (EEZ), except where other nations have adjacent territorial claims. NOAA also conducts research to foster resource protection in state waters (*i.e.,* estuaries and oceanic waters with 3 nm of shore). The U.S. government has also entered into a number of international agreements and treaties related to the management of living marine resources in international waters outside of the U.S. EEZ (*i.e.,* the high seas). To carry out its responsibilities over Federal and international waters, Congress has enacted several statutes authorizing certain Federal agencies to administer programs to manage and protect living marine resources. Among these Federal agencies, NOAA has the primary responsibility for protecting marine finfish and shellfish species and their habitats. Within NOAA, NMFS has been delegated primary responsibility for the science-based management, conservation, and protection of living marine resources.

The SEFSC conducts multi-disciplinary research programs to provide management information to support national and regional programs of NMFS and to respond to the needs of Regional Fishery Management Councils (FMCs), interstate and international fishery commissions, Fishery Development Foundations, government agencies, and the general public. SEFSC develops the scientific information required for fishery resource conservation, fishery development and utilization, habitat conservation, and protection of marine mammals and endangered marine species. Research is pursued to address specific needs in population dynamics, fishery biology and economics, engineering and gear development, and protected species biology. Specifically, research includes monitoring fish stock recruitment, abundance, survival and biological rates, geographic distribution of species and stocks, ecosystem process changes, and marine ecological research.

To carry out this research, the SEFSC proposes to administer or conduct 74 survey programs during the 5-year period the proposed regulations would be effective; however, only 44 surveys have the potential to take marine mammals from gear interaction or acoustic harassment. Surveys would be carried out by SEFSC scientists alone or in combination with Federal, state, or academic partners while some surveys would be carried out solely by cooperating research partners. Surveys not conducted by SEFSC staff are included here because they are funded or have received other support (*e.g.,* gear) by the SEFSC. SEFSC scientists conduct fishery-independent research onboard NOAA-owned and operated vessels or chartered vessels while partners conduct research aboard NOAA, their own or chartered vessels. Table 1 provides a summary of annual projects including survey name, entity conducting the survey, location, gear type, and effort. The information presented here augments the more detailed table included in the SEFSC's application. In the subsequent section, we describe relevant active acoustic devices, which are commonly used in SEFSC survey activities. Appendix A of the SEFSC's application contains detailed descriptions, pictures, and diagrams of all research gear and vessels used by the SEFSC and partners under this proposed rulemaking.

TABLE 1—SUMMARY DESCRIPTION OF FISHERIES AND ECOSYSTEM RESEARCH ACTIVITIES CONDUCTED OR FUNDED BY THE SEFSC IN THE GOMRA, ARA, AND CRA

Survey name (research agency)	General area of operation	Season, frequency, yearly days at sea (DAS)	Vessel used	Gear used	Number of stations
Gulf of Mexico Research Area					
HMS—GOM Shark Pupping & Nursery Survey (GULFSPAN), (SEFSC, USM/GCRL, UWF, FSU/CML) [1] * UWF is inactive.	SEFSC—FL Panhandle in St. Andrew Bay and St. Joseph Bay, 1–10 m depths.	Annual Apr–Oct, 30 DAS, (approximately 4 days/month), daytime operations only.	USCG Class I: R/V *Mokarran, R/V Pristis*.	Set gillnet	SEFSC—16–20 sets/month, up to 120 sets total.
	Mississippi Sound, 1–9 m depths.	Annual Apr–Oct, 8 DAS (1/month), daytime operations only.	USCG Class I: *Small vessel*.	Set gillnet	3 sets/month, 21 sets total.
	Perdido Bay, Pensacola Bay, Choctawhatchee Bay, and Santa Rosa Sound, 1.5–6 m depths.	Annual May–Sep, 10 DAS (2/month), daytime operations only.	USCG Class I: State vessel.	Set gillnet	10 sets/month, 50 sets total.
	Northwest FL state waters, 0.7–7 m depths.	Annual	USCG Class I: R/V *Naucrates*.	Set gillnet	74 sets/yr total.
	(A) Apalachee Bay	(A) Jan–Dec, 12 DAS (1/month).			(A) 24 sets.
	(B) Alligator Pt.-Anclote Keys.	(B) June & July, 20 DAS, daytime operations only.		Bottom longline.	(B) 50 sets. 74 sets/yr total. (A) 24 total. (B) 50 total.
	State waters of southwest FL within Pine Island Sound in the Charlotte Harbor estuary. Depth ranges 0.6–4.6 m depth.	Annual May–Sep, 15 DAS, daytime operations only.	USCG Class I: State vessel.	Set gillnet	16 sets/month (within two designated 10 km^2 grids), 80 sets total.
IJA Coastal Finfish Gillnet Survey, (MDMR) [1].	Mississippi Sound and estuaries; 0.2–2 m depths.	Annual, Jan–Dec, 24 DAS, daytime operations only.	USCG Class I: *Small vessel*.	Sinking gillnet, shallow deployment.	8 sets/month, 96 sets total.
Smalltooth Sawfish Abundance Survey, (SEFSC) [1].	Ten Thousand Islands, FL backcountry region, including areas in Everglades National Park and Ten Thousand Island National Wildlife Refuge in 0.2–1.0 m depths.	Annual, Mar–Nov, 56 DAS (6–7 DAS/trip), daytime operations only.	USCG Class I: R/V *Pristis*.	Set gillnet, shallow deployment.	~20 sets/month, 180–200 sets total.
Pelagic Longline Survey—GOM, (SEFSC) [1].	U.S. GOM	Intermittent, Feb–May, 30 DAS, 24 hour operations (set/haul anytime day or night).	USCG R/V: R/V *Oregon II*.	Pelagic longline CTD profiler	100–125 sets. 100–125 casts.
Shark and Red Snapper Bottom Longline Survey-GOM, (SEFSC) [1].	Randomly selected sites from FL to Brownsville, TX between bottom depths 9–366 m.	Annually, July–Sep, 60 DAS, 24 hour operations (set/haul anytime day or night).	USCG R/V: R/V *Oregon II, R/V Gordon Gunter;*. USCG Small R/V: R/V *Caretta,* R/V *Gandy*.	Bottom longline CTD profiler and rosette water sampler.	175 sets 175 casts.
SEAMAP—GOM Bottom Longline Survey, (ADCNR, USM–GCRL, LDWF, TPWD) [1].	AL—MS Sound, Mobile Bay, and near Dauphin Island. MS—MS Sound, south of the MS Barrier Islands, Chandeleur, and Breton Sound, and the area east of the Chandeleur Islands. LA—LA waters west of the MS River. TX—near Aransas Pass and Bolivar Roads Ship Channel.	Annually, Apr–May, June–July, Aug–Sep. AL—8 DAS, day operations only. MS—16 DAS, day operations only. LA—30 DAS, day operations only. TX—10 DAS, day operations only.	USCG Class III: R/V *E.O. Wilson,* R/V *Alabama Discovery,* R/V *Defender I,* R/V *Tom McIlwain,* RV *Jim Franks,* R/V *Nueces,* R/V *SanJacinto*. USCG R/V: R/V *Blazing Seven* (2011–2014).	Bottom longline CTD Profiler Water quality and chemistry (YSI instruments, Niskin bottles, turbidity meter).	AL—32 sets. MS—40. LA—98. TX—20. AL—32 casts. LA—40. MS—40 casts. TX—20.
IJA Biloxi Bay Beam Trawl Survey, (MDMR) [1].	MS state waters in Biloxi Bay, 1–5 ft depths.	Annually, Jan–Dec, 25 DAS, day operations only.	USCG Class I: R/V *Grav I,* R/V *Grav II,* R/V *Grav IV*.	Modified beam trawl	11 trawls/month, 132 trawls total.
IJA Inshore Finfish Trawl Survey, (MDMR) [1].	MS state waters from Bay St. Louis, to approximately 2 miles south Cat Island, 5–25 ft depths.	Annually, Jan–Dec, 12 DAS, day operations only.	USCG Class I: small vessel R/V *Geoship*.	Otter trawl	72 trawls.
IJA Open Bay Shellfish Trawl Survey, (TPWD) [1].	TX state waters in Galveston, Matagorda, Aransas, and Corpus Christi Bays and the lower Laguna Madre, 3–30 ft depths.	Annually, Jan–Dec, 120 DAS, day operations only.	USCG Class I: small vessel. USCG Class II: R/V *Trinity Bay,* R/V *Copano Bay,* R/V *RJ Kemp*.	Otter trawl Water quality and chemistry (YSI instruments, Niskin bottles, turbidity meter).	90 trawls/month, 1080 trawls total.

TABLE 1—SUMMARY DESCRIPTION OF FISHERIES AND ECOSYSTEM RESEARCH ACTIVITIES CONDUCTED OR FUNDED BY THE SEFSC IN THE GOMRA, ARA, AND CRA—Continued

Survey name (research agency)	General area of operation	Season, frequency, yearly days at sea (DAS)	Vessel used	Gear used	Number of stations
Oceanic Deep-water Trawl—GOM, (SEFSC) [1].	U.S. GOM waters >500 m deep.	Intermittent due to funding, 20 DAS, 24 hour operations. * conducted in 2009 & 2010 and in the future as funding allows.	USCG R/V: R/V *Gunter,* R/V *Pisces*.	High Speed Midwater Trawl, Aleutian Wing Trawl. CTD profiler and rosette water sampler.	60 trawls (2–3 per day). 60 casts. Tow speed: 0. Duration: 60–90 min.
St. Andrew Bay Juvenile Reef Fish Trawl Survey, (SEFSC) [1].	St. Andrew Bay, FL, up to 2 m depths.	Annually, May–Nov, 28 DAS, day operations only, (one day/week).	USCG Class I: Boston Whaler.	Benthic Trawl	13 trawls per week, 24 weeks, 312 trawls total.
Small Pelagics Trawl Survey, (SEFSC) [1].	U.S. GOM in depths of 50–500 m.	Annually, Oct–Nov, 40 DAS, 24 hour operations (set/haul anytime day or night).	USCG R/V: R/V *Gordon Gunter,* R/V *Pisces*.	High-opening bottom trawl. Simrad ME70 Multi-Beam echosounder. EK60 Multi-frequency single-beam active acoustics. ADCP CTD profiler and rosette water sampler.	150–200 trawls. Continuous. Continuous. Continuous. 250 casts.
SEAMAP–GOM Shrimp/Groundfish Trawl Survey, (SEFSC, FFWCC, ADCNR, USM/GCRL, LDWF) [1].	U.S. GOM from FL to Mexico in depths of 30–360 ft.	Annually, summer (June & July) and fall (Oct–Nov), effort evenly divided between seasons unless noted; all surveys have 24 hour operations-set/haul anytime day or night. SEFSC—80 DAS FL—20 DAS (summer only). AL—6 DAS MS—6 DAS LA—5 DAS	USCG Class II: R/V *Trinity Bay,* R/V *Copano Bay,* R/V *RJ Kemp*. USCG Class III: R/V *A.E. Verrill,* R/V *Alabama Discovery,* R/V *Sabine Lake,* R/V *Nueces,* R/V *San Jacinto,* R/V *San Antonio,* R/V *Matagorda Bay*. USCG R/V: R/V *Oregon II,* R/V *Tommy Munro,* R/V *Weatherbird II,* R/V *Pelican,* R/V *Blazing Seven* (2011–2014), R/V *Point Sur*.	Otter trawl CTD profiler and rosette water sampler TPWD uses YSI Datasonde 6600 v2–4.	Effort evenly divided between seasons unless noted. SEFSC—345 trawls (summer), 325 (fall). FL—160 (summer only). AL—16–24. MS—60. LA—32. SEFSC—395 casts (summer), 305 (fall). FL—200 (summer only). AL—20. MS—81. LA—39.
SEFSC BRD Evaluations, (SEFSC) [1].	State and Federal nearshore and offshore waters off FL, AL, MS, and LA at depths of 10–35 m. Also Mississippi Sound at depths of 3–6 m.	Annually, May & Aug (one week/month), 14 DAS, night operations only.	USCG Class III: R/V *Caretta*.	Western jib shrimp trawls	20 paired trawls each season, 40 paired trawls total.
SEFSC–GOM TED Evaluations, (SEFSC) [1].	State and Federal nearshore and offshore waters off FL, AL, MS, and LA at depths of 10–35 m. Also Mississippi Sound at depths of 3–6 m.	Annually, May, Aug, & Sep (one week/month), 21 DAS, day operations only.	USCG Class I & II: NOAA small boats. USCG Class III: R/V *Caretta*.	Western jib shrimp trawls	30 paired trawls per season, 90 paired trawls total.
SEFSC Skimmer Trawl TED Testing, (SEFSC) [1].	Conducted in Mississippi Sound, Chandeleur Sound, and Breton Sound at depths of 2–6 m.	Annually until 2016 (tentative depending on funding and need) May–Dec, 5–15 DAS/month, 60 DAS total, 24 hour operations-set/haul anytime day or night.	USCG Class III: R/V *Caretta*.	Skimmer trawls	600 paired trawls.
SEFSC Small Turtle TED Testing and Gear Evaluations, (SEFSC) [1].	State waters in St. Andrews Bay, FL and off Shell Island and/or Panama City Beach, FL at depths of 7–10 m.	Annually , 21 DAS, day operations only.	USCG Class III: R/V *Caretta*.	Western jib shrimp trawls are utilized during TED evaluations.	100 paired trawls.
IJA Biloxi Bay Seine Survey, (MDMR) [1].	MS state waters in Biloxi Bay, 1–5 ft depths.	Annually, Jan–Dec, 25 DAS, day operations only.	USCG Class I & II: R/V *Grav I,* R/V *Grav II,* R/V *Grav IV,* small vessel.	Bag seine	11 sets/month, 132 sets total.
IJA Oyster Dredge Monitoring Survey, (MDMR).	MS state waters, at commercially important oyster reefs: Pass Christian Complex, Pass Marianne Reef, Telegraph Reef and St. Joe Reef, in 5–15 ft depths.	Annually, Jan–Dec, 12 DAS, day operations only.	USCG Class I: R/V *Rookie*. USCG Class II: R/V *Silvership*.	Oyster dredge	38 tows.

TABLE 1—SUMMARY DESCRIPTION OF FISHERIES AND ECOSYSTEM RESEARCH ACTIVITIES CONDUCTED OR FUNDED BY THE SEFSC IN THE GOMRA, ARA, AND CRA—Continued

Survey name (research agency)	General area of operation	Season, frequency, yearly days at sea (DAS)	Vessel used	Gear used	Number of stations
IJA Shoreline Shellfish Bag Seine Survey, (TPWD) [1].	TX state waters in Galveston, Matagorda, Aransas, and Corpus Christi Bays and the lower Laguna Madre, 0–6 ft depths.	Annually, Jan–Dec, 120 DAS, day operations only.	N/A	Bag seine	100 sets/month, 1200 total.
Marine Mammal and Ecosystem Assessment Survey-GOM, (SEFSC) [1].	Northern GOM	Every three years, June–Sep, 60 DAS, 24 hour operations (set/haul anytime day or night).	USCG R/V: R/V *Gordon Gunter*.	CTD profiler and rosette water sampler.	60 casts.
				Expendable bathythermographs.	300 units.
				ADCP	Continuous.
				Simrad ME70 Multi-Beam echosounder.	Continuous.
				EK60 Multi-frequency single-beam active acoustics.	Continuous.
				Passive acoustic arrays	Continuous.
Northeast GOM MPA Survey, (SEFSC). *Currently Inactive	Madison-Swanson, Steamboat Lumps, and The Edges marine reserves on the West Florida Shelf.	Annually, Feb–Mar, 60 DAS, day operations only.	USCG Class III: R/V *Caretta*.	4-camera array CTD Profiler	100—200 deployments 100—200 casts.
Panama City Laboratory Reef Fish (Trap/Video) Survey, (SEFSC).	Penscecola, FL to Cedar Key, FL.	Annually, May–Sep, 40 DAS, day operations only.	USCG Class II: *R/V Harold B,* USCG Class III: *R/V Caretta, R/V Defender, R/V Apalachee*.	4-camera array Chevron fish trap outfitted with one GoPro video camera. CTD profiler	200 deployments. 100 sets. 200 casts.
SEAMAP–GOM Finfish Vertical Line Survey, (ADCNR, LDWF, USM/GCRL).	State and Federal waters off Alabama at sampling depths from 60 to 500 ft and LA waters west of the Mississippi River across three depth strata (60–120 ft, 120–180 ft, and 180–360 ft) and selected areas of Texas at three depth strata (33–66 ft, 66–132 ft, and 132–495 ft). Stations are sampled during daylight hours.	AL: Annually, two intervals: spring (Apr/May) and summer (July–Sep), 9 DAS, day operations only. LA and TX: Annually, April–Oct.	USCG Class III: R/V *Escape,* R/V *Lady Ann,* R/V *Defender I*. USCG R/V: R/V *Blazing Seven* (2011–2014), *Poseidon, Trident R/V Sabine, San Jacinto, San Antonio, Nueces, Laguna*.	Bandit gear	AL: 120 sets per season, 240 sets total. LA: 100 sets total. TX: 165 sets total.
	State and Federal waters off MS. Sampling depths 5–55 fathoms.. Stations are sampled during daylight hours.	Annually, Mar–Oct, 16 DAS (4 days/month), day operations only.	USCG Class III: R/V *Jim Franks*.	Bandit gear	15 stations/season—45 stations total, 3 sets per station, 135 sets total.
SEAMAP–GOM Plankton Survey, (ADCNR, LDWF, USM/GCRL).	State and Federal waters off the coast of AL, MS, LA, and FL.	AL: Annually, Aug–Sep, 2 DAS, day operations only. LA: Annually, June, Sep, 2 DAS, day operations only. MS: Annually, May and Sep, 4 DAS, 24 hour operations.	USCG Class III: R/V *A.E. Verrill,* R/V *Alabama Discovery,* R/V *Acadiana*. USCG R/V: R/V *Blazing Seven* (2011–2014), R/V *Point Sur;* R/V *Defender*.	Bongo net Neuston net CTD Profiler	AL: 6 tows. LA: 9 tows. MS: 20 tows. AL: 6 tows. LA: 9 tows. MS/FL: 20 tows. AL: 6 casts. LA: 9 casts. MS/FL: 20 casts.
SEAMAP–GOM Plankton Survey, (SEFSC).	Coastal, shelf and open ocean waters of the GOM.	Annually, Feb–Mar (winter), 30 DAS;. Apr–May (spring), 60 DAS;. Aug–Sep (fall), 36 DAS .. 24 hour operations (set/haul anytime day or night).	USCG R/V: R/V *Oregon II,* R/V *Gordon Gunter,* R/V *Pisces*.	Bongo net Neuston net MOCNESS Methot juvenile fish net .. CTD profiler and rosette water sampler.	650 tows. 650 tows. 378 tows. 126 tows. 756 casts.
SEAMAP–GOM Reef Fish Monitoring, (FFWCC).	West FL shelf from 26°N to Dry Tortugas, FL.	Annual, July–Sep, 50 DAS, daylight hours.	USCG Class I & II: R/V *No Frills,* R/V *Gulf Mariner,* R/V *Sonic,* R/V *Johnson,* chartered fishing vessels. USCG Small R/V: R/V *Bellows,* R/V *Apalachee.* USCG R/V: *R/V Weatherbird*.	2-camera array Chevron fish trap CTD profiler	150 deployments. 300–450 sets. 300 casts.

TABLE 1—SUMMARY DESCRIPTION OF FISHERIES AND ECOSYSTEM RESEARCH ACTIVITIES CONDUCTED OR FUNDED BY THE SEFSC IN THE GOMRA, ARA, AND CRA—Continued

Survey name (research agency)	General area of operation	Season, frequency, yearly days at sea (DAS)	Vessel used	Gear used	Number of stations
SEAMAP–GOM Reef Fish Survey, (SEFSC).	Gulf-wide survey from Brownsville, TX to Key West, FL, in depths of 15–500 ft. Approximately 7.0% of this survey effort (458 stations) occurs within the Florida Garden Banks NMS.	Annual, Apr–July, 60 DAS, 24 hour operations on large vessels (cameras, traps, bandit—daytime only), 12 hour operations on small vessels (daytime only).	USCG Class III: R/V *Caretta*, R/V *Gandy*. USCG R/V: R/V *Pisces*, R/V *Oregon II*. USCG R/V: *Southern Journey*. NOAA Ship: *Gordon Hunter*.	4-camera array ..... Chevron trap (discontinued use in 2013). CTD Profiler ..... Bandit Reels ..... Acoustic Doppler Current Profiler. Simrad ME70 Multi-beam echosounder. EK60 Multi-frequency single-beam active acoustics.	400–600 deployments. 50–100 sets. 400–600 casts. 120 sets. Continuous. Continuous. Continuous.
IJA Oyster Visual Monitoring Survey, (MDMR).	MS state waters, 5–15 ft depths.	Annually, Sep/Oct to Apr/May of following year, 12 DAS, day operations only.	USCG Class I & II: R/V *Silvership*, R/V *Rookie*.	SCUBA divers	~ 20 dives.
Reef Fish Visual Census Survey—Dry Tortugas, Flower Gardens (SEFSC).	Dry Tortugas area in the GOM, <33m deep.	Biannually, May–Sept, 25 DAS, day operations only.	USCG Class II & III: Chartered dive vessel.	SCUBA divers with meter sticks, 30 cm rule and digital camera.	300 stations (4 dives per station).
Tortugas Ecological Reserve Survey, (SEFSC) *. *Currently inactive since 2015..	Tortugas South Ecological Reserve, Florida Keys National Marine Sanctuary.	Biannually, summer (June or July), 6 days, day and night 12 hour operations. *Survey has been discontinued since 2015.	USCG Class II & III: Chartered vessel.	SCUBA divers, transect tape, clipboards/pencils.	16 stations, each station done 2–3 times.
Atlantic Research Area					
ACFCMA American Eel Fyke Net Survey, (SCDNR).	Goose Creek Reservoir or the Cooper River, near Charleston, SC, 1–7 ft depths.	Annually, Feb–Apr, 32 DAS, day operations only.	USCG Class A: John Boat—no motor, walk/wade to work net.	Fyke net ..... Thermometer	1 station per day, 40 collections total. 32 casts.
ACFCMA American Shad Drift Gillnet Survey, (SCDNR) [1].	Santee, Edisto, Waccamaw, Combahee Rivers, SC.	Annual, Jan–Apr, (2–3 trips/week), 40 DAS, day operations only.	USCG Class I: R/V *Bateau* R/V *McKee Craft*.	Drift gillnet	4–5 sets/trip, 120 sets total.
RecFIN Red Drum Trammel Net Survey, (SCDNR).	Coastal estuaries and rivers of SC in depths of 6 ft or less along shoreline..	Annually, Jan–Dec, 120–144 DAS (14–18 days/month), day operations only.	USCG Class I: Florida Mullet Skiffs.	Trammel net	1000 sets/yr covering 225 stations/yr. Operates in 7–9 strata/month.
HMS Chesapeake Bay and Coastal Virginia Bottom Longline Shark Survey, (VIMS) [1].	Chesapeake Bay and state and Federal waters off Virginia.	Annually, May–Oct (5 days/month), 30 DAS, day operations only.	USCG Class III: R/V *Bay Eagle*.	Bottom longline ..... Hydrolab MS5 Sonde	50 sets. 50 casts.
MARMAP Reef Fish Long Bottom Longline Survey, (SCDNR) [1].	South Atlantic Bight (between 27°N and 34°N, but mostly off GA and SC). Sampling occurs in Federal waters. Depths from ~ 500 to 860 ft.	Annually 1996–2012 *, Aug–Oct, 10–20 DAS, day operations only. *Halted in 2012 but will resume annually if funding obtained.	USCG Small R/V: R/V *Lady Lisa*.	Bottom longline ..... CTD profiler	60 sets. 60 casts.
MARMAP/SEAMAP–SA Reef Fish Survey, (SCDNR) [1]. *Inactive 2012–2014	South Atlantic Bight (between 27°N and 34°N).	Annually, year-round but primarily Apr–Oct, 70–120 DAS, day operations only. Bottom longline ..... Bandit reels ..... CTD profiler	USCG R/V: R/V *Palmetto* 60 sets. ..... 400 sets. ..... 300 casts..	Chevron fish trap outfitted with two cameras.	600 sets.
Pelagic Longline Survey-SA, (SEFSC) [1]. (See also effort conducted in the GOMRA).	Cape Hatteras, NC to Cape Canaveral, FL.	Intermittent, Feb–May, 30 DAS, 24 hour operations (set/haul anytime day or night).	USCG R/V: R/V *Oregon II*.	Pelagic Longline ..... CTD profiler	100–125 sets. 100–125 casts.
Shark and Red Snapper Bottom Longline Survey-SA, (SEFSC) [1]. (See also effort conducted in the GOMRA).	Cape Hatteras, NC to Cape Canaveral, FL between bottom depths 9–183 m.	Annually, July–Sep, 60 DAS, 24 hour operations (set/haul anytime day or night).	USCG Class III: R/V *Caretta*. USCG R/V: R/V *Oregon II*, R/V *Gordon Gunter*.	Bottom longline ..... CTD profiler and rosette water sampler. Neuston and bongo effort if needed to augment SEAMAP plankton objectives.	70 sets. 70 casts. 0–20 tows.

TABLE 1—SUMMARY DESCRIPTION OF FISHERIES AND ECOSYSTEM RESEARCH ACTIVITIES CONDUCTED OR FUNDED BY THE SEFSC IN THE GOMRA, ARA, AND CRA—Continued

Survey name (research agency)	General area of operation	Season, frequency, yearly days at sea (DAS)	Vessel used	Gear used	Number of stations
SEAMAP–SA Red Drum Bottom Longline Survey, (NCDEQ, SCDNR, GDNR) [1].	NC: Pamlico Sound or in the nearshore waters of Ocracoke Inlet. SC: Estuaries out to 10 miles in Winyah Bay, Charleston Harbor, St. Helena Sound, and Port Royal Sound. GA: State and Federal waters off the coast of GA and NE FL, (~32°05′N latitude to the north, 29°20′N latitude to the south, 80°30′W longitude to the east, and the coastline to the west.).	Annually ..... NC: mid-July to mid-Oct (2 days/week for 12 weeks), 24 DAS, 12 hour operations, beginning at dusk. SC: Aug–Dec, day operations only 36 DAS GA: Apr–Dec (6 days/month), 54 DAS, day operations only.	USCG Class II: 26 ft outboard. USCG Class III: R/V *Marguerite,* R/V *Silver Crescent*.	Bottom longline ..... YSI (Dissolved oxygen, salinity, temperature).	NC: 75–100 sets total. SC: 360 sets. GA: 200–275 sets. NC: 75–100 casts. SC: 360 casts. GA: 200–275 casts.
ACFCMA Ecological Monitoring Trawl Survey, (GDNR) [1].	Georgia state waters out to three nm, 10–35 ft depths.	Annually, Jan–Dec (7 days/month), 84 DAS, day operations only.	USCG Class III: R/V *Anna*.	Otter trawl ..... YSI 85 (Dissolved oxygen, salinity, temperature).	42 trawls/month, 504 trawls total. 504 casts total.
ACFCMA Juvenile Stage Trawl Survey, (GDNR) [1].	Creeks and rivers of three Georgia sound systems (Ossabaw, Altamaha, and St. Andrew).	Annually, Dec–Jan (3 days/month), 36 DAS, day operations only.	USCG Class I: 19 ft Cape Horn; 25 ft Parker.	Otter trawl ..... YSI 85 (Dissolved oxygen, salinity, temperature).	18 trawls/month, 216 trawls total. 216 casts total.
Atlantic Striped Bass Tagging Bottom Trawl Survey, (USFWS) [1].	North of Cape Hatteras, NC, in state and Federal waters, 30–120 ft depths.	Annually, Jan–Feb, 14 DAS, 24 hour operations (set/haul anytime day or night).	USCG R/V: R/V *Oregon II,* R/V *Cape Hatteras,* R/V *Savannah*.	65 ft high-opening bottom trawls.	200–350 trawls.
Juvenile Sport Fish Trawl Monitoring in Florida Bay, (SEFSC) [1].	Florida Bay, FL	Annually, May–Nov, 35 DAS, day operations only.	USCG Class I: R/V *Batou*.	Otter trawl	~500 trawls.
Oceanic Deep-water Trawl Survey (SEFSC) [1]. *Currently Inactive	Southeastern U.S. Atlantic waters >500 m deep.	Intermittent due to funding, 20 DAS, 24 hour operations (trawls may be set and retrieved day or night), *conducted as funding allows.	USCG R/V: NOAA ships	High Speed Midwater Trawl, Aleutian Wing Trawl. CTD profiler and rosette water sampler.	60 trawls (2–3 per day). 60 casts.
SEAMAP–SA NC Pamlico Sound Trawl Survey, (NCDENR) [1].	Pamlico Sound and the Pamlico, Pungo, and Neuse rivers in waters ≥6 ft deep.	Annually, June & Sep, 20 DAS (10 days/month), day operations only.	USCG Class III: R/V *Carolina Coast*.	Otter trawl: paired mongoose-type Falcon bottom trawls. Ponar grab ..... YSI 556 (Dissolved oxygen, salinity, temperature). Secchi disk	54 trawls each month, 108 trawls total. 54 casts each month, 108 total. 54 casts each month, 108 total. 54 casts each month, 108 total.
SEAMAP–SA Coastal Trawl Survey, (SCDNR) [1].	Cape Hatteras, NC to Cape Canaveral, FL in nearshore oceanic waters of 15–30 ft depth.	Annually, Apr–May (spring), July–Aug (summer), and Oct–Nov (fall), 60–65 DAS, day operations only.	USCG Small R/V: R/V *Lady Lisa*.	Otter trawl: paired mongoose-type Falcon bottom trawls. SEABIRD electronic CTD	300–350 trawls total, evenly divided between seasons. 300–350 casts.
SEFSC–SA TED Evaluations, (SEFSC) [1].	State and Federal waters off Georgia and eastern FL.	Annually, Nov–Apr, 10 DAS, 24 hour operations-set/haul anytime day or night.	USCG Class III: R/V *Georgia Bulldog*.	Otter trawl: Mongoose shrimp trawls.	50 paired trawls.
In-Water Sea Turtle Research (SCDNR) [1].	Winyah Bay, SC to St. Augustine, FL in water depths of 15–45 ft.	Annually, mid-May through late Jul to early Aug, 24–30 DAS, day operations only.	USCG Class III: R/V *Georgia Bulldog*. USCG Small R/V: R/V *Lady Lisa*.	Paired flat net bottom trawls (NMFS Turtle Nets per Dickerson et al. 1995) with tickler chains.	400–450 trawls.

TABLE 1—SUMMARY DESCRIPTION OF FISHERIES AND ECOSYSTEM RESEARCH ACTIVITIES CONDUCTED OR FUNDED BY THE SEFSC IN THE GOMRA, ARA, AND CRA—Continued

Survey name (research agency)	General area of operation	Season, frequency, yearly days at sea (DAS)	Vessel used	Gear used	Number of stations
ACFCMA American Eel Pot Survey for Yellow-phase Eels, (GADNR).	Georgia state waters in the Altamaha River System. Sampling is conducted during daylight hours. Depth ranges from 2 to 20 ft.	Annually. Sampling monthly Nov–Apr. based on water temp. 36 DAS (6 days/month), day operations only.	USCG Class I: 19 ft Cape Horn, 18 ft skiff.	Eel traps/pots with float ..	30 stations (180 sets/month; 30 traps set each of 6 days).
Beaufort Bridgenet Plankton Survey, (SEFSC).	Pivers Island Bridge, NOAA Beaufort facility, Beaufort, NC.	Annually, Nov–May (some years monthly Jan–Dec), night operations only sampling occurs once per week, n + 4 tows per night.	None	Plankton net	125 tows.
Integrated Biscayne Bay Ecological Assessment and Monitoring Project (IBBEAM) Project, (SEFSC).	Western shoreline of Biscayne Bay, FL.	Twice annually, May–Oct (wet season) and Nov–Apr (dry season), 14 DAS, day operations only.	USCG Class II & III vessels.	Human divers	100 dives
				Throw trap	372 casts.
Intraspecific Diversity in Pink Shrimp Survey, (SEFSC).	Florida Bay, Whitewater Bay, Fakahatchee Bay, Biscayne Bay, Sanibel shrimp fishery, Tortugas shrimp fishery.	Annually, June–Aug, 16 DAS, day operations only.	USCG Class I: R/V *Privateer*.	Miniature roller-frame trawl.	40 trawls.
				Dip net	40 samples.
*Currently inactive				Bag seine	40 sets.
Marine Mammal and Ecosystem Assessment Survey-SA, (SEFSC) [1].	Southeastern U.S. Atlantic.	Every three years, June–Sep, 60 DAS, 24 hour operations.	USCG R/V: R/V *Gordon Gunter*.	CTD profiler and rosette water sampler.	60 casts.
				Expendable bathythermographs.	300 units.
				Acoustic Doppler Current Profiler.	Continuous.
				Simrad ME70 Multi-Beam echosounder.	Continuous.
				EK60 Multi-frequency single-beam active acoustics.	Continuous.
				Passive acoustic arrays	Continuous.
RecFIN Red Drum Electrofishing Survey, (SCDNR).	Coastal estuaries and rivers of SC in depths of 6 ft or less in low salinity waters (0–12 ppt).	Annually, Jan–Dec, 60–72 DAS (5–6 days/month), day operations only.	USCG Class I: Small vessels.	18 ft elecrofishing boat ...	360 stations per year (30 sites/month).
St. Lucie Rod-and-Reel Fish Health Study, (SEFSC) [1].	Nearshore reef, inlet, and estuary of St. Lucie River, FL inlet system (Jupiter or Ft. Pierce, FL).	Annually, Jan–Dec, weekly, 156 DAS, day operations only.	USCG Class I: Small vessels.	Rod and reel gear	468 stations per year: 3/day × 3 day/wk.
*Currently inactive					
SEAMAP–SA Gag Ingress Study, (SCDNR).	In the vicinity of Swansboro, NC; Wilmington, NC; Georgetown, SC; Charleston, SC; Beaufort, SC; Savannah, GA; and Brunswick, GA.	Annually, Mar–June, 100 DAS, day operations only.	USCG Class I: Small vessels.	Witham collectors	15 sets (4 collectors at each set), 60 sets total.
*Inactive since 2016					
Southeast Fishery Independent Survey (SEFIS) (SEFSC) [1].	Cape Hatteras, NC, to St. Lucie Inlet, FL. Fifteen survey stations occur within Gray's Reef NMS.	Annually, Apr–Oct, 30–80 DAS, 24 hour operations (cameras & traps-daytime operations, acoustics—anytime day or night).	USCG R/V: R/V *Nancy Foster*, R/V *Pisces,* R/V *Savannah*.	Chevron fish trap outfitted with 2 high-definition video cameras.	1000 deployments.
				CTD profiler	100–200 casts.
				Simrad ME70 Multi-Beam echosounder.	Continuous.
				Multi-frequency single-beam active acoustics.	Continuous.
U.S. South Atlantic MPA Survey, (SEFSC) [1].	Jacksonville, FL to Cape Fear, NC on or near the continental shelf edge at depths between 80 and 600 m.	Annually, May–Aug, 14 DAS, 24 hour operations (ROV daytime operations, acoustics—anytime day or night).	USCG R/V: R/V *Pisces,* R/V *Nancy Foster,* R/V *Spree*.	ROV Phantom S2 vehicle with tether attached to CTD cable.	10–40 deployments.
				CTD profiler	28 casts.
				Simrad ME70 Multi-Beam echosounder.	Every other night for 6–12 hrs.
				EK60 Multi-frequency single-beam active acoustics.	Every other night for 6–12 hrs.

TABLE 1—SUMMARY DESCRIPTION OF FISHERIES AND ECOSYSTEM RESEARCH ACTIVITIES CONDUCTED OR FUNDED BY THE SEFSC IN THE GOMRA, ARA, AND CRA—Continued

Survey name (research agency)	General area of operation	Season, frequency, yearly days at sea (DAS)	Vessel used	Gear used	Number of stations
FL/Dry Tortugas Coral Reef Benthic Survey, (SEFSC).	Survey area encompasses Federal and territorial waters from Dry Tortugas to Martin County, FL. Surveys occur within the Florida Keys NMS (150 stations).	Quarterly-annually, May–Oct, 100 DAS.	USCG Class I & II: small vessels.	SCUBA divers with measuring devices, cameras, and hand tools.	300 dives.
Demographic Monitoring of *Acropora* Species, (SEFSC).	Florida Keys National Marine Sanctuary.	3x per year, ~35 DAS	USCG Class I	SCUBA divers	30 fixed plots.
Reef Fish Visual Census Survey—Florida Keys/SE Florida Shelf, (SEFSC).	Florida Keys NMS and SE Florida Shelf, <33 m deep.	Annually, May–Sep, 25 DAS, day operations only.	USCG Class I: R/V *Aldo Leopold*.	SCUBA divers with meter sticks, 30 cm rule and digital camera.	300 dives.
Caribbean Research Area.					
Caribbean Plankton Recruitment Experiment, (SEFSC).	Caribbean and Mexican waters.	Bi-annually, Feb or June, 15 DAS, 24 hour operations, anytime day or night.	USCG R/V: R/V *Gordon Gunter,* R/V *Nancy Foster*.	Bongo net ..... MOCNESS ..... CTD profiler and rosette water sampler.	75 tows 75 tows 75 casts.
Caribbean Reef Fish Survey, (SEFSC) [1].	PR and USVI, continental shelf waters.	Every two years, Mar–June, 40 DAS, 24 hour operations.	USCG R/V: R/V *Pisces,* R/V *Oregon II*.	Bandit Reels ..... 4-camera array ..... Chevron traps ..... CTD profiler ..... Simrad ME70 Multi-Beam echosounder. Acoustic Doppler Current Profiler. EK60 Multi-frequency single-beam active acoustics.	300 sets. 150 deployments. 100 sets. 300 casts. Continuous. Continuous. Continuous.
Marine Mammal and Ecosystem Assessment Survey-C, (SEFSC) [1].	U.S. Caribbean Sea	Every three years, June–Sep, 60 DAS, 24 hour operations-acoustics—anytime day or night.	USCG R/V: R/V *Gordon Gunter*.	CTD profiler and rosette water sampler. Expendable bathythermographs Acoustic Doppler Current Profiler. Simrad ME70 Multi-Beam echosounder. EK60 Multi-frequency single-beam active acoustics. Passive acoustic arrays	60 casts. 300 units. Continuous. Continuous. Continuous. Continuous.
SEAMAP–C Reef Fish Survey (PR–DNER, USVI–DFW). *Began 2017	USVI and PR territorial and Federal waters at 15–300 ft depths.	Annually, Jan–Dec, ... (Day operations only) ..... PR: 70 DAS for each coast. USVI: ~30 DAS.	USCG Class I & III: ..... *Three chartered vessels*	Camera array—two GoPro cameras and four lasers set on an aluminum frame.	PR: 120 per coast total of 240. USVI: 72 per island, 144 total.
SEAMAP–C Lane Snapper Bottom Longline Survey, (PR–DNER) [1].	East, west, and south coasts of PR in territorial and Federal waters at depths ranging from 15–300 ft.	Annually beginning July 2015, (summer, winter, fall, spring), 120 DAS (30 days/season), night operations only.	USCG Class III: *Two chartered vessels*.	Bottom longline	45 sets/season, 180 sets total.
SEAMAP–C Yellowtail Snapper Rod-and-Reel Survey, (PR–DNER) [1].	East, west, and south coasts of PR in territorial and Federal waters at depths ranging from 15–300 ft.	Annually beginning 2014, (4 sampling seasons), 120 DAS, night operations only.	USCG Class I & III: *Three chartered vessels*.	Rod-and-reel gear	120 stations (360 lines total).
Caribbean Coral Reef Benthic Survey, (SEFSC).	Federal and territorial waters around PR, USVI, and Navassa.	Annual to triennial, May–Oct, 30 DAS, day operations only.	USCG Class I & II: Small vessel <28 ft.	SCUBA divers with measuring devices and hand tools.	300 dives.
Reef Fish Visual Census Survey—U.S. Caribbean, (SEFSC).	PR and USVI waters <100 ft deep.	Annually, May–Sept, 25 DAS, day operations only.	USCG Class I & II: Small vessel <24 ft.	SCUBA divers with meter sticks, 30 cm rule and digital camera.	300 dives.
SEAMAP–C Queen Conch Visual Survey, (PR–DNER, USVI–DFW).	PR and USVI territorial waters in 10–90 ft depths, some sampling occurs in Federal waters.	Annually, ... PR: July–Nov, 35 DAS ... USVI: June–Oct, 62 DAS, day operation only.	USCG Class I & III: *Three chartered vessels*.	SCUBA divers, SCUBA gear and underwater scooters.	PR: 100 dives. USVI: 62 dives.
SEAMAP–C Spiny Lobster Post Larvae Settlement Surveys, (PR–DNER).	PR territorial waters in 6–90 ft depths.	Every four years ..... West cost of PR: Jan–Dec, 84 DAS.	USCG Class I & III: *Three chartered vessels*. R/V Erdman.	Fifty-six modified Witham pueruli collectors.	6 stations along the west coast platform per depth and distance from the shoreline.

TABLE 1—SUMMARY DESCRIPTION OF FISHERIES AND ECOSYSTEM RESEARCH ACTIVITIES CONDUCTED OR FUNDED BY THE SEFSC IN THE GOMRA, ARA, AND CRA—Continued

Survey name (research agency)	General area of operation	Season, frequency, yearly days at sea (DAS)	Vessel used	Gear used	Number of stations
SEAMAP–C Spiny Lobster Artificial Habitat Survey, (PR–DNER, USVI–DFW).	PR and USVI territorial waters in 6–90 ft depths.	Annually, ... PR: Jan–Dec, 84 DAS ... USVI: Jan–Dec, 20 DAS, day operations only.	USCG Class I & III: *Three chartered vessels.*	Juvenile lobster artificial shelters. SCUBA divers, SCUBA gear and underwater scooters.	10 shelters, continuous deployment. PR: 60 dives. USVI: 20 dives.

[1] These surveys have the potential to take marine mammals through M/SI and/or Level B harassment.
* Inactive projects are currently not conducted but could resume if funds became available.

Gillnets—A gillnet is a wall of netting that hangs in the water column, typically made of monofilament or multifilament nylon. Mesh sizes are designed to allow fish to get only their head through the netting, but not their body. The fish's gills then get caught in the mesh as the fish tries to back out of the net. A variety of regulations and factors determine the mesh size, length, and height of commercial gillnets, including area fished and target species. Gillnets can be fished floating or sinking, and stationary or drifting. Set gillnets are attached to poles fixed in the substrate or an anchor system to prevent movement of the net (*i.e.,* stationary) while drift gillnets are free-flowing but kept afloat at the proper depth using a system of weights and buoys attached to the headrope, footrope, or floatline.

A trammel net is a type of gillnet. However, unlike single wall gillnets, which will catch a narrow range of fish sizes, a trammel net is a type of gillnet that will catch a wide variety of fish sizes. Essentially, a trammel net is three layers of netting tied together on a common floatline and common leadline. The two outer layers of netting (known as walls or brails) are constructed out of large mesh netting (12 in to 18 in square) with a twine size of #9 multifilament nylon or 0.81 millimeter (mm) to 0.90 mm monofilament. The light-weight or fine netting sandwiched between the two walls is usually small mesh multifilament or monofilament gill netting. Trammel nets have a large amount of lightweight gill netting hung in the nets, and fish will be caught by gilling or by tangling in the excess netting.

Trammel nets are only used by the SCDNR in the ARA. The SCDNR sets trammel nets in depths of 6 ft or less along a shoreline. Scientists monitor the immediate area 15 minutes prior to deploying the gear. Before the net is set, while the net is being deployed, during the soak, and during haulback, the scientists monitor the net and waters around the net, maintaining a lookout for protected species. Survey protocol calls for a short, 10 minute soak time before the net is hauled.

A total of six survey programs (3 in GOMRA, 3 in ARA) utilize gillnets to accomplish the SEFSC's research objectives (see Table 1–1 in SEFSC's application). In total, 545 set gillnet deployments and 96 sinking gillnet deployments would be made in the GOMRA, primarily in bays, sounds, and estuaries. These surveys occur year-round and each set typically lasts up to 1 hour with the exception of the gillnets fished in shallow waters (0.2 to 1 m) for the Smalltooth Sawfish Abundance Survey which can last 1 to 4 hours. In the ARA, 120 drift gillnet sets would be deployed in rivers and estuaries for the American Shad Drift Gillnet Survey conducted by the SCDNR.

Trawl nets—A trawl is a funnel-shaped net towed behind a boat to capture fish. The codend (or bag) is the fine-meshed portion of the net most distant from the towing vessel where fish and other organisms larger than the mesh size are retained. In contrast to commercial fishery operations, which generally use larger mesh to capture marketable fish, research trawls often use smaller mesh to enable estimates of the size and age distributions of fish in a particular area. The body of a trawl net is generally constructed of relatively coarse mesh that functions to gather schooling fish so that they can be collected in the codend. The opening of the net, called the mouth, is extended horizontally by large panels of wide mesh called wings. The mouth of the net is held open by hydrodynamic force exerted on the trawl doors attached to the wings of the net. As the net is towed through the water, the force of the water spreads the trawl doors horizontally apart. The top of a net is called the headrope, and the bottom is called the footrope.

The SEFSC uses several types of trawl nets: Aleutian Wing Trawl, otter trawls, semi-balloon shrimp trawl, mongoose trawl, western jib shrimp trawls, skimmer trawls, roller frame trawl, and modified beam trawl. Bottom trawls (*e.g.,* shrimp trawls) are designed to capture target species at or near the seafloor. Skimmer trawls are used at the surface. Contrary to skimmer trawls, bottom trawls are not usually visible after they are deployed because they operate at or near the sea floor and the optical properties of the water limit the ability to see the bottom from the surface. Pelagic trawls are designed to operate at various depths within the water column and are most commonly set at the surface or mid-water depths. The trawl gear may be constructed and rigged for various target species and to operate over different types of bottom surfaces.

Trawls typically used in estuaries include semi-balloon shrimp trawls (fished near creeks and rivers of Georgia Sound) and miniature roller-frame trawls (fished at various South Florida estuaries). In coastal waters, the types of trawls (and operating depths) SEFSC and partners typically use include modified beam trawls (1–5 ft), otter trawls (3–360 ft), benthic trawls (up to 7 ft), western jib shrimp trawls (10–20 ft), and skimmer trawls (7–20 ft). Typical offshore trawls (and operating depths) include high speed midwater trawls (> 1,600 ft), Aleutian wing trawls (> 1,600 ft), and high-opening bottom trawls (160 to 1,600 ft).

All trawls have a lazy line attached to the codend. The lazy line floats free during active trawling, and as the net is hauled back, it is retrieved with a boat- or grappling-hook to assist in guiding and emptying the trawl nets. Twisted, three-strand, polypropylene is the most commonly used type of rope for lazy lines due to cost, strength, handling, and low specific gravity (0.91), which allows it to float.

Active acoustic devices (described later) incorporated into the research vessel and the trawl gear monitor the position and status of the net, speed of the tow, and other variables important to the research design. Gear details, schematics, and photos associated with each of these trawl net categories can be found in Table 1–1 of the SEFSC's application and Appendix A of the SEFSC's Draft PEA.

For research purposes, the speed and duration of the tow and the characteristics of the net must be standardized to allow meaningful comparisons of data collected at different times and locations. Typically, tow speed ranges from 2–4 knots (kts) while duration can range from thirty seconds to 3 hours at target depth; however most trawls last less than 30 minutes. The shorter trawls (30 seconds to 30 minutes) occur in estuaries and coastal waters less than 500 meters in depth while the longer trawls (1–3 hours) are reserved for offshore, deepwater research. The only exceptions to this are the BRD Evaluation Survey designed to test various gear for the shrimp fishery in the Gulf of Mexico and the SEFSC-South Atlantic (SA) Turtle Exclusion Device (TED) Evaluation Survey designed to test bycatch reduction devices and TEDs for commercial fishing vessels in the Atlantic Ocean. A total of 40 paired BRD Evaluation Survey trawls occur annually in May and August in state and Federal nearshore and offshore waters, including Mississippi Sound. Each trawl can last up to 2 hours. Fifty paired SEFSC–SA TED Evaluation Survey trawls occur annually from November through April in state and Federal waters off Georgia and Florida, and each trawl can last up to 4 hours.

Bag seines—Bag seines used in the GOMRA during the Inter-jurisdictional Fisheries Act (IJA) Biloxi Bay Seine Survey and IJA Shoreline Shellfish Bag Seine Survey are 50–60 feet long with 6 ft deep lateral wings (½ in stretch nylon multifilament mesh) and 6 ft wide central bag. They are both fished by hand with the Biloxi Bay survey having a 20 minute soak time and the shoreline survey having a 2–3 minute soak time. Bag seines used in the Intraspecific Diversity Pink Shrimp Survey (also in the GOMRA) are 9 ft long and taper from 50 to 10 in at the closed codend. Bag seines and similar gear are not considered to pose any risk to protected species because of their small size, slow deployment speeds, and/or structural details of the gear and are therefore not subject to specific mitigation measures. However, the officer on watch and crew monitor for any unusual circumstances that may arise at a sampling site and use their professional judgment and discretion to avoid any potential risks to marine mammals during deployment of all research equipment.

Plankton nets—SEFSC research activities include the use of several plankton sampling nets that employ very small mesh to sample plankton from various parts of the water column. Plankton sampling nets usually consist of fine mesh attached to a weighted frame. The frame spreads the mouth of the net to cover a known surface area.

1. Bongo nets are used by the SEFSC during various plankton surveys conducted throughout the three research areas. Bongo nets are also used to collect additional data during shark and finfish surveys. Bongo nets consist of two cylindrical nets that come in various diameters and fine mesh sizes (Figure A–13). The bongo nets are towed through the water at an oblique angle to sample plankton over a range of depths. During each plankton tow, the bongo nets are deployed to a depth of approximately 210 m and are then retrieved at a controlled rate so that the volume of water sampled is uniform across the range of depths. In shallow areas, the sampling protocol is adjusted to prevent contact between the bongo nets and the seafloor. A collecting bucket, attached to the end of the net, is used to contain the plankton sample. When the net is retrieved, the collecting bucket can be detached and easily transported to a laboratory. Some bongo nets can be opened and closed using remote control to enable the collection of samples from particular depth ranges. A group of depth-specific bongo net samples can be used to establish the vertical distribution of zooplankton species in the water column at a site. Bongo nets are generally used to collect zooplankton for research purposes and are not used for commercial harvest. There are no documented takes of marine mammals incidental to SEFSC research using bongo nets.

2. *Neuston net*—Neuston nets are used to collect zooplankton that lives in the top few centimeters of the sea surface (the neuston layer). This specialized net has a rectangular mouth opening (usually 2 or 3 times as wide as deep, *i.e.* 60 cm by 20 cm). They are generally towed half submerged at 1–2 kts from the side of the vessel on a boom to avoid the ship's wake. There are no documented takes of marine mammals incidental to SEFSC research using bongo nets.

3. *Other small nets*—The SEFSC also uses Methot juvenile fish nets, Multiple Opening/Closing Net and Environmental Sensing System (MOCNESS), and bag seines. A complete description of this gear and SEFSC operational protocols can be found in Appendix A of the SEFSC's Draft PEA. There are no documented takes of marine mammals and NMFS incidental to research using this gear.

Oyster Dredge—Oyster dredges are constructed from a metal frame with metal chain netting. Along the front edge of the dredge is a long bar with teeth that are dragged on the seafloor to pick up oysters and deposit them into the chain mesh netting. The oyster dredge used for the Mississippi Department of Marine Resource Oyster surveys consists of a nine-tooth bar about 20 inches wide with teeth 4 in. long and spaced 2 in. apart. There are no documented takes of marine mammals incidental to SEFSC research using oyster dredges.

Hook and Line Gear—A variety of SEFSC surveys use hook-and-line gears to sample fish either in the water column or in benthic environments. These gear types include baited hooks deployed on longlines as well as rod-and-reel and bandit gear deployments.

1. Longline—Longlines are basically strings of baited hooks that are either anchored to the bottom, for targeting groundfish, or are free-floating, for targeting pelagic species and represent a passive fishing technique. Pelagic longlines, which notionally fish near the surface with the use of floats, may be deployed in such a way as to fish at different depths in the water column. For example, deep-set longlines targeting tuna may have a target depth of 400 m, while a shallow-set longline targeting swordfish is set at 30–90 m depth. We refer here to bottom and pelagic longlines. Any longline generally consists of a mainline from which leader lines (gangions) with baited hooks branch off at a specified interval and is left to passively fish, or soak, for a set period of time before the vessel returns to retrieve the gear. Longlines are marked by two or more floats that act as visual markers and may also carry radio beacons; aids to detection are of particular importance for pelagic longlines, which may drift a significant distance from the deployment location. Pelagic longlines are generally composed of various diameter monofilament line and are generally much longer, and with more hooks, than are bottom longlines. Bottom longlines may be of monofilament or multifilament natural or synthetic lines.

Longline vessels fish with baited hooks attached to a mainline (or groundline). The length of the longline and the number of hooks depend on the species targeted, the size of the vessel, and the purpose of the fishing activity. Hooks are attached to the mainline by another thinner line called a gangion. The length of the gangion and the distance between gangions depends on the purpose of the fishing activity. Depending on the fishery, longline gear can be deployed on the seafloor (bottom longline), in which case weights are

attached to the mainline, or near the surface of the water (pelagic longline), in which case buoys are attached to the mainline to provide flotation and keep the baited hooks suspended in the water.

Target species for pelagic longline surveys conducted by the SEFSC are pelagic sharks and finfish species. These pelagic longline protocols have a five-nautical mile mainline with 100 gangions. The time period between completing deployment and starting retrieval of the longline gear is referred to as the soak time. Soak time is an important parameter for calculating fishing effort and is typically three hours for SEFSC surveys. Short soak times can help reduce longline interactions with sea turtles and marine mammals. Bottom longlines used by the SEFSC to survey species in deeper water, including sablefish, have a one-mile long monofilament mainline that is anchored on the seafloor with weights at the mid-point and ends. The line is marked at the surface by radar high flyers.

2. Bandit Reels—Bandit reels are heavy duty fishing reels that are used for deep sea fishing. These are used by the SEFSC to sample fish in the nearshore reef inlet and estuary of the St. Lucie River, Florida. The SEFSC uses a bandit reel with a vertical mainline and 10 gangions that is either deployed from the vessel and marked at the surface by a buoy or is fished while maintaining an attachment to the reel. The hook sizes used are 8/0, 11/0, or 15/0 circle hooks with 0 offset.

Traps and pots—Traps and pots are submerged, three-dimensional devices, often baited, that permit organisms to enter the enclosure but make escape extremely difficult or impossible. Most traps are attached by a rope to a buoy on the surface of the water and may be deployed in series. The trap entrance can be regulated to control the maximum size of animal that can enter, and the size of the mesh in the body of the trap can regulate the minimum size that is retained. In general, the species caught depends on the type and characteristics of the pot or trap used. The SEFSC uses fyke nets and various types of small traps and cages.

1. *Fyke nets*—A fyke net is a fish trap that consists of cylindrical or cone-shaped netting bags that are mounted on rings or other rigid structures and fixed on the bottom by anchors, ballast or stakes (Figure A–19). Fyke traps are often outfitted with wings and/or leaders to guide fish towards the entrance of the bags. The Fyke nets used by the SEFSC are constructed with wings that are 18.8 x 9 feet and bag netting of 700 micron mesh.

2. *Chevron traps, shrimp cages, eel traps and throw traps*—Chevron fish traps are wire mesh fish cages that are used to sample fish populations (Figure A–23). The SEFSC uses several different chevron fish traps of various dimensions that are baited to attract target species. Shrimp cages come in various shapes and are constructed of 1-inch PVC poles that were oriented vertically attached to two fiberglass hoops and wrapped in 2mm mesh netting. They work by being lowered from a vessel or shore onto the bottom of the sea floor where they are baited and left for a certain amount of time and then later retrieved. The SEFSC uses 16 x 20 x 11 inch eel traps with ½-inch metal mesh. The openings for the internal funnels are 2 x 3 inches and the trap is baited with horseshoe crabs and shrimp heads. Throw traps are small open ended boxes of aluminum with 1 m^2 walls and a depth of 45 cm. Research using any of these traps or cages has little to no potential to result in marine mammal harassment.

Conductivity, temperature, and depth profilers (CTD)—A CTD profiler measures these parameters and is the primary research tool for determining chemical and physical properties of seawater. A CTD profiler may be a fairly small device or it may be deployed with a variety of other oceanographic sensors and water sampling devices in a large (1 to 2 meter diameter) metal rosette wheel. The CTD profiler is lowered through the water column on a cable, and CTD data are collected either within the device or via a cable connecting to the ship. The data from a suite of samples collected at different depths are often called a depth profile, and are plotted with the value of the variable of interest on the x-axis and the water depth on the y-axis. Depth profiles for different variables can be compared in order to glean information about physical, chemical, and biological processes occurring in the water column.

Remotely Operated Vehicle—The Super Phantom S2 (Figure A–26) is a powerful, versatile remotely operated vehicle (ROV) with high reliability and mobility. This light weight system can be deployed by two operators and is designed as an underwater platform which provides support services including color video, digital still photography, navigation instruments, laser scaling device, lights, position information of the ROV and support ship, vehicle heading, vehicle depth, and a powered tilt platform. The Mini ROV is used during the SEFSC Panama City Reef Fish survey to help conduct line surveys and identify cryptic and rare fish species in the Gulf of Mexico.

Description of Active Acoustic Sound Sources—A wide range of active acoustic devices are used in SEFSC fisheries surveys for remotely sensing bathymetric, oceanographic, and biological features of the environment. Most of these sources involve relatively high frequency, directional, and brief repeated signals tuned to provide sufficient focus and resolution on specific objects. SEFSC active acoustic sources include various echosounders (*e.g.,* multibeam systems), scientific sonar systems, positional sonars (*e.g.,* net sounders for determining trawl position), and environmental sensors (*e.g.,* current profilers). The SEFSC also uses passive listening sensors (*i.e.,* remotely and passively detecting sound rather than producing it), which do not have the potential to impact marine mammals.

Underwater acoustic sources typically used for scientific purposes operate by creating an oscillatory overpressure through rapid vibration of a surface, using either electromagnetic forces or the piezoelectric effect of some materials. A vibratory source based on the piezoelectric effect is commonly referred to as a transducer. Transducers are usually designed to excite an acoustic wave of a specific frequency, often in a highly directive beam, with the directional capability increasing with operating frequency. The main parameter characterizing directivity is the beam width, defined as the angle subtended by diametrically opposite ''half power'' (-3 dB) points of the main lobe. For different transducers at a single operating frequency, the beam width can vary from 180 ° (almost omnidirectional) to only a few degrees. Transducers are usually produced with either circular or rectangular active surfaces. For circular transducers, the beam width in the horizontal plane (assuming a downward pointing main beam) is equal in all directions, whereas rectangular transducers produce more complex beam patterns with variable beam width in the horizontal plane. In general, the more narrow the beam, the shorter distance to which the sound propagates.

The types of active sources employed in fisheries acoustic research and monitoring may be considered in two broad categories here (Category 1 and Category 2), based largely on their respective operating frequency (*i.e.,* within or outside the known audible range of marine species) and other output characteristics (*e.g.,* signal duration, directivity). As described

below, these operating characteristics result in differing potential for acoustic impacts on marine mammals.

Before identifying the active acoustic sources used by the SEFSC, we further describe scientific sonar sound source characteristics here relevant to our analysis. Specifically, we look at the following two ways to characterize sound: By its temporal (continuous or intermittent) and its pulse properties (*i.e.,* impulsive or non-impulsive). Continuous sounds are those whose sound pressure level remains above that of the ambient sound, with negligibly small fluctuations in level (NIOSH, 1998; ANSI, 2005), while intermittent sounds are defined as sounds with interrupted levels of low or no sound (NIOSH, 1998).

Sounds can also be characterized as either impulsive or non-impulsive. Impulsive sounds are typically transient, brief (< 1 sec), broadband, and consist of a high peak pressure with rapid rise time and rapid decay (ANSI, 1986; NIOSH, 1998). Impulsive sounds, by definition, are intermittent. Non-impulsive sounds can be broadband, narrowband or tonal, brief or prolonged, and typically do not have a high peak sound pressure with rapid rise/decay time that impulsive sounds do (ANSI 1995; NIOSH 1998). Non-impulsive sounds can be intermittent or continuous. Scientific sonars, such as the ones used by the SEFSC, are characterized as intermittent and non-impulsive. Discussion on the appropriate harassment threshold associated with these types of sources based on these characteristics can be found in the *Estimated Take* section.

Category 1 active fisheries acoustic sources include those with high output frequencies (>180 kHz) that are outside the known functional hearing capability of any marine mammal. Example Category 1 sources include short range echosounders and acoustic Doppler current profilers). These sources also generally have short duration signals and highly directional beam patterns, meaning that any individual marine mammal would be unlikely to even detect a signal.

While sounds that are above the functional hearing range of marine animals may be audible if sufficiently loud (*e.g.,* Møhl, 1968), the relative output levels of the sources used by the SEFSC would only be detectable to marine mammals out to a few meters from the source. If detected, these sound levels are highly unlikely to be of sufficient intensity to result in behavioral harassment. Two recent studies (Deng *et al.,* 2014; Hastie *et al.,* 2014) demonstrate some behavioral reaction by marine mammals to acoustic signals at frequencies above 180 kHz. These studies generally indicate only that sub-harmonics could be detectable by certain species at distances up to several hundred meters. However, this detectability is in reference to ambient noise, not any harassment threshold for assessing the potential for Level B incidental take for these sources. Source levels of the secondary peaks considered in these studies—those within the hearing range of some marine mammals—range from 135–166 dB, meaning that these sub-harmonics would either be below the threshold for behavioral harassment (160 dB) or would attenuate to such a level within a few meters. Beyond these important study details, these high-frequency (*i.e.,* Category 1) sources and any energy they may produce below the primary frequency that could be audible to marine mammals would be dominated by a few primary sources that are operated near-continuously, and the potential range above threshold would be so small as to essentially discount them. Therefore, Category 1 sources are not expected to have any effect on marine mammals and are not considered further in this document.

Category 2 acoustic sources, which would be present on many vessels operating under this rulemaking include a variety of single, dual, and multi-beam echosounders (many with a variety of modes), sources used to determine the orientation of trawl nets, and several current profilers with lower output frequencies than Category 1 sources. Category 2 active acoustic sources have moderate to high output frequencies (10 to 180 kHz) that are generally within the functional hearing range of marine mammals and therefore have the potential to cause behavioral harassment. However, while likely potentially audible to certain species, these sources have generally short ping durations and are typically highly directional (*i.e.,* narrow beam width) to serve their intended purpose of mapping specific objects, depths, or environmental features. These characteristics reduce the likelihood and or spatial extent of an animal receiving or perceiving the signal. In addition, sources with relatively lower output frequencies coupled with higher output levels, can be operated in different output modes (*e.g.,* energy can be distributed among multiple output beams) which may lessen the likelihood of perception by and potential impact on marine mammals.

Category 2 active acoustic sources are unlikely to be audible to whales and most pinnipeds, whereas they may be detected by odontocete cetaceans and high frequency specialists. Category 2 sources are described further in detail below because, unlike Category 1 sources, they have the potential to take a marine mammal by Level B (behavioral) harassment.

The acoustic system used during a particular survey is optimized for surveying under specific environmental conditions (*e.g.,* depth and bottom type). Lower frequencies of sound travel further in the water than in air but provide lower resolution (*i.e.,* are less precise). Pulse width and power may also be adjusted in the field to accommodate a variety of environmental conditions. Signals with a relatively long pulse width travel further and are received more clearly by the transducer (*i.e.,* good signal-to-noise ratio) but have a lower range resolution. Shorter pulses provide higher range resolution and can detect smaller and more closely spaced objects in the water. Similarly, higher power settings may decrease the utility of collected data. Power level is also adjusted according to bottom type, as some bottom types have a stronger return and require less power to produce data of sufficient quality. Power is typically set to the lowest level possible in order to receive a clear return with the best data.

Survey vessels may be equipped with multiple acoustic systems; each system has different advantages that may be utilized depending on the specific survey area or purpose. In addition, many systems may be operated at one of two frequencies or at a range of frequencies. Characteristics of these sources are summarized in Table 2.

1. *Multi-Frequency Narrow Beam Scientific Echosounders (Simrad EK60)*—Echosounders and sonars work by transmitting acoustic pulses into the water that travel through the water column, reflect off the seafloor, and return to the receiver. Water depth is measured by multiplying the time elapsed by the speed of sound in water (assuming accurate sound speed measurement for the entire signal path), while the returning signal itself carries information allowing ''visualization'' of the seafloor. Multi-frequency split-beam sensors are deployed from SEFSC survey vessels to acoustically map the distributions and estimate the abundances and biomasses of many types of fish; characterize their biotic and abiotic environments; investigate ecological linkages; and gather information about their schooling behavior, migration patterns, and avoidance reactions to the survey vessel. The use of multiple frequencies allows coverage of a broad range of marine

acoustic survey activity, ranging from studies of small plankton to large fish schools in a variety of environments from shallow coastal waters to deep ocean basins. Simultaneous use of several discrete echosounder frequencies facilitates accurate estimates of the size of individual fish and can also be used for species identification based on differences in frequency-dependent acoustic backscattering between species. The SEFSC uses devices that transmit and receive at six frequencies from 18 to 333 kHz.

2. *Multibeam Echosounder and Sonars (Simrad ME70, MS70, SX90)*—Multi-beam echosounders and sonars work by transmitting acoustic pulses into the water then measuring the time required for the pulses to reflect and return to the receiver and the angle of the reflected signal. However, the use of multiple acoustic ''beams'' allows coverage of a greater area compared to single beam sonar. The sensor arrays for multibeam echosounders and sonars are usually mounted on the keel of the vessel and have the ability to look horizontally in the water column as well as straight down. Multibeam echosounders and sonars are used for mapping seafloor bathymetry, estimating fish biomass, characterizing fish schools, and studying fish behavior. The multi-beam echosounders used by the SEFSC emit frequencies in the 70–120 kHz range.

3. *Acoustic Doppler Current Profiler (ADCP)*—An ADCP is a type of sonar used for measuring water current velocities simultaneously at a range of depths. It can be mounted to a mooring or to the bottom of a boat. The ADCP works by transmitting ''pings'' of sound at a constant frequency into the water. As the sound waves travel, they ricochet off particles suspended in the moving water and reflect back to the instrument (WHOI 2011). Sound waves bounced back from a particle moving away from the profiler have a slightly lowered frequency when they return and particles moving toward the instrument send back higher frequency waves. The difference in frequency between the waves the profiler sends out and the waves it receives is called the Doppler shift. The instrument uses this shift to calculate how fast the particle and the water around it are moving. Sound waves that hit particles far from the profiler take longer to come back than waves that strike close by. By measuring the time it takes for the waves to return to the sensor and the Doppler shift, the profiler can measure current speed at many different depths with each series of pings (WHOI 2011).

4. *Trawl Monitoring Systems (Simrad ITI)*—Trawl monitoring systems allow continuous monitoring of net dimensions during towing to assess consistency, maintain quality control, and provide swept area for biomass calculations. Transponders are typically located in various positions on the trawl or cables connecting the trawl to the ship. Data are monitored in real time to make adjustments in ship speed or depth of trawl to meet survey protocols. This system operates in the 27- 33 kHz range, below the functional hearing range of all marine mammals.

TABLE 2—OPERATING CHARACTERISTICS OF SEFSC ACTIVE ACOUSTIC SOURCES

Active acoustic system	Operating frequencies (kHz)	Maximum source level (dB re: 1μPa @1 m)	Nominal beamwidth	Effective exposure area: Sea surface to 200 m depth (km^2)	Effective exposure area: Sea surface to 160 dB threshold depth (km^2)
Simrad EK60 narrow beam echosounder	18, 38, 70, 120, 200*, 333*	224	11° @18 kHz, 7° @38 kHz	0.0142	0.1411
Simrad ME70 multibeam echosounder	70–120	205	140°	0.0201	0.0201
Teledyne RD Instruments ADCP, Ocean Surveyor	75	223.6	N/A	0.0086	0.0187
Simrad EQ50	50, 200*	210	16 @50kHz, 7 @200kHz	0.0075	0.008
Simrad ITI Trawl Monitoring System	27–33	<200	40° × 100°	0.0032	0.0032

*Devices working at this frequency is outside of known marine mammal hearing range and is not considered to have the potential to result in marine mammal harassment.

SEFSC Vessels Used for Survey Activities

The SEFSC and its research partners use a variety of different types and sizes of vessels to meet their needs and objectives. Vessels may be owned and operated by NMFS, owned and operated by the cooperative partners, or chartered. Vessels vary in size, including, small fishing vessels (U.S. Coast Guard [USCG] Class A—up to 16 ft. and Class I—16 to <26 ft.), medium vessels (USCG Class II—26 to <40 ft. and Class III—40 to 65 ft.), USCG Small Research Vessel (R/V) (>65 ft. and <300 gross tons) and USCG Research Vessel (R/V) (>65 ft. and >300 gross tons). Several Motor Vessels (M/V) >65 feet and USCG Research Vessels are also chartered and used by partner agencies. Please see Appendix A of the SEFSC's Draft PEA for detailed information on all vessels over 65 ft used during fisheries research.

TPWD Gillnet Research

TPWD conducts a long-term standardized fishery-independent monitoring program to assess the relative abundance and size of finfish and shellfish in Texas bays. TPWD is mandated by the Texas Legislature to conduct continuous research and study the supply, economic value, environment, and breeding habits of the various species of finfish, shrimp and oysters under Parks and Wildlife Code sections 66.217, 76.302 and 77.004. Results from this program are primarily used by the agency to manage Texas' marine finfish and shellfish resources. Data are also available for use by other agencies (*e.g.,* USFWS, Gulf of Mexico Fishery Management Council, Gulf States Marine Fisheries Commission, Texas Water Development Board, and Texas Commission on Environmental Quality), universities, non-governmental organizations, and the private sector.

The current sampling protocol began in the spring of 1983 for seven of the ten bay systems; the remaining three bay systems were gradually added. The number of gill net sets was standardized in 1985. The monitoring program utilizes a stratified random sample design, with each bay system as an independent stratum. Gill net sample locations are randomly selected from grids (1 minute latitude by 1 minute longitude), with each selected grid further subdivided into 144 5-second gridlets. Sample sites are then randomly selected from gridlets containing less than 15.2 m of shoreline.

TPWD utilizes gill nets to conduct fishery-independent modeling on relative abundance, diversity, and age

and size distributions of adult and subadult finfish in Texas waters. Samples collected also provide data for genetic, life history and age and growth analyses. Statistically, gill nets provide for the lowest variability and the best fishery-independent measure of adult and subadult finfish abundance with a low coefficient of variation for most species requiring a low sample size. Standardized sampling methods have low operational bias allowing comparison between and among bay systems and years.

Gill nets are typically set in shallow open bay systems with little to no tidal movement. In this type of system, long gill net soak times are needed to catch a statistically-significant number of fish. The average number of fish caught in the overnight gill net sets is 90 fish per gill net which equates to 1 fish per 27 ft^2 or 6.7 ± 0.07 fish per hour (CPUE) of all species per hour. CPUE for two important recreational species, red drum and spotted seatrout, is 0.97 ± .02 and 0.68 ± .01 respectively.

Each gillnet is 183 m (600 ft) long, 1.2 m (3 ft) deep, and comprised of four 45 m (150 ft) long panels. Each panel is a different sized mesh: 7.6 cm (3 in.), 10.2 cm (4 in.), 12.7 cm (5 in.), and 15.2 cm (6 in.) to capture different sized fish. Each panel is sewn to the next panel; therefore, there are no gaps between panels. Currently, the float line and net mesh are tied together at 8 in. intervals. This results in a 6–8 in gap between the float line and the mesh when the net is set. TPWD will modify this design so that the float line and net mesh are tied together at 4 in. intervals. This will reduce the gap to approximately one to two inches. This gear modification would also be done for the lead line to reduce gaps between the lead line and net mesh. Reducing gaps between the lines and mesh are designed to minimize the potential of a dolphin getting its pectoral fins or flukes caught in these gaps.

Gill nets are set perpendicular to the shoreline with the smaller mesh end (3″ mesh panel) of the net anchored to the shoreline and the progressively larger mesh (up to 6″ mesh panel) extending baywards for 600 ft. All gill net are set in water depths ranging from 0.0–1.1 m on the shallow end of the net and from 0.1–4.6 m (0.33 to 15 ft) on the deep end of the net. However, 86 percent of gill net sets occur at a deep-end depth of 1.5 m (4 ft) or less. Where depths are greater than 4 ft, the top of the gillnet will be submerged because it is only 3 ft high. A marker bouy is typically attached to the float line at the intersection of each mesh panel (150 ft) with sufficant length line to reach the surface. When setting the net, TPWD pulls it as taut as possible with one person pulling on the net while the anchor is set.

Gill nets are set overnight during each spring and fall season. The spring season begins with the second full week in April and extends for ten weeks. The fall season begins with the second full week in September and extends for ten weeks. Nets are set within one hour before sunset and retrieved within 4 hours after the following sunrise. Soak times vary from approximately 12–14 hours. Gill nets are set overnight to eliminate day-use disturbances (boaters running the shoreline) that can alter normal fish behavior and movement patterns, reduce the amount of disturbance by and to anglers and boaters (user conflicts), and increase boater safety (reduced likelihood of striking nets). TPWD sets two to three nets on two separate nights for each of the 10 bay systems where they fish which are separated by at least 1 km and usually miles apart. No more than one gill net is set in the same grid on the same night, nor set more than two times in the same grid in a season. Fishing effort is evenly distributed between spring and fall season. Up to 90 sets per area could occur each year the proposed regulations would be valid. This sampling rate proposed for the next five years is identical to past sampling efforts.

Description of Marine Mammals in the Area of the Specified Activity

Sections 3 and 4 of the SEFSC's application summarize available information regarding status and trends, distribution and habitat preferences, and behavior and life history, of the potentially affected species. Additional information regarding population trends and threats may be found in NMFS' Stock Assessment Reports (SAR; *https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region*) and more general information about these species (*e.g.,* physical and behavioral descriptions) may be found on NMFS' website (*https://www.fisheries.noaa.gov/find-species*). Additional species and stock information can be found in NMFS' Draft PEA (*https://www.fisheries.noaa.gov/node/23111*). In some cases, species are treated as guilds. In general ecological terms, a guild is a group of species that have similar requirements and play a similar role within a community. However, for purposes of stock assessment or abundance prediction, certain species may be treated together as a guild because they are difficult to distinguish visually and many observations are ambiguous. For example, NMFS' Atlantic SARs assess *Mesoplodon* spp. and *Kogia* spp. as guilds. Here, we consider pilot whales, beaked whales (excluding the northern bottlenose whale), and *Kogia* spp. as guilds. That is, where not otherwise specified, references to ''pilot whales'' includes both the long-finned and short-finned pilot whale, ''beaked whales'' includes the Cuvier's, Blainville's, Gervais, Sowerby's, and True's beaked whales, and ''*Kogia* spp.'' includes both the dwarf and pygmy sperm whale.

Table 3a lists all species (n = 33) with expected potential for occurrence in ARA, GOMRA, and CRA and summarizes information related to the population or stock, including regulatory status under the MMPA and ESA and potential biological removal (PBR), where known. PBR is defined by the MMPA as the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population (as described in NMFS' SARs). The use of PBR in this analysis is described in later detail in the *Negligible Impact Analyses and Determination* section. Excluding bottlenose dolphins, species with potential occurrence in the ARA and GOMRA constitute 56 managed stocks under the MMPA. Bottlenose dolphins contribute an additional 17 stocks in the ARA (1 offshore, 5 coastal, and 11 estuarine), 36 stocks in the GOMRA (1 offshore, 1 continental shelf, 3 coastal, and 31 bays, sounds, and estuaries (BSE)), and 1 stock in the CRA for a total of 54 bottlenose dolphin stocks. In total, 110 stocks have the potential to occur in the SEFSC research area.

Species that could occur in a given research area but are not expected to have the potential for interaction with SEFSC research gear or that are not likely to be harassed by SEFSC's use of active acoustic devices are listed here but omitted from further analysis. These include extralimital species, which are species that do not normally occur in a given area but for which there are one or more occurrence records that are considered beyond the normal range of the species. Extralimital or rarely sighted species within the SEFSC's ARA include the North Atlantic bottlenose whale (*Hyperoodon ampullatus*), Bryde's whale (*B. edeni*), Atlantic white-sided dolphins (*Lagenorhynchus acutus*), white-beaked dolphins (*Lagenorhynchus albirostris*), Sowerby's beaked whale (*Mesoplodon bidens*), harp seal (*Pagophilus groenlandicus*), and hooded seal (*Cystophora cristata*).

Extralimital or rarely sighted species in the GOMRA include the North Atlantic right whale (*Eubalaena glacialis*), blue whale, fin whale (*B. physalus*), sei whale, minke whale (*B. acutorostrata*), humpback whale (*Megaptera novaeangliae*), and Sowerby's beaked whale. In the CRA, extralimital or rarely sighted species include blue whale, fin whale, sei whale, Bryde's whale, minke whale, harbor seal (*Phoca vitulina*), gray seal (*Halichoerus grypus*), harp seal, and hooded seal. In addition, Caribbean manatees (*Trichechus manatus*) may be found in all three research areas. However, manatees are managed by the U.S. Fish and Wildlife Service and are not considered further in this document.

Marine mammal abundance estimates presented in this document represent the total number of individuals that make up a given stock or the total number estimated within a particular study or survey area. NMFS' stock abundance estimates for most species represent the total estimate of individuals within the geographic area, if known, that comprises that stock. For some species, this geographic area may extend beyond U.S. waters. For some species, survey abundance (as compared to stock or species abundance) is the total number of individuals estimated within the survey area, which may or may not align completely with a stock's geographic range as defined in the SARs. These surveys may also extend beyond U.S. waters.

To provide a background for how estuarine bottlenose dolphin stocks are identified, we provide the following excerpt from the Bottlenose Dolphin Stock Structure Research Plan for the Central Northern Gulf of Mexico (NMFS, 2007) which more specifically describes the stock structure of bottlenose dolphins within the bays, sounds, and estuaries of the Gulf of Mexico: The distinct stock status for each of the 31 inshore areas of contiguous, enclosed, or semi-enclosed bodies of waters is community-based. That is, stock delineation is based on the finding, through photo-identification (photo-ID) studies, of relatively discrete dolphin ''communities'' in the few GOM areas that have been studied (Waring *et al.* 2007). This finding was then generalized to all enclosed inshore GOM waters where bottlenose dolphins exist. A ''community'' consists of resident dolphins that regularly share large portions of their ranges, and interact with each other to a much greater extent than with dolphins in adjacent waters. The term emphasizes geographic, and social relationships of dolphins. Bottlenose dolphin communities do not necessarily constitute closed demographic populations, as individuals from adjacent communities may interbreed.

All values presented in Table 3a and 3b are the most recent available at the time of publication and are available in the most recent SAR for that stock, including draft 2018 SARs (Hayes et al., 2018) available at *https://www.fisheries.noaa.gov/national/marine-mammal-protection/draft-marine-mammal-stock-assessment-reports*) .

TABLE 3a—MARINE MAMMALS POTENTIALLY PRESENT IN THE ATLANTIC, GULF OF MEXICO, AND CARIBBEAN RESEARCH AREAS DURING FISHERY RESEARCH

Common name	Scientific name	MMPA stock	Research area			ESA status (L/NL), MMPA strategic (Y/N) [1]	Stock abundance (CV, N_{min}) [2]	PBR [3]	Annual M/SI [4]
			ARA	GOM	CRA				
Order Cetartiodactyla—Cetacea—Suborder Mysticeti (baleen whales)									
Family Balaenopteridae (rorquals):									
North Atlantic right whale.	*Eubalaena glacialis*	Western North Atlantic	X	.....	.....	L, Y	451 (0, 445)	0.9	5.56
Humpback whale	*Megaptera novaeangliae.*	Gulf of Maine [5]	X	X	X	NL, Y	896 (0, 896)	14.6	9.8
Blue whale	*Balaenoptera musculus.*	Western North Atlantic	X	.....	.....	L, Y	unk (unk, 440, 2010)	0.9	unk
Fin whale	*Balaenoptera physalis*	Western North Atlantic	X	.....	.....	L, Y	1,618 (0.33, 1,234)	2.5	2.65
Minke whale	*Balaenoptera acutorostrata.*	Canadian East Coast	X	X	X	NL, N	2,591 (0.81, 1,425)	14	7.5
Bryde's whale	*Balaenoptera edeni*	Northern Gulf of Mexico.	.....	X	.....	NL, [6] Y	33 (1.07, 16)	0.03	0.7
Sei whale	*Balaenoptera borealis*	Nova Scotia	X	.....	.....	L, Y	357 (0.52, 236)	0.5	0.6
Order Cetartiodactyla—Cetacea—Suborder Odontoceti (toothed whales)									
Family Physeteridae:									
Sperm whale	*Physeter macrocephalus.*	North Atlantic	X	.....	.....	L, Y	2,288 (0.28,1,815)	3.6	0.8
		Northern Gulf of Mexico.	.....	X	.....	L, Y	763 (0.38, 560)	1.1	0
		Puerto Rico and U.S. Virgin Islands.	.....	.....	X	L, Y	unk	unk	unk
Family Kogiidae:									
Pygmy sperm whale.	*Kogia breviceps*	Western North Atlantic	X	.....	X	NL, N	3,785 (0.47, 2,598) [7]	21	3.5
		Northern Gulf of Mexico.	.....	X	.....	NL, N	186 (1.04, 90) [8]	0.9	0.3
Dwarf sperm whale.	*K. sima*	Western North Atlantic	X	.....	X	NL, N	3,785 (0.47, 2,598) [7]	21	3.5
		Northern Gulf of Mexico.	.....	X	.....	NL, N	186 (1.04, 90) [8]	0.9	0
Family Ziphiidae (beaked whales):									
Cuvier's beaked whale.	*Ziphius cavirostris*	Western North Atlantic	X	.....	.....	NL, N	6,532 (0.32, 5,021)	50	0.4

TABLE 3a—MARINE MAMMALS POTENTIALLY PRESENT IN THE ATLANTIC, GULF OF MEXICO, AND CARIBBEAN RESEARCH AREAS DURING FISHERY RESEARCH—Continued

Common name	Scientific name	MMPA stock	Research area			ESA status (L/NL), MMPA strategic (Y/N) [1]	Stock abundance (CV, N_{min}) [2]	PBR [3]	Annual M/SI [4]
			ARA	GOM	CRA				
		Northern Gulf of Mexico.	.....	X	.....	NL, N	74 (1.04, 36)	0.4	0
		Puerto Rico and U.S. Virgin Islands.	.....	.....	X	NL, N	Unk	unk	unk
Blainville's beaked whale.	*Mesoplodon densirostris.*	Western North Atlantic	X	.....	X	NL, N	7,092 (0.54, 4,632) [9] ..	46	0.2
		Northern Gulf of Mexico.	.....	X	.....	NL, N	149 (0.91, 77)	0.8	0
Gervais' beaked whale.	*Mesoplodon europaeus.*	Western North Atlantic	X	.....	X	NL, N	7,092 (0.54, 4,632) [9] ..	46	0
		Northern Gulf of Mexico.	.....	X	.....	NL, N	149 (0.91, 77)	0.8	0
Sowerby's beaked whale.	*Mesoplodon bidens*	Western North Atlantic	X	.....	X	NL, N	7,092 (0.54, 4,632) [9] ..	46	0
True's beaked whale.	*Mesoplodon mirus*	Western North Atlantic	X	.....	X	NL, N	7,092 (0.54, 4,632) [9] ..	46	0
Family Delphinidae (dolphins):									
Melon-headed whales.	*Peponocephala electra.*	Western North Atlantic	X	.....	X	NL, N	unk	unk	0
		Northern Gulf of Mexico.	.....	X	.....	NL, N	2,235 (0.75, 1,274)	13	0
Risso's dolphin	*Grampus griseus*	Western North Atlantic	X	.....	X	NL, N	18,250 (0.46, 12,619)	126	49.9
		Northern Gulf of Mexico.	.....	X	.....	NL, N	2,442 (0.57, 1,563)	16	7.9
Short-finned pilot whales.	*Globicephala macrorhynchus.*	Western North Atlantic	X	.....	.....	NL, N	28,924 (0.24, 23,637)	236	168
		Northern Gulf of Mexico.	.....	X	.....	NL, N	2,415 (0.66, 1,456)	15	0.5
		Puerto Rico and U.S. Virgin Islands.	.....	.....	X	NL, N	unk	unk	unk
Long-finned pilot whales.	*Globicephala melas* ...	Western North Atlantic	X	.....	.....	NL, N	5,636 (0.63, 3,464)	35	27
Bottlenose dolphin	*Tursiops truncatus*	See table 3b.							
Common dolphin	*Delphinus delphis*	Western North Atlantic	X	.....	.....	NL, N	70,184 (0.28, 55,690)	557	406
Atlantic spotted dolphin.	*Stenella frontalis*	Western North Atlantic	X	.....	.....	NL, N	44,715 (0.43, 31,610)	316	0
		Northern Gulf of Mexico.	.....	X	.....	NL, N	unk	unk	42
		Puerto Rico and U.S. Virgin Islands.	.....	.....	X	NL, N	unk	unk	unk
Pantropical spotted dolphin.	*Stenella attenuata*	Western North Atlantic	X	.....	X	NL, N	3,333 (0.91, 1,733)	17	0
		Northern Gulf of Mexico.	.....	X	.....		50,880 (0.27, 40,699)	407	4.4
Striped dolphin	*Stenella coeruleoalba*	Western North Atlantic	X	.....	X	NL, N	54,807 (0.3, 42,804) ..	428	0
		Northern Gulf of Mexico.	.....	X	.....	NL, N	1,849 (0.77, 1,041)	10	0
Fraser's dolphin ..	*Lagenodelphis hosei* ..	Western North Atlantic	X	.....	X	NL, N	unk	unk	0
		Gulf of Mexico	.....	X	.....	NL, N	unk	undet	0
Rough-toothed dolphin.	*Steno bredanensis*	Western North Atlantic	X	.....	X	NL, N	136 (1.0, 67)	0.7	0
		Northern Gulf of Mexico.	.....	X	.....	NL, N	624 (0.99, 311)	2.5	0.8
Clymene dolphin	*Stenella clymene*	Western North Atlantic	X	.....	X	NL, N	unk	undet	0
		Northern Gulf of Mexico.	.....	X	.....	NL, N	129 (1.0, 64)	0.6	0
Spinner dolphin ...	*Stenella longirostris* ...	Western North Atlantic	X	.....	.....	NL, N	unk	unk	0
		Northern Gulf of Mexico.	.....	X	.....	NL, N	11,441 (0.83, 6,221) ..	62	0
		Puerto Rico and U.S. Virgin Islands.	.....	.....	X	NL, N	unk	unk	unk
Killer whale	*Orcinus orca*	Western North Atlantic	X	.....	X	NL, N	unk	unk	0
		Northern Gulf of Mexico.	.....	X	.....	NL, N	28 (1.02, 14)	0.1	0
Pygmy killer whale.	*Feresa attenuata*	Western North Atlantic	X	.....	X	NL, N	unk	unk	0
		Northern Gulf of Mexico.	.....	X	.....	NL, N	152 (1.02, 75)	0.8	0
False killer whale	*Pseudorca crassidens*	Western North Atlantic	X	.....	X	NL, N	442 (1.06, 212)	2.1	unk
		Northern Gulf of Mexico.	.....	X	.....	NL, N	unk	undet	0
Family Phocoenidae (porpoises):									

TABLE 3a—MARINE MAMMALS POTENTIALLY PRESENT IN THE ATLANTIC, GULF OF MEXICO, AND CARIBBEAN RESEARCH AREAS DURING FISHERY RESEARCH—Continued

Common name	Scientific name	MMPA stock	Research area			ESA status (L/NL), MMPA strategic (Y/N) [1]	Stock abundance (CV, N_{min}) [2]	PBR [3]	Annual M/SI [4]
			ARA	GOM	CRA				
Harbor porpoise ..	*Phocoena phocoena vomerina*.	Gulf of Maine/Bay of Fundy.	X	.....	.....	NL, N	79,833 (0.32, 61,415)	706	255
Order Carnivora—Superfamily Pinnipedia									
Family Phocidae (earless seals):									
Harbor seal	*Phoca vitulina richardii*	Western North Atlantic	X	.....	.....	NL, N	75,834 (0.15, 66,884)	2,006	345
Gray seal	*Halichoerus grypus*	Western North Atlantic	X	.....	.....	NL, N	27,131 (0.19, 23,158)	1,389	5,688

[1] Endangered Species Act (ESA) status: Endangered (E), Threatened (T)/MMPA status: Depleted (D). NL indicates that the species is not listed under the ESA and is not designated as depleted under the MMPA. Under the MMPA, a strategic stock is one for which the level of direct human-caused mortality exceeds PBR or which is determined to be declining and likely to be listed under the ESA within the foreseeable future. Any species or stock listed under the ESA is automatically designated under the MMPA as depleted and as a strategic stock.

[2] NMFS marine mammal stock assessment reports at: *www.nmfs.noaa.gov/pr/sars/*. CV is coefficient of variation; N_{min} is the minimum estimate of stock abundance.).

[3] PBR indicates Potential Biological Removal as referenced from NMFS 2017 SARs. PBR is defined by the MMPA as the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population. It is the product of minimum population size, one-half the maximum net productivity rate and a recovery factor for endangered, depleted, threatened stocks, or stocks of unknown status relative to OSP.

[4] These values, found in NMFS' SARs, represent annual levels of human-caused mortality plus serious injury from all sources combined (*e.g.,* commercial fisheries, subsistence hunting, ship strike). Annual M/SI often cannot be determined precisely and is in some cases presented as a minimum value. All M/SI values are as presented in the 2016 SARs.

[5] Humpback whales present off the southeastern U.S. are thought to be predominantly from the Gulf of Maine stock; however, could include animals from Canadian stocks (*e.g.,* Nova Scotia) (NMFS, 2017). Here we provide estimates for the Gulf of Maine stock only as a conservative value.

[6] The Bryde's whale is proposed for listing under the ESA (81 FR 88639, December 8, 2016). NMFS decision is pending.

[7] This estimate includes both dwarf and pygmy sperm whales in the N. Atlantic stock.

[8] This estimate includes both dwarf and pygmy sperm whales in the Gulf of Mexico stock.

[9] This estimate includes all species of *Mesoplodon* in the N.Atlantic stock.

TABLE 3b—BOTTLENOSE DOLPHIN STOCKS POTENTIALLY PRESENT IN THE ATLANTIC, GULF OF MEXICO, AND CARIBBEAN RESEARCH AREAS DURING FISHERY RESEARCH

Stock	MMPA status	Stock abundance (CV, N_{min}) [1]	PBR	Annual M/SI
ATLANTIC RESEARCH AREA				
Western North Atlantic, Offshore	Not Strategic	77,532 (0.40, 56,053)	561	39.4
Northern Migratory Coastal	Depleted	6,639 (0.41, 4,759)	48	6.1–13.2
Southern Migratory Coastal	Depleted	3,751 (0.06, 2,353)	23	0–14.3
South Carolina & Georgia Coastal	Depleted	6,027 (0.34, 4,569)	46	1.4–1.6
Northern Florida Coastal	Depleted	877 (0.0.49, 595)	6	0.6
Central Florida Coastal	Depleted	1,218 (0.71, 2,851)	9.1	0.4
Northern North Carolina Estuarine System	Strategic	823 (0.06, 782)	7.8	0.8–18.2
Southern North Carolina Estuarine System	Strategic	unk	Undet	0.4–0.6
Northern South Carolina Estuarine System	Strategic	unk	Undet	0.2
Charleston Estuarine System	Strategic	unk	Undet	unk
Northern Georgia/Southern South Carolina Estuarine System.	Strategic	unk	undet	1.4
Central Georgia Estuarine System	Strategic	192 (0.04, 185)	1.9	unk
Southern Georgia Estuarine System	Strategic	194 (0.05, 185)	1.9	unk
Jacksonville Estuarine System	Strategic	unk	undet	1.2
Biscayne Bay	Strategic	unk	undet	unk
Florida Bay	Not Strategic	unk	undet	unk
GULF OF MEXICO RESEARCH AREA				
Oceanic	Not Strategic	5,806 (0.39, 4,230)	42	6.5
Continental Shelf	Not Strategic	51,192 (0.1, 46,926)	469	0.8
Western Coastal	Not Strategic	20,161 (0.17, 17,491)	175	0.6
Northern Coastal	Not Strategic	7,185 (0.21, 6,004)	60	0.4
Eastern Coastal	Not Strategic	12,388 (0.13, 11,110)	111	1.6
Northern Gulf of Mexico Bay, Sound, and Estuary [2 3]				
Laguna Madre	Strategic	80 (1.57, unk)	undet	0.4
Nueces Bay, Corpus Christi Bay	Strategic	58 (0.61, unk)	undet	0
Copano Bay, Aransas Bay, San Antonio Bay, Redfish Bay, Espirtu Santo Bay.	Strategic	55 (0.82, unk)	undet	0.2
Matagorda Bay, Tres Palacios Bay, Lavaca Bay	Strategic	61 (0.45, unk)	undet	0.4
West Bay	Strategic	48 (0.03, 46)	0.5	0.2

TABLE 3b—BOTTLENOSE DOLPHIN STOCKS POTENTIALLY PRESENT IN THE ATLANTIC, GULF OF MEXICO, AND CARIBBEAN RESEARCH AREAS DURING FISHERY RESEARCH—Continued

Stock	MMPA status	Stock abundance (CV, N_{min}) [1]	PBR	Annual M/SI
Galveston Bay, East Bay, Trinity Bay	Strategic	152 (0.43, unk)	undet	0.4
Sabine Lake	Strategic	0 (-,-)	undet	0.2
Calcasieu Lake	Strategic	0 (-,-)	undet	0.2
Vermillion Bay, West Cote Blanche Bay, Atchafalaya Bay.	Strategic	0 (-,-)	undet	0
Terrebonne Bay, Timbalier Bay	Strategic	3,870 (0.15, 3426)	27	0.2
Barataria Bay	Strategic	2306 (0.09, 2,138)	17	160
Mississippi River Delta	Strategic	332 (0.93, 170)	1.4	0.2
Mississippi Sound, Lake Borgne, Bay Boudreau	Strategic	3,046 (0.06, 2,896)	23	310
Mobile Bay, Bonsecour Bay	Strategic	122 (0.34, unk)	undet	1
Perdido Bay	Strategic	0 (-,-)	undet	0.6
Pensacola Bay, East Bay	Strategic	33 (	undet	unk
Choctawhatchee Bay	Strategic	179 (0.04, unk)	undet	0.4
St. Andrews Bay	Strategic	124 (0.57, unk)	undet	0.2
St. Joseph Bay	Strategic	152 (0.08, unk)	undet	unk
St. Vincent Sound, Apalachicola Bay, St. Georges Sound.	Strategic	439 (0.14,-)	undet	0
Apalachee Bay	Strategic	491 (0.39, unk)	undet	0
Waccasassa Bay, Withlacoochee Bay, Crystal Bay	Strategic	unk	undet	0
St. Joseph Sound, Clearwater Harbor	Strategic	unk	undet	0.4
Tampa Bay	Strategic	unk	undet	0.6
Sarasota Bay, Little Sarasota Bay	Strategic	158 (0.27, 126)	1.3	0.6
Pine Island Sound, Charlotte Harbor, Gasparilla Sound, Lemon Bay.	Strategic	826 (0.09, -)	undet	1.6
Caloosahatchee River	Strategic	0 (-,-)	undet	0.4
Estero Bay	Strategic	unk	undet	0.2
Chokoloskee Bay, Ten Thousand Islands, Gullivan Bay.	Strategic	unk	undet	0
Whitewater Bay	Strategic	unk	undet	0
Florida Keys (Bahia Honda to Key West)	Strategic	unk	undet	0
CARRIBEAN RESEARCH AREA				
Puerto Rico and U.S. Virgin Islands	Strategic	unk	undet	unk

[1] CV is coefficient of variation; N_{min} is the minimum estimate of stock abundance).
[2] Details for these 25 stocks are included in the report: Common bottlenose dolphin (Tursiops truncatus truncatus), Northern Gulf of Mexico Bay, Sound, and Estuary Stocks.
[3] The total annual human-caused mortality and serious injury for these stocks of common bottlenose dolphins is unknown because these stocks may interact with unobserved fisheries. Also, for Gulf of Mexico BSE stocks, mortality estimates for the shrimp trawl fishery are calculated at the state level and have not been included within mortality estimates for individual BSE stocks. Therefore, minimum counts of human-caused mortality and serious injury for these stocks are presented.

Take reduction planning—Incidental take of marine mammals in commercial fisheries has been and continues to be a serious issue in the Southeast region. In compliance with section 118 of the MMPA, NMFS has developed and implemented several Take Reduction Plans (TRPs) to reduce serious injuries and mortality of strategic marine mammal stocks that interact with certain commercial fisheries. Strategic stocks are those species listed as threatened or endangered under the ESA, those species listed as depleted under the MMPA, and those species with human-caused mortality that exceeds the PBR for the species. The immediate goal of TRPs is to reduce serious injury and mortality for each species below PBR within six months of the TRP's implementation. The long-term goal is to reduce incidental serious injury and mortality of marine mammals from commercial fishing operations to insignificant levels approaching a zero serious injury and mortality rate, taking into account the economics of the fishery, the availability of existing technology, and existing state or regional fishery management plans.

TRPs relevant to the fisheries research areas in this rule include the Atlantic Large Whale Take Reduction Plan (ALWTRP), the Bottlenose Dolphin Take Reduction Plan (BDTRP), and the Pelagic Longline Take Reduction Plan (PLTRP). The ALWTRP was developed to reduce serious injury and mortality of North Atlantic right, humpback, fin, and minke whales from Northeast/Mid-Atlantic lobster trap/pot, Atlantic blue crab trap/pot, Atlantic mixed species trap/pot, Northeast sink gillnet, Northeast anchored float gillnet, Northeast drift gillnet, Mid-Atlantic gillnet, Southeastern U.S. Atlantic shark gillnet, and Southeastern Atlantic gillnet fisheries (NMFS 2010c). Gear requirements vary by geographic area and date. Universal gear modification requirements and restrictions apply to all traps/pots and anchored gillnets, including: no floating buoy line at the surface; no wet storage of gear (all gear must be hauled out of the water at least once every 30 days); fishermen are encouraged, but not required, to maintain knot-free buoy lines; and all groundlines must be made of sinking line. Additional gear modification requirements and restrictions vary by location, date, and gear type. Additional requirements may include the use of weak links, and gear marking and configuration specifications. Detailed requirements may be found in the regional guides to gillnet and pot/trap gear fisheries available at *http://www.nero.noaa.gov/Protected/whaletrp/*. The SEFSC MARMAP/SEAMAP–SA Reef Fish Survey (carried out by the SCDNR) and SEFIS (carried

out by the SEFSC) surveys meet the requirements necessary to implement TRP regulations; both surveys abide by all ALWTRP requirements.

In 2006, NMFS implemented the BDTRP to reduce the serious injury and mortality of Western North Atlantic coastal bottlenose dolphins incidental to 13 Category I and II U.S. commercial fisheries. In addition to multiple non-regulatory provisions for research and education, the BDTRP requires modifications of fishing practices or gear for small, medium, and large-mesh gillnet fisheries from New York to Florida, and Virginia pound nets in Virginia state waters (50 CFR 229.35). The BDTRP also established seasonal closures for certain gillnet commercial fisheries in state waters. The following general requirements are contained with BDTRP: Spatial/temporal gillnet restrictions, gear proximity (fishermen must stay within a set distance of gear), gear modifications for gillnets and Virginia pound nets, non-regulatory gear modifications for crab pots, and other non-regulatory conservation measures (71 FR 24776, April 26, 2006; 77 FR 45268, July 31, 2012; and 80 FR 6925, February 9, 2015). Due to substantial differences between SEFSC research fishing practices (*e.g.,* smaller gear size, reduced set time, spatial and temporal differences) and scientific survey methods versus commercial fishing practices, the SEFSC and research partners do not have any surveys that meet the requirements necessary to implement BDTRP regulations. However, the SEFSC would abide by the mitigation, monitoring, and reporting requirements included in this proposed rule.

The Pelagic Longline Take Reduction Plan (PLTRP) addresses incidental serious injury and mortality of long-finned and short-finned pilot whales and Risso's dolphins in commercial pelagic longline fishing gear in the Atlantic. Regulatory measures include limiting mainline length to 20 nm or less within the Mid-Atlantic Bight and posting an informational placard on careful handling and release of marine mammals in the wheelhouse and on working decks of the vessel (NMFS 2009). Currently, the SEFSC uses gear that is only 5 nm long and per the PLTRP, uses the Pelagic Longline Marine Mammal Handling and Release Guidelines for any pelagic longline sets made within the Atlantic EEZ.

Unusual Mortality Events (UME)—The marine mammal UME program was established in 1991. A UME is defined under the MMPA as a stranding that is unexpected; involves a significant die-off of any marine mammal population; and demands immediate response. From 1991 to present, there have been 62 formally recognized UMEs in the U.S., involving a variety of species and dozens to hundreds of individual marine mammals per event. Twenty-seven of these UMEs have occurred within SEFSC fisheries research operating areas (we note 7 of these UMEs were for manatees managed by the USFWS). For the GOMRA, Litz *et al.* (2014) provides a review of historical UMEs in the Gulf of Mexico from 1990 through 2009. For more information on UMEs, please visit the internet at: *www.nmfs.noaa.gov/pr/health/mmume/events.html.*

From 2010 through 2014, NMFS declared a multi-year, multi-cetacean UME in response to the Deepwater Horizon (DWH) oil spill in the Northern Gulf of Mexico. The species and temporal and spatial boundaries included all cetaceans stranded in Alabama, Mississippi, and Louisiana from March 2010 through July 2014 and all cetaceans other than bottlenose dolphins stranded in the Florida Panhandle (Franklin County through Escambia County) from March 2010 through July 2014. The UME involved 1,141 cetacean strandings in the Northern Gulf of Mexico (5 percent stranded alive and 95 percent stranded dead).

The Deepwater Horizon Natural Resource Damage Assessment (NRDA) Trustees' 2016 Final Programmatic Damage Assessment and Restoration Plan (PDARP) and Final Programmatic Environmental Impact Statement (PEIS) quantified injuries to marine mammals in the Gulf of Mexico that were exposed to the oil spill, including bottlenose dolphins in four bay, sound, and estuary areas: Barataria Bay, the Mississippi River Delta, Mississippi Sound, and Mobile Bay (NRDA Trustees, 2016; DWH MMIQT, 2015). Both stocks are estimated to have been reduced significantly in population size from the DWH oil spill (DWH MMIQT 2015; Schwacke et al. 2017). According to the PDARP, 24 percent of the Mississippi Sound stock had adverse health effects from DWH oil spill. Of the pregnant females studied in Barataria Bay and Mississippi Sound between 2010 and 2014, 19.2 percent gave birth to a viable calf. In contrast, dolphin populations in Florida and South Carolina have a pregnancy success rate of 64.7 percent (DWH MMIQT, 2015).

Dolphin and whale species living farther offshore were also affected. Many of these species are highly susceptible to population changes because of their low initial population numbers. Thus, it is unclear how effectively these populations can recover from lower estimated injuries. For example, Deepwater Horizon oil exposure resulted in up to an estimated 7-percent decline in the population of endangered sperm whales, which will require 21 years to recover. For Bryde's whales, 48 percent of the population was impacted by Deepwater Horizon oil, resulting in up to an estimated 22-percent decline in population that will require 69 years to recover. For both nearshore and offshore populations, injuries were most severe in the years immediately following the spill. Health assessments on bottlenose dolphins in BBES and MS Sound have shown that there has been some improvement post spill, but that there are still persistent injuries (Smith et al. 2017).

Biologically Important Areas

In 2015, NOAA's Cetacean Density and Distribution Mapping Working Group identified Biologically Important Areas (BIAs) for 24 cetacean species, stocks, or populations in seven regions (US East Coast, Gulf of Mexico, West Coast, Hawaiian Islands, Gulf of Alaska, Aleutian Islands and Bering Sea, and Arctic) within U.S. waters through an expert elicitation process. BIAs are reproductive areas, feeding areas, migratory corridors, and areas in which small and resident populations are concentrated. BIAs are region-, species-, and time-specific. A description of the types of BIAs found within the SEFSC's fishery research areas follows:

Reproductive Areas: Areas and months within which a particular species or population selectively mates, gives birth, or is found with neonates or other sensitive age classes.

Feeding Areas: Areas and months within which a particular species or population selectively feeds. These may either be found consistently in space and time, or may be associated with ephemeral features that are less predictable but can be delineated and are generally located within a larger identifiable area.

Migratory Corridors: Areas and months within which a substantial portion of a species or population is known to migrate; the corridor is typically delimited on one or both sides by land or ice.

Small and Resident Population: Areas and months within which small and resident populations occupying a limited geographic extent exist.

The delineation of BIAs does not have direct or immediate regulatory consequences. Rather, the BIA assessment is intended to provide the best available science to help inform regulatory and management decisions

under existing authorities about some, though not all, important cetacean areas in order to minimize the impacts of anthropogenic activities on cetaceans and to achieve conservation and protection goals. In addition, the BIAs and associated information may be used to identify information gaps and prioritize future research and modeling efforts to better understand cetaceans, their habitat, and ecosystems. Table 4 provides a list of BIA's found within the SEFSC's fisheries research areas.

TABLE 4—BIOLOGICALLY IMPORTANT AREAS WITHIN THE ARA AND GOMRA

BIA name	Species	BIA type	Time of year	Size (km^2)
ATLANTIC RESEARCH AREA				
Eastern Atlantic	N. Atlantic right whale	Migration	North: March–April; South: November–December.	269,448
Southeast Atlantic—Calving	N. Atlantic right whale	Reproduction	Mid-Nov–April	43,783
Northern North Carolina Estuarine System—Inland & Coastal.	Bottlenose dolphin	Small and resident	July–October	8,199
Northern North Carolina Estuarine System—Coastal.	Bottlenose dolphin	Small and resident	July–March	534
Southern North Carolina Estuarine System.	Bottlenose dolphin	Small and resident	July–October	783
Prince Inlet, SC; Charleston Harbor; North Edisto River.	Bottlenose dolphin	Small and resident	Year-round	152
St. Helena Sound, SC to Ossabaw Sound, GA.	Bottlenose dolphin	Small and resident	Year-round	676
Southern Georgia, GA	Bottlenose dolphin	Small and resident	Year-round	411
Jacksonville, FL	Bottlenose dolphin	Small and resident	Year-round	195
Indian River Lagoon Estuarine System.	Bottlenose dolphin	Small and resident	Year-round	776
Biscayne Bay, FL	Bottlenose dolphin	Small and resident	Year-round	614
GULF OF MEXICO				
Florida Bay, FL	Bottlenose dolphin	Small and resident	Year-round	1,527
Lemon Bay, Charlotte Harbor, Pine Island Sound, FL.	Bottlenose dolphin	Small and resident	Year-round	892
Sarasota Bay and Little Sarasota Bay, FL.	Bottlenose dolphin	Small and resident	Year-round	117
Tampa Bay, FL	Bottlenose dolphin	Small and resident	Year-round	899
St. Vincent Sound and Apalachicola Bay, FL.	Bottlenose dolphin	Small and resident	Year-round	262
St. Joseph Bay, FL	Bottlenose dolphin	Small and resident	Year-round	371
Mississippi Sound, MS	Bottlenose dolphin	Small and resident	Year-round	1,335
Caminada Bay and Barataria Bay, LA.	Bottlenose dolphin	Small and resident	Year-round	253
Galveston Bay, TX	Bottlenose dolphin	Small and resident	Year-round	1,222
San Luis Pass, TX	Bottlenose dolphin	Small and resident	Year-round	143
Matagorda Bay and Espiritu Santo Bay, TX.	Bottlenose dolphin	Small and resident	Year-round	740
Aransas Pass, TX	Bottlenose dolphin	Small and resident	Year-round	273
Eastern Gulf of Mexico	Bryde's whale	Small and resident	Year round	23,559

Marine Mammal Hearing

Hearing is the most important sensory modality for marine mammals underwater, and exposure to anthropogenic sound can have deleterious effects. To appropriately assess the potential effects of exposure to sound, it is necessary to understand the frequency ranges marine mammals are able to hear. Current data indicate that not all marine mammal species have equal hearing capabilities (*e.g.,* Richardson *et al.*, 1995; Wartzok and Ketten, 1999; Au and Hastings, 2008). To reflect this, Southall *et al.* (2007) recommended that marine mammals be divided into functional hearing groups based on directly measured or estimated hearing ranges on the basis of available behavioral response data, audiograms derived using auditory evoked potential techniques, anatomical modeling, and other data. Note that no direct measurements of hearing ability have been successfully completed for mysticetes (*i.e.,* low-frequency cetaceans). Subsequently, NMFS (2016) described generalized hearing ranges for these marine mammal hearing groups. Generalized hearing ranges were chosen based on the approximately 65 dB threshold from the normalized composite audiograms, with the exception for lower limits for low-frequency cetaceans where the lower bound was deemed to be biologically implausible and the lower bound from Southall *et al.* (2007) retained. The functional groups and the associated frequencies are indicated below (note that these frequency ranges correspond to the range for the composite group, with the entire range not necessarily reflecting the capabilities of every species within that group):

- Low-frequency cetaceans (mysticetes): Generalized hearing is estimated to occur between approximately 7 Hz and 35 kHz.
- Mid-frequency cetaceans (larger toothed whales, beaked whales, and most delphinids): Generalized hearing is estimated to occur between approximately 150 Hz and 160 kHz.

• High-frequency cetaceans (porpoises, river dolphins, and members of the genera Kogia and Cephalorhynchus; including two members of the genus Lagenorhynchus, on the basis of recent echolocation data and genetic data): Generalized hearing is estimated to occur between approximately 275 Hz and 160 kHz.

• Pinnipeds in water; Phocidae (true seals): Generalized hearing is estimated to occur between approximately 50 Hz to 86 kHz.

• Pinnipeds in water; Otariidae (eared seals): Generalized hearing is estimated to occur between 60 Hz and 39 kHz.

The pinniped functional hearing group was modified from Southall *et al.* (2007) on the basis of data indicating that phocid species have consistently demonstrated an extended frequency range of hearing compared to otariids, especially in the higher frequency range (Hemilä *et al.,* 2006; Kastelein *et al.,* 2009; Reichmuth and Holt, 2013).

For more detail concerning these groups and associated frequency ranges, please see NMFS (2016) for a review of available information. Thirty three marine mammal species (31 cetacean and 2 pinniped (both phocid) species) have the reasonable potential to co-occur with the proposed survey activities (Table 3a). Of the cetacean species that may be present, six are classified as low-frequency cetaceans (*i.e.,* all mysticete species), 24 are classified as mid-frequency cetaceans (*i.e.,* all delphinid and ziphiid species and the sperm whale), and 1 is classified as high-frequency cetaceans (*i.e.,* harbor porpoise and Kogia spp.).

Potential Effects of Specified Activities on Marine Mammals and Their Habitat

This section includes a summary and discussion of the ways that components of the specified activity may impact marine mammals and their habitat. The ''Estimated Take by Incidental Harassment'' section later in this document includes a quantitative analysis of the number of individuals that are expected to be taken by this activity. The ''Negligible Impact Analysis and Determination'' section considers the content of this section, the ''Estimated Take by Incidental Harassment'' section, and the ''Proposed Mitigation'' section, to draw conclusions regarding the likely impacts of these activities on the reproductive success or survivorship of individuals and how those impacts on individuals are likely to impact marine mammal species or stocks.

In the following discussion, we consider potential effects to marine mammals from ship strike, gear interaction (*e.g.,* entanglement in nets and trawls, accidental hooking) and exposure to active acoustic fisheries research sources. We also include, where relevant, knowns takes of marine mammals incidental to previous SEFSC research. These data come from NMFS' Protected Species Incidental Take (PSIT) database, a formal incidental take reporting system that documents incidental takes of protected species by all NMFS Science Centers and partners; NMFS requires this reporting to be completed within 48 hours of the occurrence. The PSIT generates automated messages to NMFS staff, alerting them to the event and to the fact that updated information describing the circumstances of the event has been entered into the database.

Ship Strike

Vessel collisions with marine mammals, or ship strikes, can result in death or serious injury of the animal. Wounds resulting from ship strike may include massive trauma, hemorrhaging, broken bones, or propeller lacerations (Knowlton and Kraus, 2001). An animal at the surface may be struck directly by a vessel, a surfacing animal may hit the bottom of a vessel, or an animal just below the surface may be cut by a vessel's propeller. Ship strikes may kill an animal; however, more superficial strikes may result in injury. Ship strikes generally involve commercial shipping, which is much more common in both space and time than is research activity. Jensen and Silber (2004) summarized ship strikes of large whales worldwide from 1975–2003 and found that most collisions occurred in the open ocean and involved large vessels (*e.g.,* commercial shipping). Commercial fishing vessels were responsible for three percent of recorded collisions, while only one such incident (0.75 percent) was reported for a research vessel during that time period.

The severity of injuries typically depends on the size and speed of the vessel, with the probability of death or serious injury increasing as vessel speed increases (Knowlton and Kraus, 2001; Laist *et al.,* 2001; Vanderlaan and Taggart, 2007; Conn and Silber, 2013). Impact forces increase with speed, as does the probability of a strike at a given distance (Silber *et al.,* 2010; Gende *et al.,* 2011). Pace and Silber (2005) found the predicted probability of serious injury or death increased from 45 to 75 percent as vessel speed increased from 10 to 14 kn, and exceeded ninety percent at 17 kn. Higher speeds during collisions result in greater force of impact and appear to increase the chance of severe injuries or death through increased likelihood of collision by pulling whales toward the vessel (Clyne, 1999; Knowlton *et al.,* 1995). In a separate study, Vanderlaan and Taggart (2007) analyzed the probability of lethal mortality of large whales at a given speed, showing that the greatest rate of change in the probability of a lethal injury to a large whale as a function of vessel speed occurs between 8.6 and 15 kn. The chances of a lethal injury decline from approximately eighty percent at 15 kn to approximately twenty percent at 8.6 kn. At speeds below 11.8 kn, the chances of lethal injury drop below fifty percent, while the probability asymptotically increases toward one hundred percent above 15 kn.

In an effort to reduce the number and severity of strikes of the endangered North Atlantic right whale (*Eubalaena glacialis*), NMFS implemented speed restrictions in 2008 (73 FR 60173; October 10, 2008). These restrictions require that vessels greater than or equal to 65 ft (19.8 m) in length travel at less than or equal to 10 kn near key port entrances and in certain areas of right whale aggregation along the U.S. eastern seaboard. Conn and Silber (2013) estimated that these restrictions reduced total ship strike mortality risk levels by eighty to ninety percent.

For vessels used in SEFSC-related research activities, transit speeds average 10 kn (but vary from 6–14 kn), while vessel speed during active sampling is typically only 2–4 kn. At sampling speeds, both the possibility of striking a marine mammal and the possibility of a strike resulting in serious injury or mortality are discountable. At average transit speed, the probability of serious injury or mortality resulting from a strike is less than fifty percent. However, it is possible for ship strikes to occur while traveling at slow speeds. For example, a NOAA-chartered survey vessel traveling at low speed (5.5 kn) while conducting multi-beam mapping surveys off the central California coast struck and killed a blue whale in 2009. The State of California determined the whale had suddenly and unexpectedly surfaced beneath the hull, with the result that the propeller severed the whale's vertebrae, and that this was an unavoidable event. This strike represents the only such incident in approximately 540,000 hours of similar coastal mapping activity ($p = 1.9 \times 10^{-6}$; 95% CI = 0–5.5×10^{-6}; NMFS, 2013). The NOAA vessel *Gordon Gunter* was conducting a marine mammal survey cruise off the coast of Savannah, Georgia in July 2011, when a group of Atlantic spotted dolphin began bow riding. The animals

eventually broke off and a dead calf was seen in the ship's wake with a large gash that was attributed to the propeller. This is the only documented ship strike by the SEFSC since 2002.

In summary, we anticipate that vessel collisions involving SEFSC research vessels, while not impossible, represent unlikely, unpredictable events. Other than the 2009 and 2011 events, no other ship strikes have been reported from any fisheries research activities nationally. Given the relatively slow speeds of research vessels, the presence of bridge crew watching for obstacles at all times (including marine mammals), the presence of marine mammal observers on some surveys, and the small number of research cruises, we believe that the possibility of ship strike is discountable. Further, the implementation of the North Atlantic ship strike rule protocols will greatly reduce the potential for interactions with North Atlantic right whales. As such, no incidental take resulting from ship strike is anticipated nor is proposed to be authorized; therefore, this potential effect of research will not be discussed further.

Gear Interaction

The types of research gear used by the SEFSC were described previously under ''Detailed Description of Activity.'' Here, we broadly categorize these gears into those which we believe may result in marine mammal interaction and those which we consider to have an extremely unlikely potential to result in marine mammal interaction. Gears with the potential for marine mammal interaction include trawl nets (*e.g.,* bottom trawls, skimmer trawls), gillnets, and hook and line gear (*i.e.,* longlines). Gears such as fyke nets, eel traps, ROVs, etc. do not have the potential for marine mammal interaction either due to small size of gear and fishing methods, and therefore do not have the potential for injury or harassment.

Entanglement in Nets, Trawls, or Longlines—Gillnets, trawl nets, and longlines deployed by the SEFSC are similar to gear used in various commercial fisheries which have a history of taking marine mammals. Read *et al.* (2006) estimated marine mammal bycatch in U.S. fisheries from 1990–99 and derived an estimate of global marine mammal bycatch by expanding U.S. bycatch estimates using data on fleet composition from the United Nations Food and Agriculture Organization (FAO). Most U.S. bycatch for both cetaceans (84 percent) and pinnipeds (98 percent) occurred in gillnets. However, global marine mammal bycatch in trawl nets and longlines is likely substantial given that total global bycatch is thought to number in the hundreds of thousands of individuals (Read *et al.,* 2006). In addition, global bycatch via longline has likely increased, as longlines have become the most common method of capturing swordfish and tuna since the United Nations banned the use of high seas driftnets over 2.5 km long in 1991 (high seas driftnets were previously often 40–60 km long) (Read, 2008; FAO, 2001).

Gear interactions can result in injury or death for the animal(s) involved and/or damage to fishing gear. Coastal animals, including various pinnipeds, bottlenose dolphins, and harbor porpoises, are perhaps the most vulnerable to these interactions and set or passive fishing gear (*e.g.,* gillnets, traps) are the most likely to be interacted with (*e.g.,* Beverton, 1985; Barlow *et al.,* 1994; Read *et al.,* 2006; Byrd *et al.,* 2014; Lewison *et al.,* 2014). Although interactions are less common for use of trawl nets and longlines, they do occur with sufficient frequency to necessitate the establishment of required mitigation measures for multiple U.S. fisheries using both types of gear (NMFS, 2014). It is likely that no species of marine mammal can be definitively excluded from the potential for interaction with fishing gear (*e.g.,* Northridge, 1984); however, the extent of interactions is likely dependent on the biology, ecology, and behavior of the species involved and the type, location, and nature of the fishery.

As described above, since 2002, NMFS Science Centers have been documenting and recording all fishery research related incidental takes of marine mammals in PSIT database. There is also a documented take on record from 2001. We present all takes documented by the SEFSC in Table 5.

TABLE 5—SEFSC RESEARCH GEAR INTERACTIONS WITH MARINE MAMMALS SINCE 2001

Survey name (lead organization)	Species taken (stock)	Gear type	Date taken	# Killed [1]	# Released alive [2]	Total taken
ATLANTIC RESEARCH AREA						
SEFSC In-Water Sea Turtle Research (SCDNR [3]).	Bottlenose dolphin (South Carolina/Georgia coastal).	Bottom trawl	20 July 2016	1	0	1
SEAMAP–SA Coastal Trawl Survey_Spring (SCDNR).	Bottlenose dolphin (Northern Florida coastal).	Bottom trawl	11 April 2014	1	0	1
SEAMAP–SA Coastal Trawl Survey_Summer (SCDNR).	Bottlenose dolphin (South Carolina/Georgia coastal).	Bottom trawl	2 Aug 2012	1	0	1
In-Water Sea Turtle Trawl Survey (SCDNR).	Bottlenose dolphin (South Carolina/Georgia coastal).	Bottom trawl	11 July 2012	0	1	1
SEAMAP–SA Coastal Trawl Survey_Fall (SCDNR).	Bottlenose dolphin (southern migratory).	Bottom trawl	5 October 2006	1	0	1
SEAMAP–SA Coastal Trawl Survey_Summer (SCDNR).	Bottlenose dolphin (South Carolina/Georgia coastal).	Bottom trawl	28 July 2006	1	0	1
RecFIN Red Drum Trammel Net Survey (SCDNR).	Bottlenose dolphin (Charleston Estuarine System).	Trammel net	22 August 2002	2	0	2
In-Water Sea Turtle Trawl Survey (SCDNR).	Bottlenose dolphin (unk)	Bottom Trawl	2001 [3]	0	1	1
ARA TOTAL				7	2	9
GULF OF MEXICO RESEARCH AREA						
Gulf of Mexico Shark Pupping and Nursery GULFSPAN (SEFSC).	Bottlenose dolphin (Sarasota Bay)	Gillnet	03 July 2018	0	1	1
Gulf of Mexico Shark Pupping and Nursery GULFSPAN (USA/DISL [2]).	Bottlenose dolphin (northern Gulf of Mexico).	Gillnet	15 July 2016	1	0	1
Skimmer Trawl TED Testing (SEFSC)	Bottlenose dolphin (MS Sound, Lake Borgne, Bay Boudreau).	Skimmer trawl	1 October 2014	1	0	1
Skimmer Trawl TED Testing (SEFSC)	Bottlenose dolphin (MS Sound, Lake Borgne, Bay Boudreau).	Skimmer trawl	23 October 2013	0	1	1

TABLE 5—SEFSC RESEARCH GEAR INTERACTIONS WITH MARINE MAMMALS SINCE 2001—Continued

Survey name (lead organization)	Species taken (stock)	Gear type	Date taken	# Killed [1]	# Released alive [2]	Total taken
SEAMAP–GOM Bottom Longline Survey (ADCNR [3]).	Bottlenose dolphin (Mobile Bay, Bonsecour Bay).	Bottom longline	6 August 2013	0	1 (SI)	1
Gulf of Mexico Shark Pupping and Nursery GULFSPAN (USA/DISL).	Bottlenose dolphin (MS Sound, Lake Borgne, Bay Boudreau).	Gillnet	18 April 2011	1	0	1
GOMRA TOTAL	.....	.....	.....	3	3	6
TOTAL ALL AREAS [3]	.....	.....	.....	10	5	15

[1] If there was question over an animal's fate after it was released (*e.g.,* it was struggling to breath/swim), it was considered ''killed''. Serious injury determinations were not previously made for animals released alive but are now part of standard protocols for released animals and will be reported in stock assessment reports.
[2] Animals released alive but were considered seriously injured as marked as SI.
[3] This take occurred prior to development of the PSIT database but we include it here because it is documented.
[4]There have been no SEFSC fishery research-related takes of marine mammals in the CRA.

Gillnets—According to the PSIT database, there are five documented takes of marine mammals (2 ARA, 3 GOMRA) incidental to SEFSC gillnet fishery research since 2002. On August 22, 2002, two bottlenose dolphins belonging to the Charleston Estuarine System stock became entangled in a trammel net (a type of gillnet) during the RecFIN Red Drum Trammel Net survey. One animal died before biologists could untangle it. The second animal was disentangled and released but it was listless; and, when freed, it sank and no subsequent resurface or breath was observed. Both animals were documented as a mortality. On April 18, 2013, a single bottlenose dolphin calf became entangled during the Gulf of Mexico Shark Pupping and Nursery (GULFSPAN) survey. On July 15, 2016, the lead line of a gillnet used for the same survey became wrapped around the fluke of an adult bottlenose dolphin. Both animals were considered part of the Northern Gulf of Mexico coastal stock and documented as taken by mortality. Most recently, on July 3, 3018, a dolphin from the Sarasota Bay stock was entangled in a GULFSPAN survey gillnet. Researchers were attending the net when the dolphin became entangled and were able to respond immediately. All gear was removed from the animal, no injuries were observed, and the dolphin was observed breathing multiple times after release.

TPWD also has a history of taking bottlenose dolphins during gillnet fisheries research. In 35 years of TPWD gill net sampling (1983–2017), and with over 26,067 gillnet sets, there have been 32 to 35 dolphin entangled in the net (range is due to possible double counting incidents or two animals being entangled at the same time but logged as one incident during early years of reporting). According to the incident reports submitted to NMFS, 7 encounters (comprising eight animals) resulted in mortality, 2 were serious injury, 14 animals were released alive, and the condition of 10 animals was recorded as unknown.

Commercial gillnet fisheries are also implicated in taking marine mammals. In the ARA, the mid-Atlantic gillnet fishery has the highest documented level of mortality of coastal morphotype common bottlenose dolphins. The sink gillnet gear in North Carolina is the largest component in terms of fishing effort and observed takes (Waring *et al.* 2015). The SEFSC does not use sink gillnets in the ARA. The North Carolina Division of Marine Fisheries (NCDMF) has operated systematic coverage of the fall (September-December) flounder gillnet fishery (greater 5 in. mesh) in Pamlico Sound. In May 2010, NCDMF expanded the observer coverage to include gillnet effort using nets greater than 4 in. mesh in most internal state waters and throughout the year, with a goal of 7–10 percent coverage. No bycatch of bottlenose dolphins has been recorded by state observers, although stranding data continue to indicate interactions with this fishery occur. One gillnet take has also occurred in commercial fishing off a Florida's east coast in March 2015 (eastern coastal stock); the animal was released alive but considered seriously injured. In the GOMRA, no marine mammal mortalities associated with commercial gillnet fisheries have been reported or observed despite observer coverage on commercial fishing vessels in Alabama, Mississippi, and Louisiana since 2012 (Waring *et al.* 2016).

Trawl nets—As described previously, trawl nets are towed nets (*i.e.,* active fishing) consisting of a cone-shaped net with a codend or bag for collecting the fish and can be designed to fish at the bottom, surface, or any other depth in the water column. Trawls are categorized as bottom, skimmer or mid-water trawls based on where they are towed in the water column. Trawl nets have the potential to capture or entangle marine mammals. The likelihood of an animal being caught in a skimmer trawl is less than a bottom trawl because the gear can be observed directly; the SEFSC research permit 20339 authorizing research on sea turtles contains monitoring and mitigation measures related to marine mammals during skimmer trawling.

Globally, at least seventeen cetacean species are known to feed in association with trawlers and individuals of at least 25 species are documented to have been killed by trawl nets, including several large whales, porpoises, and a variety of delphinids (Young and Iudicello, 2007; Karpouzli and Leaper, 2004; Hall *et al.,* 2000; Fertl and Leatherwood, 1997; Northridge, 1991; Song *et al.,* 2010). Fertl and Leatherwood (1997) provide a comprehensive overview of marine mammal-trawl interactions, including foraging behavior and considerations regarding entanglement risks. Capture or entanglement may occur whenever marine mammals are swimming near the gear, intentionally (*e.g.,* foraging) or unintentionally (*e.g.,* migrating), and any animal captured in a net is at significant risk of drowning unless quickly freed. Animals can also be captured or entangled in netting or tow lines (also called lazy lines) other than the main body of the net; animals may become entangled around the head, body, flukes, pectoral fins, or dorsal fin.

Interaction that does not result in the immediate death of the animal by drowning can cause injury (*i.e.,* Level A harassment) or serious injury. Constricting lines wrapped around the animal can immobilize the animal or injure by cutting into or through blubber, muscles and bone (*i.e.,* penetrating injuries) or constricting blood flow to or severing appendages. Immobilization of the animal can cause internal injuries from prolonged stress and/or severe struggling and/or impede the animal's ability to feed (resulting in starvation or reduced fitness) (Andersen *et al.,* 2008).

As described in the *Description of Specific Activity* section, all trawls have lazy lines. For otter trawls, conventional lazy lines are attached at their forward end to the top/back edge of the inside trawl door closest to the vessel and at their aft end to either a ''choker strap'' that consists of a line looped around the forward portion of the codend or a ring in the ''elephant ear,'' which is a triangle of reinforced webbing sewn to the codend. Both ''choker straps'' and ''elephant ears'' act as lifting straps to bring the codend onboard the vessel. The length of the lazy line is dependent on trawl size with conventional lazy lines having sufficient length to allow the codend of the trawl to be hauled to the side of the vessel after trawls have been retrieved. The lazy line is routed through a block and wound around a capstan to lift the codend to the side of the boat where the catch can be easily emptied on deck. During active commercial trawling, the lazy line is long enough to form a 10–12 ft loop behind the codend. When traditional polypropylene rope is used, this loop floats even with or slightly above and behind the codend. It is in this loop section where many lazy line dolphin interactions have been observed.

Lazy lines are most commonly made from polypropylene. Because polypropylene is manufactured in a manner that produces soft lay rope, it is limber and can be dropped in a pile. This property lends to the potential risk of half hitching around bottlenose dolphin flukes when they interact with the line. In addition, polypropylene rope does not absorb water or lose strength when wet and becomes prickly to the touch as it ages, which may contribute to bottlenose dolphin rubbing behavior.

When interacting with lazy lines, bottlenose dolphins are often observed rubbing, corkscrewing, or biting the aft portion of the line ahead of the point of attachment on the trawl (Greenman 2012). Although reasons for these behaviors are poorly understood, this type of interaction poses an entanglement threat. When corkscrewing on the lazy line, animals run the risk of the line wrapping around their fluke in a half-hitch preventing escapement. Soldevilla *et al.* (2016) provided bottlenose dolphin bycatch estimates for the Gulf of Mexico (GOM) shrimp otter trawl fishery for 2012–2014. The study found interactions with lazy lines represented the most common mode of entanglement observed.

The SEFSC Harvesting Systems Unit (HSU) has conducted limited research examining the potential use of lazy lines constructed of alternative materials. In 2007, the HSU conducted preliminary diver assisted trials with polydac and polyester hard lay ropes as a replacement for traditional polypropylene. Polydac rope is a blend of polyester and polypropylene. Compared to polypropylene, polydac rope has similar properties including negligible water absorption and ultraviolet (UV) light resistance. However, polydac may be constructed with a harder lay than traditional polypropylene rope, which prevents it from knotting easily. Divers found the polydac and polyester lines to be significantly stiffer and less pliable underwater than the conventional polypropylene lines. When towed, divers noted that the polypropylene rope was positively buoyant and arced upward, while polydac and polyester ropes were negatively buoyant and arced downward.

The 2007 diver evaluations were followed by sea trial evaluations of five different types of rope made from polypropylene, polyethylene, or nylon as lazy lines in a standard twin-rigged shrimp trawl configuration (Hataway 2008). The study utilized a Dual-Frequency Identification Sonar (DIDSON) to image bottlenose dolphins interacting with the lazy lines. Dolphin behaviors observed during the study included; rubbing, sliding down, and pulling the lazy line. No statistical analyses were conducted, but researchers noted that no differences in the frequency or types of interactions observed were apparent between line types.

In the estuary and coastal waters, dolphins are attracted to and are consistently present during fishery research trawls. Dolphins are known to attend operating nets in order to either benefit from disturbance of the bottom or to prey on discards or fish within the net. Researchers have also identified that holes in trawl nets from dolphins are typically located in net pockets where fish congregate. Pelagic trawls have the potential to capture cetaceans because the nets may be towed at faster speeds. These trawls are more likely to target species that are important prey for marine mammals (*e.g.,* squid, mackerel), and the likelihood of working in deeper waters means that a more diverse assemblage of species could potentially be present (Hall *et al.,* 2000).

According to the PSIT database, there are nine documented takes of marine mammals (7 ARA, 2 GOMRA) incidental to SEFSC trawl-based fishery research since 2002; all are bottlenose dolphins. In the ARA, all animals were taken in a bottom trawl while skimmer trawls were implicated in takes in the GOMRA. Six of the animals were dead upon net retrieval and two animals were released alive and determined not be serious injury. In 2001, a dolphin was caught in a bottom trawl during SCDNR's sea turtle research survey. Information regarding this take are sparse (date and location are unknown) but the animal was released alive. On July 28, 2006, and again later that year on October 5, bottlenose dolphins belonging to South Carolina/Georgia coastal and southern migratory coastal stock, respectively, was found dead in a bottom trawl net used during the fall Southeast Area Monitoring and Assessment Program (SEAMAP) SA Coastal Trawl survey. Both animals were taken back to partner labs for necropsy. On July 11, 2012, a bottlenose dolphin belonging to the South Carolina/Georgia coastal stock was also caught in a bottom trawl net during the In-Water Sea Turtle Research survey. The net was immediately retrieved and the animal was released alive, breathing without difficulty and swiftly swimming away. On August 2, 2012 a bottlenose dolphin also belonging to the South Carolina/Georgia coastal stock was captured in the trawl net during the summer SEAMAP–SA Coastal Trawl survey. The animal was dead upon net retrieval. Most recently, on July 20, 2016, a bottlenose dolphin belonging to the South Carolina/Georgia coastal stock was taken in a bottom trawl during the In-Water Sea Turtle Research survey. Upon net retrieval, a suspected juvenile bottlenose dolphin, approximately 6 feet in length, was observed in the starboard codend of the trawl net. Although the animal was released alive, it was listless and not actively swimming when returned to the water. Therefore, the event was documented as a take by mortality.

In the GOMRA, a bottlenose dolphin belonging to the Mississippi Sound, Lake Borge, Bay Boudreau stock was captured in a skimmer trawl on October 23, 2013, during the SEFSC Skimmer Trawl TED Testing survey. The animal was observed breathing at the surface in the trawl upon retrieval of tailbag. To free the animal, the researchers redeployed the bag and slowed the vessel, allowing the animal to swim away unharmed. On October 1, 2014, a bottlenose dolphin belonging to the same stock was taken during the same survey. The animal was dead upon net retrieval.

In November 2010, NMFS elevated the Southeast Atlantic shrimp trawl fishery from a Category II to Category III fishing. From May through December 2010, Greenman *et al.* (2013) investigated interactions between the South Carolina shrimping fleet and

bottlenose dolphins. Methods included fishery-independent (SCNDR fisheries research surveys) and fishery-dependent onboard observations, a shrimper survey, and stranding record research. The authors found that of the 385 tows observed, dolphins were present 45 percent of the time (173 tows). Of these tows, dolphins were present 12 percent of the time at set-out and 44 percent of the time during haul back. According to the shrimper survey, most fishermen report dolphins rubbing bodies on the net or biting or tugging on nets or lines. However, 39 of the 44 fishermen surveyed reported a dolphin has never become entangled in the net while 38 of the 44 fishermen reported a dolphin has never become entangled in the lazy line.

Hook and Line—Marine mammals may be hooked or entangled in longline gear, with interactions potentially resulting in death due to drowning, strangulation, severing of carotid arteries or the esophagus, infection, an inability to evade predators, or starvation due to an inability to catch prey (Hofmeyr *et al.,* 2002), although it is more likely that animals will survive being hooked if they are able to reach the surface to breathe. Injuries, which may include serious injury, include lacerations and puncture wounds. Animals may attempt to depredate either bait or catch, with subsequent hooking, or may become accidentally entangled. As described for trawls, entanglement can lead to constricting lines wrapped around the animals and/or immobilization, and even if entangling materials are removed the wounds caused may continue to weaken the animal or allow further infection (Hofmeyr *et al.,* 2002).

Large whales may become entangled in a longline and then break free with a portion of gear trailing, resulting in alteration of swimming energetics due to drag and ultimate loss of fitness and potential mortality (Andersen *et al.,* 2008). Weight of the gear can cause entangling lines to further constrict and further injure the animal. Hooking injuries and ingested gear are most common in small cetaceans and pinnipeds but have been observed in large cetaceans (*e.g.,* sperm whales). The severity of the injury depends on the species, whether ingested gear includes hooks, whether the gear works its way into the gastrointestinal (GI) tract, whether the gear penetrates the GI lining, and the location of the hooking (*e.g.,* embedded in the animal's stomach or other internal body parts) (Andersen *et al.,* 2008).

Bottom longlines pose less of a threat to marine mammals due to their deployment on the ocean bottom but can still result in entanglement in buoy lines or hooking as the line is either deployed or retrieved. The rate of interaction between longline fisheries and marine mammals depends on the degree of overlap between longline effort and species distribution, hook style and size, type of bait and target catch, and fishing practices (such as setting/hauling during the day or at night).

Rod and reel gear carry less potential for marine mammal interaction, but the use of baited hooks in the presence of inquisitive marine mammals carries some risk. However, the small amount of hook and line operations in relation to longline operations and the lack of extended, unattended soak times mean that use of rod and reel is much less likely to result in marine mammal interactions for pelagic species. However, bottlenose dolphins are known to interact with commercial and recreational rod and reel fishermen. The SEFSC rod and reel fishing would implement various mitigation measures including consistent monitoring and pulling lines from water should marine mammals, especially bottlenose dolphins, be at risk of interaction. Therefore, we find a reduced potential for interaction from SEFSC rod and reel surveys than compared to commercial and recreational fishing.

Many species of cetaceans and pinnipeds are documented to have been killed by longlines, including several large whales, porpoises, a variety of delphinids, seals, and sea lions (Perez, 2006; Young and Iudicello, 2007; Northridge, 1984, 1991; Wickens, 1995). Generally, direct interaction between longlines and marine mammals (both cetaceans and pinnipeds) has been recorded wherever longline fishing and animals co-occur. A lack of recorded interactions where animals are known to be present may indicate simply that longlining is absent or an insignificant component of fisheries in that region or that interactions were not observed, recorded, or reported.

In evaluating risk relative to a specific fishery (or research survey), one must consider the length of the line and number of hooks deployed as well as frequency, timing, and location of deployment. These considerations inform determinations of whether interaction with marine mammals is likely. As with other gear and fishing practice comparisons to those involved in commercial fisheries, the longlines used by the SEFSC are shorter and are not set as long.

According to the PSIT database, one bottlenose dolphin belonging to the Mobile Bay, Bonsecour Bay stock was taken incidental to longline fisheries research. On August 6, 2013, while retrieving bottom longline gear during the SEAMAP–GOM Bottom Longline survey, a dolphin was caught by a circle hook during a longline research survey. After less than 60 seconds, the animal broke free from the gear and swam away vigorously, but the hook and approximately 2 m of trailing line remained attached to the animal. As such, the incident was documented as a serious injury. While a lack of repeated historical interaction does not in and of itself indicate that future interactions are unlikely, we believe that the historical record, considered in context with the frequency and timing of these activities, as well as mitigation measures employed indicate that future marine mammal interactions with these gears would be uncommon but not totally unexpected.

Other research gear—All other gear used in SEFSC fisheries research (*e.g.,* a variety of plankton nets, eel and chevron traps, CTDs, ROVs) do not have the expected potential for marine mammal interactions and are not known to have been involved in any marine mammal interaction. Specifically, we consider very small nets (*e.g.,* bongo and nueston nets), CTDs, ROVs, and vertically deployed or towed imaging systems to be no-impact gear types.

Unlike trawl nets, gillents, and hook and line gear, which are used in both scientific research and commercial fishing applications, the gear and equipment discussed here are not considered similar or analogous to any commercial fishing gear and are not designed to capture any commercially salable species, or to collect any sort of sample in large quantities. They do not have the potential to take marine mammals primarily because of their design, size, or how they are deployed. For example, CTDs are typically deployed in a vertical cast on a cable and have no loose lines or other entanglement hazards. A bongo net is typically deployed on a cable, whereas neuston nets (these may be plankton nets or small trawls) are often deployed in the upper one meter of the water column; either net type has very small size (*e.g.,* two bongo nets of 0.5 m^2 each or a neuston net of approximately 2 m^2) and no trailing lines. Due to lack of potential to result in harassment to marine mammals, these other gear types are not considered further in this document.

Potential Effects of Underwater Sound—Anthropogenic sounds cover a broad range of frequencies and sound levels and can have a range of highly variable impacts on marine life, from

none or minor to potentially severe responses, depending on received levels, duration of exposure, behavioral context, and various other factors. The potential effects of underwater sound from active acoustic sources can potentially result in one or more of the following: Temporary or permanent hearing impairment, non-auditory physical or physiological effects, behavioral disturbance, stress, and masking (Richardson *et al.,* 1995; Gordon *et al.,* 2004; Nowacek *et al.,* 2007; Southall *et al.,* 2007; Götz *et al.,* 2009). The degree of effect is intrinsically related to the signal characteristics, received level, distance from the source, duration of the sound exposure, and context in which the signal is received.

When considering the potential for a marine mammal to be harassed by a sound-generating source, we consider multiple signal characteristics, including, but not limited to, sound type (*e.g.,* impulsive vs. non-impulsive; continuous vs. intermittent), frequency (expressed as hertz (Hz) or kilohertz (kHz), and source levels (expressed as decibels (dB)). A sound pressure level (SPL) in dB is described as the ratio between a measured pressure and a reference pressure (for underwater sound, this is 1 microPascal [µPa]). Typically SPLs are expressed as root mean square (rms) values which is the quadratic mean sound pressure over the duration of an impulse or sound exposure levels (SEL; represented as dB re 1 μPa^2-s) which represents the total energy contained within a pulse, and considers both intensity and duration of exposure.

The SEFSC would not use acoustic sources with spectral characteristics resembling non-impulsive, continuous noise (*e.g.,* drilling). For impulsive sounds, peak sound pressure levels (PK) also provide an indication of potential harassment. We also consider other source characteristics when assessing potential effects such as directionality and beam width of fishery sonar equipment such as the ones involved here.

As described above, category 1 sources (those operating above 180kHz), are determined to have essentially no probability of being detected by or resulting in any potential adverse impacts on marine species. This conclusion is based on the fact that operating frequencies are above the known hearing capabilities of any marine species (as described above). Although sounds that are above the functional hearing range of marine animals may be audible if sufficiently loud (*e.g.,* see Møhl, 1968), the relative output levels of these sources and the levels that would likely be required for animals to detect them would be on the order of a few meters. The probability for injury or disturbance from these sources is discountable; therefore, no take is proposed to be authorized by Category 1 sources.

Auditory Thresholds Shifts

NMFS defines threshold shift (TS) as ''a change, usually an increase, in the threshold of audibility at a specified frequency or portion of an individual's hearing range above a previously established reference level'' (NMFS, 2016). Threshold shift can be permanent (PTS) or temporary (TTS). As described in NMFS (2016), there are numerous factors to consider when examining the consequence of TS, including, but not limited to, the signal temporal pattern (*e.g.,* impulsive or non-impulsive), likelihood an individual would be exposed for a long enough duration or to a high enough level to induce a TS, the magnitude of the TS, time to recovery (seconds to minutes or hours to days), the frequency range of the exposure (*i.e.,* spectral content), the hearing and vocalization frequency range of the exposed species relative to the signal's frequency spectrum (*i.e.,* how animal uses sound within the frequency band of the signal; *e.g.,* Kastelein et al. 2014b), and their overlap (*e.g.,* spatial, temporal, and spectral).

Permanent Threshold Shift

NMFS defines PTS as ''a permanent, irreversible increase in the threshold of audibility at a specified frequency or portion of an individual's hearing range above a previously established reference level'' (NMFS, 2016). It is the permanent elevation in hearing threshold resulting from irreparable damage to structures of the inner ear (*e.g.,* sensory hair cells, cochlea) or central auditory system (ANSI, 1995; Ketten 2000). Available data from humans and other terrestrial mammals indicate that a measured 40 dB threshold shift approximates PTS onset (see Ward *et al.* 1958; Ward *et al.* 1959; Kryter *et al.* 1966; Miller 1974; Henderson *et al.* 2008). Unlike TTS, NMFS considers PTS auditory injury and therefore constitutes Level A harassment, as defined in the MMPA.

With the exception of a single study unintentionally inducing PTS in a harbor seal (Kastak *et al.*, 2008), there are no empirical data measuring PTS in marine mammals largely due to the fact that, for various ethical reasons, experiments involving anthropogenic noise exposure at levels inducing PTS are not typically pursued or authorized (NMFS, 2016). As described in the SWFSC and NWFSC proposed rules for incidental take of marine mammals incidental to fisheries research and the SEFSC's application, the potential for PTS is extremely low given the high frequency and directionality of the active acoustic sources used during fisheries research. Because the frequency ranges of all sources are outside the hearing range of baleen whales (with the exception of the 18 kHz mode of the Simrad EK60), we do not anticipate PTS to occur for mysticetes. Any potential PTS for mid-frequency and high-frequency cetaceans is also very low given the cone of highest received levels is centered under the ship because, while echosounders may transmit at high sound pressure levels, the very short duration of their pulses and their high spatial selectivity make them unlikely to cause damage to marine mammal auditory systems (Lurton and DeRuiter, 2011). Natural avoidance responses by animals to the proximity of the vessel at these extremely close ranges would likely further reduce their probability of being exposed to these levels.

Temporary Threshold Shift

NMFS defines TTS as ''a temporary, reversible increase in the threshold of audibility at a specified frequency or portion of an individual's hearing range above a previously established reference level'' (NMFS, 2016). A TTS of 6 dB is considered the minimum threshold shift clearly larger than any day-to-day or session-to-session variation in a subject's normal hearing ability (Schlundt *et al.,* 2000; Finneran *et al.,* 2000; Finneran *et al.* 2002, as reviewed in Southall *et al.,* 2007 for a review)). TTS can last from minutes or hours to days (*i.e.,* there is recovery), occur in specific frequency ranges (*i.e.,* an animal might only have a temporary loss of hearing sensitivity between the frequencies of 1 and 10 kHz)), and can be of varying amounts (for example, an animal's hearing sensitivity might be temporarily reduced by only 6 dB or reduced by 30 dB). Currently, TTS measurements exist for only four species of cetaceans (bottlenose dolphins, belugas, harbor porpoises, and Yangtze finless porpoise) and three species of pinnipeds (Northern elephant seal, harbor seal, and California sea lion). These TTS measurements are from a limited number of individuals within these species.

Depending on the degree (elevation of threshold in dB), duration (*i.e.,* recovery time), and frequency range of TTS, and the context in which it is experienced, TTS can have effects on marine mammals ranging from discountable to

serious (similar to those discussed in auditory masking, below). For example, a marine mammal may be able to readily compensate for a brief, relatively small amount of TTS in a non-critical frequency range that takes place during a time when the animal is traveling through the open ocean, where ambient noise is lower and there are not as many competing sounds present. Alternatively, a larger amount and longer duration of TTS sustained during time when communication is critical for successful mother/calf interactions could have more serious impacts. We note that reduced hearing sensitivity as a simple function of aging has been observed in marine mammals, as well as humans and other taxa (Southall *et al.,* 2007), so we can infer that strategies exist for coping with this condition to some degree, though likely not without cost.

As described previously (see *Description of Active Acoustic Sound Sources*), the SEFSC proposes to use various active acoustic sources, including echosounders (*e.g.,* multibeam systems), scientific sonar systems, positional sonars (*e.g.,* net sounders for determining trawl position), and environmental sensors (*e.g.,* current profilers). These acoustic sources are not as powerful as many typically investigated acoustic sources (*e.g.,* seismic airguns, low- and mid-frequency active sonar used for military purposes) which produce signals that are either much lower frequency and/or higher total energy (considering output sound levels and signal duration) than the high-frequency mapping and fish-finding systems used by the SEFSC. There has been relatively little attention given to the potential impacts of high-frequency sonar systems on marine life, largely because their combination of high output frequency and relatively low output power means that such systems are less likely to impact many marine species. However, some marine mammals do hear and produce sounds within the frequency range used by these sources and ambient noise is much lower at high frequencies, increasing the probability of signal detection relative to other sounds in the environment.

As noted above, relatively high levels of sound are likely required to cause TTS in marine mammals. However, there may be increased sensitivity to TTS for certain species generally (harbor porpoise; Lucke *et al.,* 2009) or specifically at higher sound exposure frequencies, which correspond to a species' best hearing range (20 kHz vs. 3 kHz for bottlenose dolphins; Finneran and Schlundt, 2010). Based on discussion provided by Southall *et al.* (2007), Lurton and DeRuiter (2011) modeled the potential impacts of conventional echosounders on marine mammals, estimating TTS onset at typical distances of 10–100 m for the kinds of sources considered here. Kremser *et al.* (2005) modeled the potential for TTS in blue, sperm, and beaked whales (please see Kremser *et al.* (2005) for discussion of assumptions regarding TTS onset in these species) from a multibeam echosounder, finding similarly that TTS would likely only occur at very close ranges to the hull of the vessel. The authors estimated ship movement at 12 kn (faster than SEFSC vessels would typically move), which would result in an underestimate of the potential for TTS to occur. But the modeled system (Hydrosweep) operates at lower frequencies and with a wider beam pattern than do typical SEFSC systems, which would result in a likely more significant overestimate of TTS potential. The results of both studies emphasize that these effects would very likely only occur in the cone ensonified below the ship and that animal responses to the vessel (sound or physical presence) at these extremely close ranges would very likely influence their probability of being exposed to these levels. At the same distances, but to the side of the vessel, animals would not be exposed to these levels, greatly decreasing the potential for an animal to be exposed to the most intense signals. For example, Kremser *et al.* (2005) note that SPLs outside the vertical lobe, or beam, decrease rapidly with distance, such that SPLs within the horizontal lobes are about 20 dB less than the value found in the center of the beam. For certain species (*i.e.,* odontocete cetaceans and especially harbor porpoises), these ranges may be somewhat greater based on more recent data (Lucke *et al.,* 2009; Finneran and Schlundt, 2010) but are likely still on the order of hundreds of meters. In addition, potential behavioral responses further reduce the already low likelihood that an animal may approach close enough for any type of hearing loss to occur.

Various other studies have evaluated the environmental risk posed by use of specific scientific sonar systems. Burkhardt *et al.* (2007) considered the Simrad EK60, which is used by the SEFSC, and concluded that direct injury (*i.e.,* sound energy causes direct tissue damage) and indirect injury (*i.e.,* self-damaging behavior as response to acoustic exposure) would be unlikely given source and operational use (*i.e.,* vessel movement) characteristics, and that any behavioral responses would be unlikely to be significant. Similarly, Boebel *et al.* (2006) considered the Hydrosweep system in relation to the risk for direct or indirect injury, concluding that (1) risk of TTS (please see Boebel *et al.* (2006) for assumptions regarding TTS onset) would be less than two percent of the risk of ship strike and (2) risk of behaviorally-induced damage would be essentially nil due to differences in source characteristics between scientific sonars and sources typically associated with stranding events (*e.g.,* mid-frequency active sonar, but see discussion of the 2008 Madagascar stranding event below). It should be noted that the risk of direct injury may be greater when a vessel operates sources while on station (*i.e.,* stationary), as there is a greater chance for an animal to receive the signal when the vessel is not moving.

Boebel *et al.* (2005) report the results of a workshop in which a structured, qualitative risk analysis of a range of acoustic technology was undertaken, specific to use of such technology in the Antarctic. The authors assessed a single-beam echosounder commonly used for collecting bathymetric data (12 kHz, 232 dB, 10° beam width), an array of single-beam echosounders used for mapping krill (38, 70, 120, and 200 kHz; 230 dB; 7° beam width), and a multibeam echosounder (30 kHz, 236 dB, 150° x 1° swath width). For each source, the authors produced a matrix displaying the severity of potential consequences (on a six-point scale) against the likelihood of occurrence for a given degree of severity. For the former two systems, the authors determined on the basis of the volume of water potentially affected by the system and comparisons between its output and available TTS data that the chance of TTS only exists in a small volume immediately under the transducers, and that consequences of level four and above were inconceivable, whereas level one consequences (''Individuals show no response, or only a temporary (minutes) behavior change'') would be expected in almost all instances. Some minor displacement of animals in the immediate vicinity of the ship may occur. For the multibeam echosounder, Boebel *et al.* (2005) note that the high output and broad width of the swath abeam of the vessel makes displacement of animals more likely. However, the fore and aft beamwidth is small and the pulse length very short, so the risk of ensonification above TTS levels is still considered quite small and the likelihood of auditory or other injuries low. In general, the authors reached the

same conclusions described for the single-beam systems but note that more severe impacts—including fatalities resulting from herding of sensitive species in narrow sea ways—are at least possible (*i.e.,* may occur in exceptional circumstances). However, the probability of herding remains low not just because of the rarity of the necessary confluence of species, bathymetry, and likely other factors, but because the restricted beam shape makes it unlikely that an animal would be exposed more than briefly during the passage of the vessel (Boebel *et al.,* 2005). More recently, Lurton (2016) conducted a modeling exercise and concluded similarly that likely potential for acoustic injury from these types of systems is negligible, but that behavioral response cannot be ruled out.

Characteristics of the sound sources used by SEFSC reduce the likelihood of effects to marine mammals, as well as the intensity of effect assuming that an animal perceives the signal. Intermittent exposures—as would occur due to the brief, transient signals produced by these sources—require a higher cumulative SEL to induce TTS than would continuous exposures of the same duration (*i.e.,* intermittent exposure results in lower levels of TTS) (Mooney *et al.,* 2009a; Finneran *et al.,* 2010). In addition, animals recover from intermittent exposures faster in comparison to continuous exposures of the same duration (Finneran *et al.,* 2010). Although echosounder pulses are, in general, emitted rapidly, they are not dissimilar to odontocete echolocation click trains. Research indicates that marine mammals generally have extremely fine auditory temporal resolution and can detect each signal separately (*e.g.,* Au *et al.,* 1988; Dolphin *et al.,* 1995; Supin and Popov, 1995; Mooney *et al.,* 2009b), especially for species with echolocation capabilities. Therefore, it is likely that marine mammals would indeed perceive echosounder signals as being intermittent.

We conclude that, on the basis of available information on hearing and potential auditory effects in marine mammals, high-frequency cetacean species would be the most likely to potentially incur temporary hearing loss from a vessel operating high-frequency fishery research sonar sources, and the potential for PTS to occur for any species is so unlikely as to be discountable. Even for high-frequency cetacean species, individuals would have to make a very close approach and also remain very close to vessels operating these sources in order to receive multiple exposures at relatively high levels, as would be necessary to cause TTS. Additionally, given that behavioral responses typically include the temporary avoidance that might be expected (see below), the potential for auditory effects considered physiological damage (injury) is considered extremely low in relation to realistic operations of these devices. Given the fact that fisheries research survey vessels are moving, the likelihood that animals may avoid the vessel to some extent based on either its physical presence or due to aversive sound (vessel or active acoustic sources), and the intermittent nature of many of these sources, the potential for TTS is probably low for high-frequency cetaceans and very low to zero for other species.

Behavioral Effects on Marine Mammals

Category 2 active acoustic sources are likely to be audible to some marine mammal species. Among the marine mammals, most of these sources are unlikely to be audible to whales and most pinnipeds, whereas they may be detected by odontocete cetaceans (and particularly high frequency specialists such as harbor porpoise). Richardson *et al.* (1995) described zones of increasing intensity of effect that might be expected to occur, in relation to distance from a source and assuming that the signal is within an animal's hearing range. First is the area within which the acoustic signal would be audible (potentially perceived) to the animal but not strong enough to elicit any overt behavioral or physiological response. The next zone corresponds with the area where the signal is audible to the animal and of sufficient intensity to elicit behavioral or physiological responses. Third is a zone within which, for signals of high intensity, the received level is sufficient to potentially cause discomfort or tissue damage to auditory or other systems. Overlaying these zones to a certain extent is the area within which masking (*i.e.,* when a sound interferes with or masks the ability of an animal to detect a signal of interest that is above the absolute hearing threshold) may occur; the masking zone may be highly variable in size.

Behavioral disturbance may include a variety of effects, including subtle changes in behavior (*e.g.,* minor or brief avoidance of an area or changes in vocalizations), more conspicuous changes in similar behavioral activities, and more sustained and/or potentially severe reactions, such as displacement from or abandonment of high-quality habitat. Behavioral responses to sound are highly variable and context-specific and any reactions depend on numerous intrinsic and extrinsic factors (*e.g.,* species, state of maturity, experience, current activity, reproductive state, auditory sensitivity, time of day), as well as the interplay between factors (*e.g.,* Richardson *et al.,* 1995; Wartzok *et al.,* 2003; Southall *et al.,* 2007; Weilgart, 2007; Archer *et al.,* 2010). Behavioral reactions can vary not only among individuals but also within an individual, depending on previous experience with a sound source, context, and numerous other factors (Ellison *et al.,* 2012), and can vary depending on characteristics associated with the sound source (*e.g.,* whether it is moving or stationary, number of sources, distance from the source).

Habituation can occur when an animal's response to a stimulus wanes with repeated exposure, usually in the absence of unpleasant associated events (Wartzok *et al.,* 2003). Animals are most likely to habituate to sounds that are predictable and unvarying. It is important to note that habituation is appropriately considered as a ''progressive reduction in response to stimuli that are perceived as neither aversive nor beneficial,'' rather than as, more generally, moderation in response to human disturbance (Bejder *et al.,* 2009). The opposite process is sensitization, when an unpleasant experience leads to subsequent responses, often in the form of avoidance, at a lower level of exposure. As noted, behavioral state may affect the type of response. For example, animals that are resting may show greater behavioral change in response to disturbing sound levels than animals that are highly motivated to remain in an area for feeding (Richardson *et al.,* 1995; NRC, 2003; Wartzok *et al.,* 2003). Controlled experiments with captive marine mammals have showed pronounced behavioral reactions, including avoidance of loud sound sources (Ridgway *et al.,* 1997; Finneran *et al.,* 2003). Observed responses of wild marine mammals to loud pulsed sound sources (typically seismic airguns or acoustic harassment devices) have been varied but often consist of avoidance behavior or other behavioral changes suggesting discomfort (Morton and Symonds, 2002; see also Richardson *et al.,* 1995; Nowacek *et al.,* 2007).

Available studies show wide variation in response to underwater sound; therefore, it is difficult to predict specifically how any given sound in a particular instance might affect marine mammals perceiving the signal. If a marine mammal does react briefly to an underwater sound by changing its behavior or moving a small distance, the

impacts of the change are unlikely to be significant to the individual, let alone the stock or population. However, if a sound source displaces marine mammals from an important feeding or breeding area for a prolonged period, impacts on individuals and populations could be significant (*e.g.,* Lusseau and Bejder, 2007; Weilgart, 2007; NRC, 2005). However, there are broad categories of potential response, which we describe in greater detail here, that include alteration of dive behavior, alteration of foraging behavior, effects to breathing, interference with or alteration of vocalization, avoidance, and flight.

Changes in dive behavior can vary widely and may consist of increased or decreased dive times and surface intervals as well as changes in the rates of ascent and descent during a dive (*e.g.,* Frankel and Clark, 2000; Costa *et al.,* 2003; Ng and Leung, 2003; Nowacek *et al.;* 2004; Goldbogen *et al.,* 2013a, b). Variations in dive behavior may reflect interruptions in biologically significant activities (*e.g.,* foraging) or they may be of little biological significance. The impact of an alteration to dive behavior resulting from an acoustic exposure depends on what the animal is doing at the time of the exposure and the type and magnitude of the response.

Disruption of feeding behavior can be difficult to correlate with anthropogenic sound exposure, so it is usually inferred by observed displacement from known foraging areas, the appearance of secondary indicators (*e.g.,* bubble nets or sediment plumes), or changes in dive behavior. As for other types of behavioral response, the frequency, duration, and temporal pattern of signal presentation, as well as differences in species sensitivity, are likely contributing factors to differences in response in any given circumstance (*e.g.,* Croll *et al.,* 2001; Nowacek *et al.;* 2004; Madsen *et al.,* 2006; Yazvenko *et al.,* 2007). A determination of whether foraging disruptions incur fitness consequences would require information on or estimates of the energetic requirements of the affected individuals and the relationship between prey availability, foraging effort and success, and the life history stage of the animal.

Variations in respiration naturally vary with different behaviors and alterations to breathing rate as a function of acoustic exposure can be expected to co-occur with other behavioral reactions, such as a flight response or an alteration in diving. However, respiration rates in and of themselves may be representative of annoyance or an acute stress response. Various studies have shown that respiration rates may either be unaffected or could increase, depending on the species and signal characteristics, again highlighting the importance in understanding species differences in the tolerance of underwater noise when determining the potential for impacts resulting from anthropogenic sound exposure (*e.g.,* Kastelein *et al.,* 2001, 2005b, 2006; Gailey *et al.,* 2007).

Marine mammals vocalize for different purposes and across multiple modes, such as whistling, echolocation click production, calling, and singing. Changes in vocalization behavior in response to anthropogenic noise can occur for any of these modes and may result from a need to compete with an increase in background noise or may reflect increased vigilance or a startle response. For example, in the presence of potentially masking signals, humpback whales and killer whales have been observed to increase the length of their songs (Miller *et al.,* 2000; Fristrup *et al.,* 2003; Foote *et al.,* 2004), while right whales have been observed to shift the frequency content of their calls upward while reducing the rate of calling in areas of increased anthropogenic noise (Parks *et al.,* 2007b). In some cases, animals may cease sound production during production of aversive signals (Bowles *et al.,* 1994).

Avoidance is the displacement of an individual from an area or migration path as a result of the presence of a sound or other stressors, and is one of the most obvious manifestations of disturbance in marine mammals (Richardson *et al.,* 1995). For example, gray whales are known to change direction—deflecting from customary migratory paths—in order to avoid noise from seismic surveys (Malme *et al.,* 1984). Avoidance may be short-term, with animals returning to the area once the noise has ceased (*e.g.,* Bowles *et al.,* 1994; Goold, 1996; Morton and Symonds, 2002; Gailey *et al.,* 2007). Longer-term displacement is possible, however, which may lead to changes in abundance or distribution patterns of the affected species in the affected region if habituation to the presence of the sound does not occur (*e.g.,* Blackwell *et al.,* 2004; Bejder *et al.,* 2006; Teilmann *et al.,* 2006).

A flight response is a dramatic change in normal movement to a directed and rapid movement away from the perceived location of a sound source. The flight response differs from other avoidance responses in the intensity of the response (*e.g.,* directed movement, rate of travel). Relatively little information on flight responses of marine mammals to anthropogenic signals exist, although observations of flight responses to the presence of predators have occurred (Connor and Heithaus, 1996). The result of a flight response could range from brief, temporary exertion and displacement from the area where the signal provokes flight to, in extreme cases, marine mammal strandings (Evans and England, 2001). However, it should be noted that response to a perceived predator does not necessarily invoke flight (Ford and Reeves, 2008), and whether individuals are solitary or in groups may influence the response.

Behavioral disturbance can also impact marine mammals in more subtle ways. Increased vigilance may result in costs related to diversion of focus and attention (*i.e.,* when a response consists of increased vigilance, it may come at the cost of decreased attention to other critical behaviors such as foraging or resting). These effects have generally not been demonstrated for marine mammals, but studies involving fish and terrestrial animals have shown that increased vigilance may substantially reduce feeding rates (*e.g.,* Beauchamp and Livoreil, 1997; Fritz *et al.,* 2002; Purser and Radford, 2011). In addition, chronic disturbance can cause population declines through reduction of fitness (*e.g.,* decline in body condition) and subsequent reduction in reproductive success, survival, or both (*e.g.,* Harrington and Veitch, 1992; Daan *et al.,* 1996; Bradshaw *et al.,* 1998). However, Ridgway *et al.* (2006) reported that increased vigilance in bottlenose dolphins exposed to sound over a five-day period did not cause any sleep deprivation or stress effects.

Many animals perform vital functions, such as feeding, resting, traveling, and socializing, on a diel cycle (24-hour cycle). Disruption of such functions resulting from reactions to stressors such as sound exposure are more likely to be significant if they last more than one diel cycle or recur on subsequent days (Southall *et al.,* 2007). Consequently, a behavioral response lasting less than one day and not recurring on subsequent days is not considered particularly severe unless it could directly affect reproduction or survival (Southall *et al.,* 2007). Note that there is a difference between multi-day substantive behavioral reactions and multi-day anthropogenic activities. For example, just because an activity lasts for multiple days does not necessarily mean that individual animals are either exposed to activity-related stressors for multiple days or, further, exposed in a manner resulting in sustained multi-day substantive behavioral responses.

Few experiments have been conducted to explicitly test for potential effects of echosounders on the behavior of wild cetaceans. Quick *et al.* (2017) describe an experimental approach to assess potential changes in short-finned pilot whale behavior during exposure to an echosounder (Simrad EK60 operated at 38 kHz, which is commonly used by SESC). In 2011, digital acoustic recording tags (DTAG) were attached to pilot whales off of North Carolina, with five of the nine tagged whales exposed to signals from the echosounder over a period of eight days and four treated as control animals. DTAGS record both received levels of noise as well as orientation of the animal. Results did not show an overt response to the echosounder or a change to foraging behavior of tagged whales, but the whales did increase heading variance during exposure. The authors suggest that this response was not a directed avoidance response but was more likely a vigilance response, with animals maintaining awareness of the location of the echosounder through increased changes in heading variance (Quick *et al.,* 2017). Visual observations of behavior did not indicate any dramatic response, unusual behaviors, or changes in heading, and cessation of biologically important behavior such as feeding was not observed. These less overt responses to sound exposure are difficult to detect by visual observation, but may have important consequences if the exposure does interfere with biologically important behavior.

We considered behavioral data from these species when assessing the potential for take (see Estimated Take section). There are few studies that obtained detailed beaked whale behavioral data in response to echosounders (*e.g.,* Quick *et al.* (2016), Cholewiak *et al.* (2017)) as more effort has been focused on mid-frequency active sonar (*e.g.,* Cox *et al.* (2006), Tyack *et al.* (2006, 2011). In 2013, passive acoustic monitoring of beaked whales in the Atlantic Ocean occurred during and in absence of prey studies using an EK60 echosounder (Cholewiak *et al.,* 2017). There was a significant reduction of acoustic detections during echosounder use; indicating beaked whales may have moved out of the detection range, initiated directed movement away from the ship, the animals remained in the area but temporarily suspend foraging activity. The authors also noted that due to some potential outliers in the data, the analysis may not be sensitive enough to fully evaluate the relationship between beaked whale sightings and echosounder use. Beaked whales have also not consistently been observed to elicit behaviors across species or source type. For example, Cuvier's beaked whales have strongly avoided playbacks of mid-frequency active sonar at distances of 10 km but reacted much less severely to naval sonar operating 118 km away, despite similar RLs (DeRuiter *et al.* 2013).

Based on the available data, NMFS anticipates beaked whales and harbor porpoise are more likely to respond in a manner that may rise to the level of take to SEFSC acoustic sources. However, the method by which take is quantified in this proposed rule is conservative (*e.g.,* simplified, conservative Level B harassment area to the 160dB isopleth, conservative amount of time surveys may occur) and adequately accounts for the number of individuals which may be taken. We also note harbor porpoise occur as far south as North Carolina in the ARA during winter months (January through March) and do not inhabit the GOMRA or CRA. Therefore, the potential for harassment from scientific sonar used by the SEFSC is unlikely outside of the January through March timeframe off of North Carolina constituting a very small subset of space and time when considering all three research areas and research effort. More information on take estimate methodology is found in the Estimated Take section.

Stress responses—An animal's perception of a threat may be sufficient to trigger stress responses consisting of some combination of behavioral responses, autonomic nervous system responses, neuroendocrine responses, or immune responses (*e.g.,* Seyle, 1950; Moberg, 2000). In many cases, an animal's first and sometimes most economical (in terms of energetic costs) response is behavioral avoidance of the potential stressor. Autonomic nervous system responses to stress typically involve changes in heart rate, blood pressure, and gastrointestinal activity. These responses have a relatively short duration and may or may not have a significant long-term effect on an animal's fitness.

Neuroendocrine stress responses often involve the hypothalamus-pituitary-adrenal system. Virtually all neuroendocrine functions that are affected by stress—including immune competence, reproduction, metabolism, and behavior—are regulated by pituitary hormones. Stress-induced changes in the secretion of pituitary hormones have been implicated in failed reproduction, altered metabolism, reduced immune competence, and behavioral disturbance (*e.g.,* Moberg, 1987; Blecha, 2000). Increases in the circulation of glucocorticoids are also equated with stress (Romano *et al.,* 2004).

The primary distinction between stress (which is adaptive and does not normally place an animal at risk) and ''distress'' is the cost of the response. During a stress response, an animal uses glycogen stores that can be quickly replenished once the stress is alleviated. In such circumstances, the cost of the stress response would not pose serious fitness consequences. However, when an animal does not have sufficient energy reserves to satisfy the energetic costs of a stress response, energy resources must be diverted from other functions. This state of distress will last until the animal replenishes its energetic reserves sufficient to restore normal function.

Relationships between these physiological mechanisms, animal behavior, and the costs of stress responses are well-studied through controlled experiments and for both laboratory and free-ranging animals (*e.g.,* Holberton *et al.,* 1996; Hood *et al.,* 1998; Jessop *et al.,* 2003; Krausman *et al.,* 2004; Lankford *et al.,* 2005). Stress responses due to exposure to anthropogenic sounds or other stressors and their effects on marine mammals have also been reviewed (Fair and Becker, 2000; Romano *et al.,* 2002b) and, more rarely, studied in wild populations (*e.g.,* Romano *et al.,* 2002a). For example, Rolland *et al.* (2012) found that noise reduction from reduced ship traffic in the Bay of Fundy was associated with decreased stress in North Atlantic right whales. These and other studies lead to a reasonable expectation that some marine mammals will experience physiological stress responses upon exposure to acoustic stressors and that it is possible that some of these would be classified as ''distress.'' In addition, any animal experiencing TTS would likely also experience stress responses (NRC, 2003).

Auditory masking—Sound can disrupt behavior through masking, or interfering with, an animal's ability to detect, recognize, or discriminate between acoustic signals of interest (*e.g.,* those used for intraspecific communication and social interactions, prey detection, predator avoidance, navigation) (Richardson *et al.,* 1995; Erbe *et al.,* 2016). Masking occurs when the receipt of a sound is interfered with by another coincident sound at similar frequencies and at similar or higher intensity, and may occur whether the sound is natural (*e.g.,* snapping shrimp, wind, waves, precipitation) or anthropogenic (*e.g.,* shipping, sonar,

seismic exploration) in origin. The ability of a noise source to mask biologically important sounds depends on the characteristics of both the noise source and the signal of interest (*e.g.,* signal-to-noise ratio, temporal variability, direction), in relation to each other and to an animal's hearing abilities (*e.g.,* sensitivity, frequency range, critical ratios, frequency discrimination, directional discrimination, age or TTS hearing loss), and existing ambient noise and propagation conditions.

Under certain circumstances, marine mammals experiencing significant masking could also be impaired from maximizing their performance fitness in survival and reproduction. Therefore, when the coincident (masking) sound is man-made, it may be considered harassment when disrupting or altering critical behaviors. It is important to distinguish TTS and PTS, which persist after the sound exposure, from masking, which occurs during the sound exposure. Because masking (without resulting in TS) is not associated with abnormal physiological function, it is not considered a physiological effect, but rather a potential behavioral effect.

The frequency range of the potentially masking sound is important in determining any potential behavioral impacts. For example, low-frequency signals may have less effect on high-frequency echolocation sounds produced by odontocetes but are more likely to affect detection of mysticete communication calls and other potentially important natural sounds such as those produced by surf and some prey species. The masking of communication signals by anthropogenic noise may be considered as a reduction in the communication space of animals (*e.g.,* Clark *et al.,* 2009) and may result in energetic or other costs as animals change their vocalization behavior (*e.g.,* Miller *et al.,* 2000; Foote *et al.,* 2004; Parks *et al.,* 2007b; Di Iorio and Clark, 2009; Holt *et al.,* 2009). Masking can be reduced in situations where the signal and noise come from different directions (Richardson *et al.,* 1995), through amplitude modulation of the signal, or through other compensatory behaviors (Houser and Moore, 2014). Masking can be tested directly in captive species (*e.g.,* Erbe, 2008), but in wild populations it must be either modeled or inferred from evidence of masking compensation. There are few studies addressing real-world masking sounds likely to be experienced by marine mammals in the wild (*e.g.,* Branstetter *et al.,* 2013).

Masking affects both senders and receivers of acoustic signals and can potentially have long-term chronic effects on marine mammals at the population level as well as at the individual level. Low-frequency ambient sound levels have increased by as much as 20 dB (more than three times in terms of SPL) in the world's ocean from pre-industrial periods, with most of the increase from distant commercial shipping (Hildebrand, 2009). All anthropogenic sound sources, but especially chronic and lower-frequency signals (*e.g.,* from vessel traffic), contribute to elevated ambient sound levels, thus intensifying masking.

We have also considered the potential for severe behavioral responses such as stranding and associated indirect injury or mortality from SEFSC acoustic survey equipment, on the basis of a 2008 mass stranding of approximately one hundred melon-headed whales in a Madagascar lagoon system. An investigation of the event indicated that use of a high-frequency mapping system (12-kHz multibeam echosounder; it is important to note that all SEFSC sources operate at higher frequencies (see Table 1)) was the most plausible and likely initial behavioral trigger of the event, while providing the caveat that there is no unequivocal and easily identifiable single cause (Southall *et al.,* 2013). The panel's conclusion was based on (1) very close temporal and spatial association and directed movement of the survey with the stranding event; (2) the unusual nature of such an event coupled with previously documented apparent behavioral sensitivity of the species to other sound types (Southall *et al.,* 2006; Brownell *et al.,* 2009); and (3) the fact that all other possible factors considered were determined to be unlikely causes. Specifically, regarding survey patterns prior to the event and in relation to bathymetry, the vessel transited in a north-south direction on the shelf break parallel to the shore, ensonifying large areas of deep-water habitat prior to operating intermittently in a concentrated area offshore from the stranding site. This may have trapped the animals between the sound source and the shore, thus driving them towards the lagoon system. The investigatory panel systematically excluded or deemed highly unlikely nearly all potential reasons for these animals leaving their typical pelagic habitat for an area extremely atypical for the species (*i.e.,* a shallow lagoon system). Notably, this was the first time that such a system has been associated with a stranding event.

The panel also noted several site- and situation-specific secondary factors that may have contributed to the avoidance responses that led to the eventual entrapment and mortality of the whales. Specifically, shoreward-directed surface currents and elevated chlorophyll levels in the area preceding the event may have played a role (Southall *et al.,* 2013). The report also notes that prior use of a similar system in the general area may have sensitized the animals and also concluded that, for odontocete cetaceans that hear well in higher frequency ranges where ambient noise is typically quite low, high-power active sonars operating in this range may be more easily audible and have potential effects over larger areas than low frequency systems that have more typically been considered in terms of anthropogenic noise impacts. It is, however, important to note that the relatively lower output frequency, higher output power, and complex nature of the system implicated in this event, in context of the other factors noted here, likely produced a fairly unusual set of circumstances that indicate that such events would likely remain rare and are not necessarily relevant to use of lower-power, higher-frequency systems more commonly used for scientific applications. The risk of similar events recurring may be very low, given the extensive use of active acoustic systems used for scientific and navigational purposes worldwide on a daily basis and the lack of direct evidence of such responses previously reported.

Characteristics of the sound sources predominantly used by SEFSC further reduce the likelihood of effects to marine mammals, as well as the intensity of effect assuming that an animal perceives the signal. Intermittent exposures—as would occur due to the brief, transient signals produced by these sources—require a higher cumulative SEL to induce TTS than would continuous exposures of the same duration (*i.e.,* intermittent exposure results in lower levels of TTS) (Mooney *et al.,* 2009a; Finneran *et al.,* 2010). In addition, intermittent exposures recover faster in comparison with continuous exposures of the same duration (Finneran *et al.,* 2010). Although echosounder pulses are, in general, emitted rapidly, they are not dissimilar to odontocete echolocation click trains. Research indicates that marine mammals generally have extremely fine auditory temporal resolution and can detect each signal separately (*e.g.,* Au *et al.,* 1988; Dolphin *et al.,* 1995; Supin and Popov, 1995; Mooney *et al.,* 2009b), especially for species with echolocation capabilities.

Therefore, it is likely that marine mammals would indeed perceive echosounder signals as being intermittent.

We conclude here that, on the basis of available information on hearing and potential auditory effects in marine mammals, the potential for threshold shift from exposure to fishery research sonar is low to discountable. High-frequency cetacean species would be the most likely to potentially incur some minimal amount of temporary hearing loss from a vessel operating high-frequency sonar sources, and the potential for PTS to occur for any species is so unlikely as to be discountable. Even for high-frequency cetacean species, individuals would have to make a very close approach and also remain very close to vessels operating these sources in order to receive multiple exposures at relatively high levels, as would be necessary to cause TTS. Additionally, given that behavioral responses typically include the temporary avoidance that might be expected (see below), the potential for auditory effects considered physiological damage (injury) is considered extremely low in relation to realistic operations of these devices. Given the fact that fisheries research survey vessels are moving, the likelihood that animals may avoid the vessel to some extent based on either its physical presence or due to aversive sound (vessel or active acoustic sources), and the intermittent nature of many of these sources, the potential for TTS is probably low for high-frequency cetaceans and very low to zero for other species.

Based on the source operating characteristics, most of these sources may be detected by odontocete cetaceans (and particularly high-frequency specialists such as porpoises) but are unlikely to be audible to mysticetes (*i.e.,* low-frequency cetaceans) and some pinnipeds. While low-frequency cetaceans and pinnipeds have been observed to respond behaviorally to low- and mid-frequency sounds (*e.g.,* Frankel, 2005), there is little evidence of behavioral responses in these species to high-frequency sound exposure (*e.g.,* Jacobs and Terhune, 2002; Kastelein *et al.,* 2006). If a marine mammal does perceive a signal from a SEFSC active acoustic source, it is likely that the response would be, at most, behavioral in nature. Behavioral reactions of free-ranging marine mammals to scientific sonars are likely to vary by species and circumstance. For example, Watkins *et al.* (1985) note that sperm whales did not appear to be disturbed by or even aware of signals from scientific sonars and pingers (36–60 kHz) despite being very close to the transducers. But Gerrodette and Pettis (2005) report that when a 38-kHz echosounder and ADCP were on (1) the average size of detected schools of spotted dolphins and pilot whales was decreased; (2) perpendicular sighting distances increased for spotted and spinner dolphins; and (3) sighting rates decreased for beaked whales.

As described above, behavioral responses of marine mammals are extremely variable, depending on multiple exposure factors, with the most common type of observed response being behavioral avoidance of areas around aversive sound sources. Certain odontocete cetaceans (particularly harbor porpoises and beaked whales) are known to avoid high-frequency sound sources in both field and laboratory settings (*e.g.,* Kastelein *et al.,* 2000, 2005b, 2008a, b; Culik *et al.,* 2001; Johnston, 2002; Olesiuk *et al.,* 2002; Carretta *et al.,* 2008). There is some additional, low probability for masking to occur for high-frequency specialists, but similar factors (directional beam pattern, transient signal, moving vessel) mean that the significance of any potential masking is probably inconsequential.

Anticipated Effects on Marine Mammal Habitat

Effects to prey—In addition to direct, or operational, interactions between fishing gear and marine mammals, indirect (*i.e.,* biological or ecological) interactions occur as well, in which marine mammals and fisheries both utilize the same resource, potentially resulting in competition that may be mutually disadvantageous (*e.g.,* Northridge, 1984; Beddington *et al.,* 1985; Wickens, 1995). Marine mammal prey varies by species, season, and location and, for some, is not well documented. There is some overlap in prey of marine mammals and the species sampled and removed during SEFSC research surveys, with primary prey of concern being zooplankton, estuarine fishes, and invertebrates. The majority of fish affected by SEFSC-affiliated research projects are caught and killed during these six annual surveys: SEAMAP–SA Coastal Trawl Survey, SEAMAP–GOM Shrimp/Groundfish (Summer/Fall) Trawl, Small Pelagics Trawl Survey, Shark and Red Snapper Bottom Longline Survey, SEAMAP–GOM Shrimp/Groundfish (Summer/Fall) Trawl Survey, and the MARMAP Reef Fish Long Bottom Longline Survey. The species caught in greatest abundance in the ARA are the great northern tilefish, Atlantic bumper, banded drum and star drum. In the GOMRA, the species caught in greatest abundance is the Atlantic croaker followed by the longspine porgy and Rough scad. In the CRA, the horse-eye jack and yellowtail snapper comprise the greatest catch. However, in all research areas, the total amount of these species taken in research surveys is very small relative to their overall biomass in the area (See Section 4.2.3 of the SEFSC EA for more information on fish catch during research surveys). Tables 4.2–8 through 4.2–12 in the SEFSC's Draft EA indicate that, while mortality to fish species is a direct effect of the SEFSC Atlantic Research Area surveys, there are likely no measurable population changes occurring as a result of these research activities because they represent such a small percentage of allowable quota in commercial and recreational fisheries, which are just fractions of the total populations for these species.

In addition to the small total biomass taken, some of the size classes of fish targeted in research surveys are very small, and these small size classes are not known to be prey of marine mammals. Research catches are also distributed over a wide area because of the random sampling design covering large sample areas. Fish removals by research are therefore highly localized and unlikely to affect the spatial concentrations and availability of prey for any marine mammal species. The overall effect of research catches on marine mammals through competition for prey may therefore be considered insignificant for all species.

Acoustic habitat—Acoustic habitat is the soundscape—which encompasses all of the sound present in a particular location and time, as a whole—when considered from the perspective of the animals experiencing it. Animals produce sound for, or listen for sounds produced by, conspecifics (communication during feeding, mating, and other social activities), other animals (finding prey or avoiding predators), and the physical environment (finding suitable habitats, navigating). Together, sounds made by animals and the geophysical environment (*e.g.,* produced by earthquakes, lightning, wind, rain, waves) make up the natural contributions to the total acoustics of a place. These acoustic conditions, termed acoustic habitat, are one attribute of an animal's total habitat.

Soundscapes are also defined by, and acoustic habitat influenced by, the total contribution of anthropogenic sound. This may include incidental emissions from sources such as vessel traffic, or

may be intentionally introduced to the marine environment for data acquisition purposes (as in the SEFSC's use of active acoustic sources). Anthropogenic noise varies widely in its frequency content, duration, and loudness, and these characteristics greatly influence the potential habitat-mediated effects to marine mammals (please see also the previous discussion on masking under ''Acoustic Effects''), which may range from local effects for brief periods of time to chronic effects over large areas and for long durations. Depending on the extent of effects to habitat, animals may alter their communications signals (thereby potentially expending additional energy) or miss acoustic cues (either conspecific or adventitious). For more detail on these concepts see, *e.g.,* Barber *et al.,* 2010; Pijanowski *et al.,* 2011; Francis and Barber, 2013; Lillis *et al.,* 2014.

As described above (''Acoustic Effects''), the signals emitted by SEFSC active acoustic sources are of higher frequencies, short duration with high directionality, and transient. These factors mean that the signals will likely attenuate rapidly (not travel over great distances), may not be perceived or affect perception even when animals are in the vicinity, and would not be considered chronic in any given location. SEFSC use of these sources is widely dispersed in both space and time. In conjunction with the prior factors, this means that it is highly unlikely that SEFSC use of these sources would, on their own, have any appreciable effect on acoustic habitat.

Physical habitat—The SEFSC conducts some bottom trawling, which may physically damage seafloor habitat. Physical damage may include furrowing and smoothing of the seafloor as well as the displacement of rocks and boulders, and such damage can increase with multiple contacts in the same area (Morgan and Chuenpagdee, 2003; Stevenson *et al.,* 2004). Damage to seafloor habitat may also harm infauna and epifauna (*i.e.,* animals that live in or on the seafloor or on structures on the seafloor), including corals. In general, physical damage to the seafloor would be expected to recover within eighteen months through the action of water currents and natural sedimentation, with the exception of rocks and boulders which may be permanently displaced (Stevenson *et al.,* 2004). Relatively small areas would be impacted by SEFSC bottom trawling and, because such surveys are conducted in the same areas but not in the exact same locations, they are expected to cause single rather than repeated disturbances in any given area. SEFSC activities would not be expected to have any other impacts on physical habitat.

As described in the preceding, the potential for SEFSC research to affect the availability of prey to marine mammals or to meaningfully impact the quality of physical or acoustic habitat is considered to be insignificant for all species. Effects to habitat will not be discussed further in this document.

Estimated Take

This section provides an estimate of the number of incidental takes proposed for authorization through this IHA, which will inform both NMFS' consideration of whether the number of takes is ''small'' and the negligible impact determination. When discussing take, we consider three manners of take: Mortality, serious injury, and harassment. Serious injury is defined as an injury that could lead to mortality while injury refers to injury that does not lead to mortality. Except with respect to certain activities not pertinent here, the MMPA defines ''harassment'' as any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment); or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering (Level B harassment).

As previously described, the SEFSC has a history of take of marine mammals incidental to fisheries research. The degree of take resulting from gear interaction can range from mortality, serious injury, Level A harassment (injury), or released unharmed with no observable injury. However, given that we cannot predict the degree of take, we conservatively assume that any interaction may result in mortality or serious injury and have issued take as such. In the case of the Mississippi Sound stock, we have also authorized a single take from Level A harassment (injury) only. The amount of research conducted in Mississippi Sound using gear with the potential for marine mammal interaction increases the potential for interaction above other estuarine systems. However, there is evidence that, even without the proposed prescribed mitigation and monitoring measures, take may not result in mortality or serious injury (*e.g.,* the October 13, 2013 skimmer trawl take which did not result in serious injury or mortality). The proposed mitigation and monitoring measures described in this proposed rulemaking are designed to further reduce risk of take and degree of take.

Estimated Take Due to Gear Interaction

Given the complex stock structure of bottlenose dolphins throughout the ARA and GOMRA as well as the vulnerability of this species to be taken incidental to fishery research, we have partitioned this section into two categories to present requested and proposed take in an organized manner. Below we present our analysis informing the proposed take of estuarine and coastal bottlenose dolphins followed by pelagic marine mammals which includes all relevant non-bottlenose dolphin species and open ocean stocks of bottlenose dolphins.

Estuarine and Coastal Bottlenose Dolphin Take—SEFSC

In order to estimate the number of potential bottlenose dolphin takes in estuarine and coastal waters, we considered the SEFSC's and TPWD's record of such past incidents and other sources of take (*e.g.,* commercial fisheries and non-SEFSC or TPWD affiliated research). We consulted the SARs, marine mammal experts at the SEFSC, and information emerging from the BDTRT to identify these other sources of mortality. We then assessed the similarities and differences between fishery research and commercial fisheries gear and fishing practices. Finally, we evaluated means of affecting the least practicable adverse impact on bottlenose dolphins through the proposed mitigation and additional mitigation developed during the proposed rulemaking process.

In total, since 2001 and over the course of thousands of hours of research effort, 15 marine mammals (all bottlenose dolphins) have been entangled in SEFSC-affiliated research gear. All takes occurred between April through October; however, this is likely a result of research effort concentrated during this time period and there does not appear to be any trend in increased vulnerability throughout the year.

In the ARA, the SEFSC has nine documented takes of bottlenose dolphins (in 8 instances) from fishing gear (Table 5) and 1 take of an Atlantic spotted dolphin. The Atlantic spotted dolphin take was a calf struck by a propeller during a marine mammal research cruise. Given the anomalous nature of the incident and proposed mitigation measures, NMFS is not proposing to authorize take by ship strike. Therefore, this take is not discussed further. Of the eight gear-related takes, two animals were taken at once in a trammel net by the SCDNR in

2002. However, the SCDNR has since changed fishing methods and implemented monitoring and mitigation measures essentially eliminating the potential for take during this survey. No other trammel net-related takes have occurred since these changes were implemented. Therefore, we believe the potential for a take in SCDNR trammel nets is discountable. The remaining six gear-related takes have been a result of interaction with bottom trawl gear during SEAMAP and TED research surveys resulting in an average 0.38 takes per year (6 takes/16 years).

To further assess the potential for take in any given year, we considered where takes have occurred and the possible stock origin from which an animal was taken. The July 2006 take occurred offshore of Fripp Island, SC; the October 2006 take occurred off Oak Island, NC; the July 2012 take occurred off Little Tybee Island, GA; the August 2012 take occurred off Pawley's Island, SC; the April 2014 take occurred just off the coast of Florida between St. Augustine and Daytona Beach; and the July 2016 take occurred off Sea Island, Georgia which is nestled between Little St. Simon's Island and St. Simon's Island. Therefore, the dolphins taken could have originated from any of the five coastal stocks (the Northern Migratory and Southern Migratory stock, South Carolina/Georgia Coastal stock, Northern Florida Coastal stock and a Central Florida stock), although they were assigned to the stock based on the location where the take occurred. Taking the average rate of 0.38 animals/five stocks equates to an average taking of 0.08 animals per stock per year. This average would be even less if one considers an estuarine stock may be the stock of origin.

According to the SEFSC's application, three trawl surveys and 2 bottom longline surveys conducted by the SEFSC or research partner overlap spatially with the NNCES stock (Table 1). These are the Atlantic Striped Bass Tagging Bottom Trawl Survey (USFWS), SEAMAP–SA Coastal Trawl Survey (SCDNR), SEAMAP–SA North Carolina Pamlico Sound Trawl Survey (NCDENR), Shark and Red Snapper Bottom Longline Survey (SEFSC), and the SEAMAP–SA Red Drum Bottom Longline Survey (NCDNR). No gillnet surveys would take place in waters overlapping with this stock. Based on data in the PSIT database, no dolphins from the NNCES stock have been taken from SEFSC or partner fishery research surveys, including those described above which have taken place for many years.

Despite the lack of historical take, we further investigated the potential for future interaction. Based on commercial fishery and SEFSC fishery survey bycatch rates of marine mammals, we would expect the trawl surveys to be more likely to take a dolphin than the bottom longline surveys. An evaluation of each survey type occurring is provided below to more thoroughly evaluate the potential for taking a bottlenose dolphin belonging to the NNCES stock.

The Atlantic Striped Bass Bottom Trawl Survey (conducted by the USFWS) is limited to two weeks (200–350 trawls) during January and February in coastal waters north of Cape Hatteras ranging from 30 to 120 ft in depth. The USFWS uses dual 65-ft trawl nets with 3.75 in. stretch nylon multifilament mesh codend. Tow speed is 3 kts and tow time does not exceed 30 minutes at depth. Trawl operations are conducted day and night from the R/V Oregon II, R/V Oregon, or R/V Savannah (please refer to the EA for detailed vessel descriptions). The winter operations of this survey overlaps in time with when some animals move out of Pamlico Sound and into coastal waters. However, photo-ID studies, available tag data and stable isotope data indicate that the portion of the stock that moves out of Pamlico Sound into coastal waters remain south of Cape Hatteras during cold water months (Waring *et al.* 2016). The USFWS has historically conducted surveys north of Cape Hatteras. However, the survey is currently inactive due to funding constraints. If funding becomes available, they may undertake this survey. However, the spatial and temporal specifications described above greatly reduce the likelihood of a take from the NNCES stock. In addition, given the short duration of the survey (2 weeks) and short tow time durations (up to 30 minutes), the chance of marine mammal interaction is limited. This logic is supported by the lack of take from this survey. At this time, for the reasons described above, we believe the likelihood of an animal from the NNCES stock being taken during Atlantic Striped Bass Bottom Trawl Survey is unlikely.

The SEAMAP–SA Pamlico Sound Trawl Survey (NCDENR) is conducted to support stock assessments and management of finfish, shrimp, and crab species in Pamlico Sound and its bays and rivers. The otter trawl survey takes place for 10 days in June and 10 days in September during daylight hours. Up to 54 trawls are completed each month (total = 108 trawls) aboard the R/V Carolina Coast. The general area of operation is Pamlico Sound and the Pamlico, Pungo, and Neuse rivers in waters greater than or equal to 6 ft. Despite spatial and temporal overall with the NNCES stock, this survey has no record of interacting with a marine mammal. Given the lack of historical interaction, limited number of tows, and implementation of the proposed monitoring and mitigation measures, we do not believe there is reasonable likelihood of take from this survey.

The SEAMAP–SA Coastal Trawl Survey (SCDNR) operates 300–350 trawls annually from Cape Hatteras, NC to Cape Canaveral, FL in nearshore oceanic waters of 15–30 ft depth. Its goal is collect long-term fishery independent data on ecologically, commercially, and recreationally important fishes and invertebrates, including shrimp and blue crab. Tow time is approximately 20 minutes. This survey is not associated with sea turtle research surveys, which have longer tow times. SCDNR uses the R/V Lady Lisa outfitted with an otter trawl comprised of paired mongoose-type Falcon bottom trawls. All takes of dolphins have occurred in coastal waters (none from estuarine waters), and all assigned takes have been from coastal stocks. However, because estuarine stocks may venture into coastal waters, there is a small possibility takes from this survey could have been from the SNCES (n=1), Northern South Carolina Estuarine System (n=1), Northern Georgia/Southern South Carolina Estuarine System (n= 2), and Southern Georgia Estuarine System (n=1) (Table 6). This is the only survey which may potentially overlap with the NNCES and SNCES stock but does so in coastal waters where coastal stocks overlap in time and space. It is most likely a take from this survey would be from a coastal stock. Therefore, we are not proposing to authorize take from the NNCES or SNCES stock.

TABLE 6—POSSIBLE STOCK ORIGIN OF BOTTLENOSE DOLPHINS TAKEN IN THE ARA

Date	Location Taken	Possible Stocks	
		Coastal	Estuarine.
2001	Unknown	Unknown	Unknown.
July 2006	Off Fripp Island, GA	W.N. Atlantic South Carolina-Georgia Coastal.	Northern Georgia/Southern South Carolina Estuarine System.
October 2006	Off Oak Island, NC	Southern Migratory	Southern North Carolina Estuarine System.
July 2012	Off Little Tybee Island, GA	W.N. Atlantic South Carolina-Georgia Coastal.	Northern Georgia/Southern South Carolina Estuarine System.
August 2012	Off Pawley's Island, SC	W.N. Atlantic South Carolina-Georgia Coastal.	Northern South Carolina Estuarine System.
April 2014	Off the coast of Florida between St. Augustine and Daytona Beach.	W.N. Atlantic Northern Florida Coastal	W.N. Atlantic Central Florida Coastal.
July 2016	Off Sea Island, Georgia	W.N. Atlantic South Carolina-Georgia Coastal.	Southern Georgia Estuarine System.

The only survey overlapping with the Indian River Lagoon (IRL) stock is the St. Lucie Rod-and-Reel Fish Health Study. There are no documented instances of the SEFSC taking a dolphin from this survey. Therefore, we believe the likelihood of take is low and mitigation measures (*e.g.* quickly reeling in line if dolphins are likely to interact with gear) would be effective at further reducing take potential to discountable. In consideration of this, we are not proposing to issue take of the IRL stock.

In summary, we are not proposing to authorize requested take in the ARA for the NNCES, SNCES, and Indian River Lagoon stocks due to low to discountable potential for take. For all other estuarine stocks for which take was requested (n=7), we are proposing to authorize the requested 1 take over 5 years by M/SI (Table 7). We are proposing to issue the requested 3 M/SI takes per stock of each of the coastal stocks and the offshore stock in the ARA over 5 years (Table 7).

In the GOMRA, the SEFSC is requesting to take one dolphin from each of the 21 estuarine stocks, three dolphins from the Mississippi Sound stock, and three dolphins per year from the coastal stocks (Table 7). Similar to the ARA, NMFS examined the SEFSC's request and assessed authorizing take based on fishing effort and stock spatial and temporal parameters, the potential for take based on fishing practices (*e.g.,* gear description, tow/soak times). In addition, the SEFSC has provided supplemental information indicating some surveys are discontinued or currently inactive and are not likely to take place during the proposed 5-year regulations.

When examining the survey gear used and fishing methods, we determined that the IJA Open Bay Shellfish Trawl Survey (conducted by TPWD) has a very low potential to take dolphins. This survey has no documented dolphin/gear interactions despite high fishing effort (90 trawls for month/1080 trawls per year). This is likely because TPWD uses a very small (20 ft wide) otter shrimp trawl which is towed for only 10 minutes in 3–30 ft of water. The nets can be retrieved within one to two minutes. The IJA Open Bay Shellfish Trawl Survey is the only survey conducted by the SEFSC that overlaps with the following BSE bottlenose dolphin stocks: Laguna Madre; Nueces Bay, Corpus Christi Bay; Copano Bay, Aransas Bay, San Antonio Bay, Redfish Bay, Espirtu Santo Bay; Matagorda Bay, Tres Palacios Bay, Lavaca Bay; West Bay, and Galveston Bay, East Bay, Trinity Bay. TPWD has no documented take of dolphins from the IJA Open Bay Shellfish Trawl Survey despite years of research effort. Due to the discountable potential for take from the IJA Open Bay Shellfish Trawl Survey, we are not proposing to authorize take of these Texas bottlenose dolphin stocks to the SEFSC.

Another stock with a discountable potential for take is the Barataria Bay stock. This stock's habitat includes Caminada Bay, Barataria Bay east to Bastian Bay, Bay Coquette, and Gulf coastal waters extending 1 km from the shoreline. The SEFSC has committed to avoiding conducting fisheries independent monitoring in these waters. Hence, we find the potential for take from the Barataria Bay stock is discountable and we are not proposing to authorize the requested take.

On December 22, 2017, the SEFSC indicated the Gulfspan shark survey conducted by University of West Florida (UWF) is considered inactive as of 2017 and would not likely take place over the course of the proposed regulations due to staffing changes. This is the only survey overlapping with the Perdido Bay, Pensacola Bay, Choctawhatchee Bay stocks. Therefore, we find the potential for take from these stocks is discountable and we are not proposing to authorize the requested take.

There are nine surveys in the GOMRA overlapping with the Mississippi Sound, Lake Borgne, Bay Boudreau stock (MS Sound stock): Four trawl, three gillnet, and two hook and line. While there are four documented takes from this stock since 2011 (from gillnet and trawl surveys), there are none prior to that year. The SEFSC requested three M/SI takes from the MS Sound stock due to the amount of fishing effort in this waterbody. However, we find two takes are warranted over the life of the 5-year regulations given the lack of take prior to 2011 and implementation of the proposed mitigation and monitoring measures. Further, previous takes indicate there is potential that a marine mammal may not die or be seriously injured in fishing gear but be injured. Therefore, we are proposing to authorize one take by M/SI and one take by Level A harassment for the Mississippi Sound stock over the 5-year regulations (Table 7).

TABLE 7—SEFSC TOTAL REQUESTED AND PROPOSED TAKE OF BOTTLENOSE DOLPHINS IN ARA, GOMRA, AND CRA OVER THE LIFE OF THE PROPOSED 5-YEAR REGULATIONS

Stock	Total requested take (M/SI)	Total proposed take (M/SI)
Northern North Carolina Estuarine System Stock	1	[1] 0
Southern North Carolina Estuarine System Stock	1	[1] 0
Northern South Carolina Estuarine Stock	1	1
Charleston Estuarine System Stock	1	1
Northern Georgia/Southern South Carolina Estuarine System Stock	1	1
Central Georgia Estuarine System	1	1
Southern Georgia Estuarine System Stock	1	1
Jacksonville Estuarine System Stock	1	1
Indian River Lagoon Estuarine System Stock	1	[1] 0
Biscayne Bay Stock	0	0
Florida Bay Stock	1	1
Western North Atlantic South Carolina/Georgia Coastal Stock	3	3
Western North Atlantic Northern Florida Coastal Stock	3	3
Western North Atlantic Central Florida Coastal Stock	3	3
Western North Atlantic Northern Migratory Coastal Stock	3	3
Western North Atlantic Southern Migratory Coastal Stock	3	3
Western North Atlantic Offshore Stock	3	3
Puerto Rico and US Virgin Islands Stock	1	1
Laguna Madre	1	[1] 0
Nueces Bay, Corpus Christi Bay	1	[1] 0
Copano Bay, Aransas Bay, San Antonio Bay, Redfish Bay, Espirtu Santo Bay	1	[1] 0
Matagorda Bay, Tres Palacios Bay, Lavaca Bay	1	[1] 0
West Bay	1	[1] 0
Galveston Bay, East Bay, Trinity Bay	1	[1] 0
Sabine Lake	1	[1] 0
Calcasieu Lake	0	0
Atchalfalaya Bay, Vermilion Bay, West Cote Blanche Bay	0	0
Terrabonne Bay, Timbalier Bay	1	1
Barataria Bay Estuarine System	1	[2] 0
Mississippi River Delta	1	1
Mississippi Sound, Lake Bornge, Bay Boudreau	3	[3] 1 M/SI, 1 Level A
Mobile Bay, Bonsecour Bay	1	1
Perdido Bay	1	[2] 0
Pensacola Bay, East Bay	1	[2] 0
Choctwhatchee Bay	1	[2] 0
St. Andrew Bay	1	1
St. Joseph Bay	1	1
St. Vincent Sound, Apalachiola Bay, St. George Sound	1	1
Apalachee Bay	1	1
Waccasassa Bay, Withlacoochee Bay, Crystal Bay	1	1
St. Joseph Sound, Clearwater Harbor	0	0
Tampa Bay	0	0
Sarasota Bay, Little Sarasota Bay	0	0
Pine Island Sound, Charlotte Harbor, Gasparilla Sound, Lemon Bay	1	1
Caloosahatchee River	0	0
Estero Bay	0	0
Chokoloskee Bay, Ten Thousand Islands, Gullivan Bay	1	1
Whitewater Bay	0	0
Florida Keys-Bahia Honda to Key West	0	0
Northern Gulf of Mexico Western Coastal Stock	3	3
Northern Gulf of Mexico Northern Coastal Stock	3	3
Northern Gulf of Mexico Eastern Coastal Stock	3	3

[1] Surveys overlapping these stocks have a low to discountable potential to take marine mammals due to temporal and spatial overlap with stock, fishing methods, and/or gear types. The SEFSC has no history of taking individuals from these stocks.
[2] No surveys are proposed that overlap with these stocks.
[3] The SEFSC has the potential to take one marine mammal by M/SI and one marine mammal by Level A harassment (injury) only for the Mississippi Sound stock.

Estuarine Bottlenose Dolphin Take—TPWD

During gillnet surveys, the TPWD may incidentally take bottlenose dolphins. TPWD conducts research in seven major bays, sounds, and estuaries in Texas. There is no history of take in three of those waterbodies (Sabine Lake, West Bay, and Galveston Bay), therefore, TPWD has not requested, and we are not proposing, to authorize take from these stocks as the potential for take from these stocks is discountable.

Historical take from TPWD's gillnet surveys is random in time and space making it difficult to predict where and how often future takes could occur. TPWD has taken 32–35 bottlenose dolphins during the 35 years of gillnet fishing (exact number is not clear due to potential errors in early reporting and record keeping). In 18 of the 35 years (52 percent) there were zero dolphins taken (see Table 3 in TPWD's

application). However, the long term average equates to approximately one animal per year (32–34 dolphins in 35 years) To cover the life of the 5-yr regulations, this would equate to five takes. However, TPWD would remove grids meeting ''hot spot'' criteria and remove potential sources of entanglement (*e.g.,* the gap between the float line and the net). Therefore, we are proposing to issue one M/SI take from each of the previously taken stocks over the life of the proposed regulations for a total of four takes over the life of the regulations. We also consider that the regulations would be conditioned with mitigation measures designed to reduce the risk of take (*e.g.,* new gear modification, removal of sampling areas deemed dolphin ''hot spots''). Therefore, NMFS is proposing to issue one take by M/SI from the following stocks of bottlenose stocks: (1) Laguna Madre; (2) Corpus Christi Bay, Nueces Bay; (3) Copano Bay, Aransas Bay, San Antonio Bay, Redfish Bay, Espiritu Santa Bay; and (4) MatagordaBay, Tres Palacios Bay, Lavaca Bay. In total, four M/SI takes (one from each stock) would be authorized over the life of the proposed regulations.

Pelagic Marine Mammals Take—SEFSC

Since systematic record keep began in 2002, the SEFSC and affiliated research partners have taken no marine mammals species other than bottlenose dolphins due to gear interaction. However, NMFS has assessed other sources of M/SI for these species (*e.g.,* commercial fishing) to inform the potential for incidental takes of marine mammals in the ARA, GOMRA, and CRA under this proposed rule. These species have not been taken historically by SEFSC research activities but inhabit the same areas and show similar types of behaviors and vulnerabilities to such gear used in other contexts. To more comprehensively identify where vulnerability and potential exists for take between SEFSC research and other species of marine mammals, we compared with similar commercial fisheries by way of the 2017 List of Fisheries (LOF) and the record of interactions from non-SEFSC affiliated research.

NMFS LOF classifies U.S. commercial fisheries into one of three categories according to the level of incidental marine mammal M/SI that is known to have occured on an annual basis over the most recent five-year period (generally) for which data has been analyzed: Category I, frequent incidental M/SI; Category II, occasional incidental M/SI; and Category III, remote likelihood of or no known incidental M/SI. In accordance with the MMPA (16 U.S.C. 1387(e)) and 50 CFR 229.6, any vessel owner or operator, or gear owner or operator (in the case of non-vessel fisheries), participating in a fishery listed on the LOF must report to NMFS all incidental mortalities and injuries of marine mammals that occur during commercial fishing operations, regardless of the category in which the fishery is placed. The LOF for 2016 was based on, among other things, stranding data; fisher self-reports; and SARs, primarily the 2014 SARs, which are generally based on data from 2008–2012. Table 8 indicates which species (other than bottlenose dolphins) have been known to interact with commercial fishing gear in the three research areas based on the 2016 LOF (81 FR 20550; April 8, 2016). More information on the 2016 LOF can be found at *http://www.nmfs.noaa.gov/pr/interactions/fisheries/lof.html.*

TABLE 8—GEAR TYPES IMPLICATED FOR INTERACTION WITH MARINE MAMMALS IN THE ATLANTIC OCEAN, GULF OF MEXICO, AND CARIBBEAN COMMERCIAL FISHERIES

Species	Fishery by Gear Type [1]			
	Gillnet Fisheries	Trawl Fisheries	Trap/Pot	Longline
N. Atlantic right whale	Y		Y	
Humpback whale	Y		Y	
Fin whale	Y		Y	
Minke whale	Y	Y	Y	Y
Risso's dolphin	Y	Y		Y
Cuvier's beaked whale				Y
Gervais beaked whale				Y
Beaked whale (*Mesoplodon spp*)				Y
False killer whale				Y
Killer whale				Y
Pygmy sperm whale				Y
Sperm Whale				Y
Long-finned pilot whale	Y	Y		Y
Short-finned pilot whale				Y
White-sided dolphin	Y	Y		
Atlantic spotted dolphin		Y		Y
Pantropical spotted dolphin	Y			Y
Common dolphin	Y	Y		Y
Harbor porpoise	Y	Y		
Harbor seal	Y	Y	Y	
Gray seal		Y		

[1] Only fisheries with gear types used by the SEFSC during the course of the proposed regulations are included here. For example, purse seine and aquaculture fisheries are also known to interact with marine mammals in the specified geographic region; however, the SEFSC would not use those gears during their research.

In addition to examining known interaction, we also considered a number of activity-related factors (*e.g.,* gear size, set duration, etc.) and species-specific factors (*e.g.,* species-specific knowledge regarding animal behavior, overall abundance in the geographic region, density relative to SEFSC survey effort, feeding ecology, propensity to travel in groups commonly associated with other species historically taken) to determine whether a species may have a similar vulnerability to certain types of gear as historically taken species. For example, despite known take in

commercial trap/pot fisheries, here we rule out the potential for traps/pots to take marine mammals incidental to SEFSC research for a number of reasons. Commercial fisheries often involve hundreds of unattended traps that are located on a semi-permanent basis, usually with long, loose float lines, in shallow waters close to shore. In contrast, SEFSC research gear is fished in deeper waters, and typically only one pot is fished at a time and monitored continuously for short soak times (*e.g.,* one hour). These differences in fishing practices, along with the fact no marine mammals have been taken in a SEFSC trap/pot, negate the potential for take to a level NMFS does not believe warrants authorization of take, and there is no historical documentation of take from this gear incidental to SEFSC surveys. Therefore, we do not expect take incidental to SEFSC research activities using trap/pot gear.

It is well documented that multiple marine mammal species are taken in commercial longline fisheries (Table 8). We used this information to help make an informed decision on the probability of specific cetacean and large whale interactions with longline gear and other hook-and-line gear while taking into account many other factors affecting the vulnerability of a species to be taken in SEFSC research surveys (*e.g.,* relative survey effort, survey location, similarity in gear type, animal behavior, prior history of SEFSC interactions with longline gear etc.). First we examined species known to be taken in longline fisheries but for which the SEFSC has not requested take. For example, the SEFSC is not requesting take of large whales in longline gear. Although large whale species could become entangled in longline gear, the probability of interaction with SEFSC longline gear is extremely low considering a far lower level of survey effort relative to that of commercial fisheries, much shorter set durations, shorter line lengths, and monitoring and mitigation measures implemented by the SEFSC (*e.g.,* the move-on rule). Although data on commercial fishing efforts comparable to the known SEFSC research protocols (net size, tow duration and speed, and total number of tows) are not publically available, based on the amount of fish caught by commercial fisheries versus SEFSC fisheries research, the ''footprint'' of research effort compared to commercial fisheries is very small (see Section 9 in the SEFSC's application). As such, the SEFSC has not requested, nor is NMFS proposing, to authorize take of large whales (*i.e.,* mysticetes) incidental to longline research. There are situations with hook-and-line (*e.g.,* longline) fisheries research gear when a caught animal cannot be identified to species with certainty. This might occur when a hooked or entangled dolphin frees itself before being identified or when concerns over crew safety, weather, or sea state conditions necessitate quickly releasing the animal before identification is possible. The top priority for live animals is to release them as quickly and safely as possible. The SEFSC ship's crew and research personnel make concerted efforts to identify animals incidentally caught in research gear whenever crew and vessel safety are not jeopardized.

With respect to trawling, both commercial fisheries and non-SEFSC affiliated research trawls in the Gulf of Mexico have taken pelagic marine mammals. For example, a mid-water research trawl conducted to monitor the effects of the Deepwater Horizon oil spill in the Gulf of Mexico took 3 pantropical spotted dolphins in one trawl in 2012. Additionally, an Atlantic spotted dolphin was taken in non-SEFSC research bottom trawl in 2014. Known takes in commercial trawl fisheries in the ARA and GOMRA include a range of marine mammal species (Table 8). NMFS examined the similarities between species known to be taken in commercial and non-SEFSC research trawls with those species that overlap in time and space with SEFSC research trawls in the open ocean. Because some species exhibit similar behavior, distribution, abundance, and vulnerability to research trawl gear to these species, NMFS proposes to authorize take of eight species of pelagic cetaceans and two pinniped species in the ARA and nine species of cetaceans in the GOMRA (Table 9). In addition, NMFS provides allowance of one take of an unidentified species in the ARA, GOMRA, and CRA over the life of these proposed regulations to account for any animal that cannot be identified to a species level. Takes would occur incidental to trawl and hook and line (including longline) research in the ARA and GOMRA. However, because the SEFSC does not use trawl gear in the CRA, take is proposed incidental to hook and line gear in the Caribbean (see Tables 6.4- 6.6 in SEFSC's application for more detail). We are proposing to authorize the amount of take requested by the SEFSC's for these stocks listed in Table 9.

TABLE 9—PROPOSED TOTAL TAKE, BY SPECIES AND STOCK, OF PELAGIC MARINE MAMMALS IN THE ARA AND GOMRA INCIDENTAL TO TRAWL AND HOOK AND LINE RESEARCH AND, IN THE CRA, INCIDENTAL TO HOOK AND LINE RESEARCH ACTIVITIES OVER THE 5 YEAR REGULATIONS

Species	Stock	Total Proposed M&SI Take
Risso's dolphin	Western North Atlantic.	
	N. Gulf of Mexico.	
Melon headed whale	N. Gulf of Mexico	3
Short-finned pilot whale	Western North Atlantic	1
	N. Gulf of Mexico	1
Long-finned pilot whale	Western North Atlantic	1
Short-beaked common dolphin	Western North Atlantic	4
Atlantic spotted dolphin	Western North Atlantic	4
	N. Gulf of Mexico	4
Pantropical spotted dolphin	Western North Atlantic	1
	N. Gulf of Mexico	4
Striped dolphin	Western North Atlantic	3
	N. Gulf of Mexico	3
Spinner dolphin	N. Gulf of Mexico	3
Rough-toothed dolphin	N. Gulf of Mexico	1
Bottlenose dolphin	Western North Atlantic Oceanic	4
	N. Gulf of Mexico Oceanic	4
	N. Gulf of Mexico Continental Shelf	4

TABLE 9—PROPOSED TOTAL TAKE, BY SPECIES AND STOCK, OF PELAGIC MARINE MAMMALS IN THE ARA AND GOMRA INCIDENTAL TO TRAWL AND HOOK AND LINE RESEARCH AND, IN THE CRA, INCIDENTAL TO HOOK AND LINE RESEARCH ACTIVITIES OVER THE 5 YEAR REGULATIONS—Continued

Species	Stock	Total Proposed M&SI Take
	Puerto Rico/USVI	1
Harbor porpoise	Gulf of Maine/Bay of Fundy	1
Undetermined delphinid	Western North Atlantic	1
	N. Gulf of Mexico	1
Harbor seal	Western North Atlantic	1
Gray seal	Western North Atlantic	1

Estimated Take Due to Acoustic Harassment

As described previously (''Potential Effects of the Specified Activity on Marine Mammals''), we believe that SEFSC use of active acoustic sources has, at most, the potential to cause Level B harassment of marine mammals. In order to attempt to quantify the potential for Level B harassment to occur, NMFS (including the SEFSC and acoustics experts from other parts of NMFS) developed an analytical framework considering characteristics of the active acoustic systems described previously under *Description of Active Acoustic Sound Sources,* their expected patterns of use, and characteristics of the marine mammal species that may interact with them. This quantitative assessment benefits from its simplicity and consistency with current NMFS acoustic guidance regarding Level B harassment but we caution that, based on a number of deliberately precautionary assumptions, the resulting take estimates may be seen as an overestimate of the potential for behavioral harassment to occur as a result of the operation of these systems. Additional details on the approach used and the assumptions made that result in these estimates are described below.

Acoustic Thresholds

Using the best available science, NMFS has developed acoustic thresholds that identify the received level of underwater sound above which exposed marine mammals would be reasonably expected to be behaviorally harassed (equated to Level B harassment) or to incur PTS of some degree (Level A harassment). We note NMFS has begun efforts to update its behavioral thresholds, considering all available data, and is formulating a strategy for updating those thresholds for all types of sound sources considered in incidental take authorizations. It is NMFS intention to conduct both internal and external review of any new thresholds prior to finalizing. In the interim, we apply the traditional thresholds.

Level B Harassment for non-explosive sources—Though significantly driven by received level, the onset of behavioral disturbance from anthropogenic noise exposure is also informed to varying degrees by other factors related to the source (*e.g.,* frequency, predictability, duty cycle), the environment (*e.g.,* bathymetry), and the receiving animals (hearing, motivation, experience, demography, behavioral context) and can be difficult to predict (Southall *et al.,* 2007, Ellison et al., 2011). Based on what the best available science indicates and the practical need to use a threshold based on a factor that is both predictable and measurable for most activities, NMFS uses a generalized acoustic threshold based on received level to estimate the onset of behavioral harassment. NMFS predicts that marine mammals are likely to be behaviorally harassed in a manner we consider Level B harassment when exposed to underwater anthropogenic noise above received levels of 120 dB re 1 μPa (rms) for continuous (*e.g.* vibratory pile-driving, drilling) and above 160 dB re 1 μPa (rms) for non-explosive impulsive (*e.g.,* seismic airguns) or intermittent (*e.g.,* scientific sonar) sources. Neither threshold is used for military sonar due to the unique source characteristics.

The Marine Mammal Commission (Commission) has previously suggested NMFS apply the 120 dB continuous threshold to scientific sonar such as the ones proposed by the SEFSC. NMFS has responded to this comment in multiple **Federal Register** notices of issuance for other NMFS science centers. However, we provide more clarification here on why the 160 dB threshold is appropriate when estimating take from acoustic sources used during SEFSC research activities. NMFS historically has referred to the 160 dB threshold as the impulsive threshold, and the 120 dB threshold as the continuous threshold, which in and of itself is conflicting as one is referring to pulse characteristics and the other is referring to the temporal component. A more accurate term for the impulsive threshold is the intermittent threshold. This distinction is important because, when assessing the potential for hearing loss (PTS or TTS) or non-auditory injury (*e.g.,* lung injury), the spectral characteristics of source (impulsive vs. non-impulsive) is critical to assessing the potential for such impacts. However, for behavior, the temporal component is more appropriate to consider. Gomez et al. (2016) conducted a systematic literature review (370 papers) and analysis (79 studies, 195 data cases) to better assess probability and severity of behavioral responses in marine mammals exposed to anthropogenic sound. They found a significant relationship between source type and behavioral response when sources were split into broad categories that reflected whether sources were continuous, sonar, or seismic (the latter two of which are intermittent sources). Moreover, while Gomez et al (2017) acknowledges acoustically sensitive species (beaked whales and harbor porpoise), the authors do not recommend an alternative method for categorizing sound sources for these species when assessing behavioral impacts from noise exposure.

To apply the continuous 120 dB threshold to all species based on data from known acoustically sensitive species (one species of which is the harbor porpoise which is likely to be rarely encountered in the ARA and do not inhabit the GOMRA or CRA) is not warranted as it would be unnecessarily conservative for non-sensitive species. Qualitatively considered in our effects analysis below is that beaked whales and harbor porpoise are more acoustically sensitive than other cetacean species, and thus are more likely to demonstrate overt changes in behavior when exposed to such sources. Further, in absence of very sophisticated acoustic modeling, our propagation rates are also conservative. Therefore, the distance to the 160 dB threshold is

likely much closer to the source than calculated. In summary, the SEFSC's proposed activity includes the use of intermittent sources (scientific sonar). Therefore, the 160 dB re 1 µPa (rms) threshold is applicable when quantitatively estimating take by behavioral harassment incidental to SEFSC scientific sonar for all marine mammal species.

Level A harassment for non-explosive sources—NMFS' Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Technical Guidance, 2018) identifies dual criteria to assess auditory injury (Level A harassment) to five different marine mammal groups (based on hearing sensitivity) as a result of exposure to noise from two different types of sources (impulsive or non-impulsive). However, as described in greater detail in the Potential Effects section, given the highly direction, *e.g.,*narrow beam widths, NMFS does not anticipate animals would be exposed to noise levels resulting in PTS. Therefore, the Level A criteria do not apply here and are not discussed further; NMFS is proposing take by Level B harassment only.

The operating frequencies of active acoustic systems used by the SEFSC sources range from 18–333 kHz (see Table 2). These frequencies are within the very upper hearing range limits of baleen whales (7 Hz to 35 kHz). The Simrad EK60 may operate at frequency of 18 kHz which is the only frequency that might be detectable by baleen whales. However, the beam pattern is extremely narrow (11 degrees) at that frequency. The Simrad ME70 echosounder, EQ50, and Teledyne RD ADCP operate at 50–200 kHz which are all outside of baleen whale hearing capabilities. Therefore, we would not expect any exposures to these signals to result in behavioral harassment. The Simrad EK60 lowest operating frequency (18 kHz) is within baleen whale hearing capabilities.

The assessment paradigm for active acoustic sources used in SEFSC fisheries research mirrors approaches by other NMFS Science Centers applying for regulations. It is relatively straightforward and has a number of key simple and conservative assumptions. NMFS' current acoustic guidance requires in most cases that we assume Level B harassment occurs when a marine mammal receives an acoustic signal at or above a simple step-function threshold. For use of these active acoustic systems used during SEFSC research, NMFS uses the threshold is 160 dB re 1 µPa (rms) as the best available science indicates the temporal characteristics of a source are most influential in determining behavioral impacts (Gomez *et al.,* 2016), and it is NMFS long standing practice to apply the 160 dB threshold to intermittent sources. Estimating the number of exposures at the specified received level requires several determinations, each of which is described sequentially below:

(1) A detailed characterization of the acoustic characteristics of the effective sound source or sources in operation;

(2) The operational areas exposed to levels at or above those associated with Level B harassment when these sources are in operation;

(3) A method for quantifying the resulting sound fields around these sources; and

(4) An estimate of the average density for marine mammal species in each area of operation.

Quantifying the spatial and temporal dimension of the sound exposure footprint (or ''swath width'') of the active acoustic devices in operation on moving vessels and their relationship to the average density of marine mammals enables a quantitative estimate of the number of individuals for which sound levels exceed the relevant threshold for each area. The number of potential incidents of Level B harassment is ultimately estimated as the product of the volume of water ensonified at 160 dB rms or higher and the volumetric density of animals determined from simple assumptions about their vertical stratification in the water column. Specifically, reasonable assumptions based on what is known about diving behavior across different marine mammal species were made to segregate those that predominately remain in the upper 200 m of the water column versus those that regularly dive deeper during foraging and transit. Methods for estimating each of these calculations are described in greater detail in the following sections, along with the simplifying assumptions made, and followed by the take estimates.

Sound source characteristics—An initial characterization of the general source parameters for the primary active acoustic sources operated by the SEFSC was conducted, enabling a full assessment of all sound sources used by the SEFSC and delineation of Category 1 and Category 2 sources, the latter of which were carried forward for analysis here. This auditing of the active acoustic sources also enabled a determination of the predominant sources that, when operated, would have sound footprints exceeding those from any other simultaneously used sources. These sources were effectively those used directly in acoustic propagation modeling to estimate the zones within which the 160 dB rms received level would occur.

Many of these sources can be operated in different modes and with different output parameters. In modeling their potential impact areas, those features among those given previously in Table 2 (*e.g.,* lowest operating frequency) that would lead to the most precautionary estimate of maximum received level ranges (*i.e.,* largest ensonified area) were used. The effective beam patterns took into account the normal modes in which these sources are typically operated. While these signals are brief and intermittent, a conservative assumption was taken in ignoring the temporal pattern of transmitted pulses in calculating Level B harassment events. Operating characteristics of each of the predominant sound sources were used in the calculation of effective line-kilometers and area of exposure for each source in each survey (Table 10).

TABLE 10—EFFECTIVE EXPOSURE AREAS FOR PREDOMINANT ACOUSTIC SOURCES ACROSS TWO DEPTH STRATA

Active acoustic system	Effective exposure area: Sea surface to 200 m depth (km^2)	Effective exposure area: Sea surface to depth at which 160-dB threshold is reached (km^2)
Simrad EK60 narrow beam echosounder	0.0142	0.1411
Simrad ME70 multibeam echosounder	0.0201	0.0201
Simrad FS70 trawl sonar	0.008	0.008
Simrad SX90 narrow beam sonar [1]	0.0654	0.1634
Teledyne RD Instruments ADCP, Ocean Surveyor	0.0086	0.0187

TABLE 10—EFFECTIVE EXPOSURE AREAS FOR PREDOMINANT ACOUSTIC SOURCES ACROSS TWO DEPTH STRATA—Continued

Active acoustic system	Effective exposure area: Sea surface to 200 m depth (km^2)	Effective exposure area: Sea surface to depth at which 160-dB threshold is reached (km^2)
Simrad ITI trawl monitoring system [1]	0.0032	0.0032

[1] Exposure area varies greatly depending on the tilt angle setting of the SX90. To approximate the varied usage this system might receive, the exposure area for each depth strata was averaged by assuming equal usage at tilt angles of 5, 20, 45, and 80 degrees.

Calculating effective line-kilometers—As described below, based on the operating parameters for each source type, an estimated volume of water ensonified at or above the 160 dB rms threshold was calculated. In all cases where multiple sources are operated simultaneously, the one with the largest estimated acoustic footprint was considered to be the effective source. Two depth zones were defined for each research area: A Continental Shelf Region defined by having bathymetry 0–200 m and an Offshore Region with bathymetry >200 m. Effective line distance and volume insonified was calculated for each depth stratum (0–200 m and > 200 m), where appropriate (*i.e.* in the Continental Shelf region, where depth is <200 m, only the exposure area for the 0–200 m depth stratum was calculated). In some cases, this resulted in different sources being predominant in each depth stratum for all line km when multiple sources were in operation. This was accounted for in estimating overall exposures for species that utilize both depth strata (deep divers). For each ecosystem area, the total number of line km that would be surveyed was determined, as was the relative percentage of surveyed linear km associated with each source. The total line km for each vessel, the effective portions associated with each of the dominant sound types, and the effective total km for operation for each sound type is given in Tables 6–8a and 6–8b in SEFSC's application. In summary, line transect kms range from 1149 to 3352 in the ARA and 16,797 to 30,146 km with sources operating 20–100 percent of the time depending on the source.

Calculating volume of water ensonified—The cross-sectional area of water ensonified to a 160 dB rms received level was calculated using a simple spherical spreading model of sound propagation loss (20 log R) such that there would be 60 dB of attenuation over 1,000 m. The spherical spreading model accounted for the frequency dependent absorption coefficient and the highly directional beam pattern of most of these sound sources. For absorption coefficients, the most commonly used formulas given by Francios and Garrison (1982) were used. The lowest frequency was used for systems that are operated over a range of frequencies. The vertical extent of this area is calculated for two depth strata (surface to 200 m, and for deep water operations > 200 m, surface to range at which the on-axis received level reaches 160 dB RMS). This was applied differentially based on the typical vertical stratification of marine mammals (see Tables 6–9 and 6–10 in SEFSC's application).

For each of the three predominant sound sources, the volume of water ensonified is estimated as the cross-sectional area (in square kilometers) of sound at or above 160 dB rms multiplied by the total distance traveled by the ship (see Table 6a and 6b in SEFSC's application). Where different sources operating simultaneously would be predominant in each different depth strata (*e.g.,* ME70 and EK60 operating simultaneously may be predominant in the shallow stratum and deep stratum, respectively), the resulting cross-sectional area calculated took this into account. Specifically, for shallow-diving species this cross-sectional area was determined for whichever was predominant in the shallow stratum, whereas for deeper-diving species, this area was calculated from the combined effects of the predominant source in the shallow stratum and the (sometimes different) source predominating in the deep stratum. This creates an effective total volume characterizing the area ensonified when each predominant source is operated and accounts for the fact that deeper-diving species may encounter a complex sound field in different portions of the water column.

Marine mammal densities—One of the primary limitations to traditional estimates of behavioral harassment from acoustic exposure is the assumption that animals are uniformly distributed in time and space across very large geographical areas, such as those being considered here. There is ample evidence that this is in fact not the case, and marine species are highly heterogeneous in terms of their spatial distribution, largely as a result of species-typical utilization of heterogeneous ecosystem features. Some more sophisticated modeling efforts have attempted to include species-typical behavioral patterns and diving parameters in movement models that more adequately assess the spatial and temporal aspects of distribution and thus exposure to sound (*e.g.,* Navy, 2013). While simulated movement models were not used to mimic individual diving or aggregation parameters in the determination of animal density in this estimation, the vertical stratification of marine mammals based on known or reasonably assumed diving behavior was integrated into the density estimates used.

The marine mammal abundance estimates used for the ARA and GOM were obtained from Stock Assessment Reports for the Atlantic and the Gulf of Mexico ecosystem areas (Waring *et al.* 2012, 2013, 2014, and 2015), and the best scientific information available to SEFSC staff. We note abundances for cetacean stocks in western North Atlantic U.S. waters are the combined estimates from surveys conducted by the NMFS Northeast Fisheries Science Center (NEFSC) from central Virginia to the lower Bay of Fundy and surveys conducted by the SEFSC from central Virginia to central Florida. The SEFSC primary area of research is south of central Virginia. Therefore, densities are based on abundance estimates from central Virginia to central Florida and are reported in the stock assessment report for each stock. For example, the fin whale abundance estimate for the stock is 1,618. However, most of those animals occur in the northeast with only about 23 individuals in the southeast where SEFSC would occur. Therefore, an abundance estimate of 23 was used to estimate density. Density estimates in areas where a species is known to occur, but where published density data is absent were calculated based on values published for the species in adjacent

regions by analogy and SEFSC expertise. For example, in the CRA there are records of marine mammal species occurrence (*e.g.,* Mignucci-Giannoni 1998, Roden and Mullin 2000), However, area specific abundance estimates are unavailable so the density estimates for the GOMRA were used as proxies where appropriate to estimate acoustic take in the CRA. There are a number of caveats associated with these estimates:

(1) They are often calculated using visual sighting data collected during one season rather than throughout the year. The time of year when data were collected and from which densities were estimated may not always overlap with the timing of SEFSC fisheries surveys (detailed previously in ''Detailed Description of Activities'').

(2) The densities used for purposes of estimating acoustic exposures do not take into account the patchy distributions of marine mammals in an ecosystem, at least on the moderate to fine scales over which they are known to occur. Instead, animals are considered evenly distributed throughout the assessed area, and seasonal movement patterns are not taken into account.

In addition, and to account for at least some coarse differences in marine mammal diving behavior and the effect this has on their likely exposure to these kinds of often highly directional sound sources, a volumetric density of marine mammals of each species was determined. This value is estimated as the abundance averaged over the two-dimensional geographic area of the surveys and the vertical range of typical habitat for the population. Habitat ranges were categorized in two generalized depth strata (0–200 m and 0 to greater than 200 m) based on gross differences between known generally surface-associated and typically deep-diving marine mammals (*e.g.,* Reynolds and Rommel, 1999; Perrin *et al.,* 2009). Animals in the shallow-diving stratum were assumed, on the basis of empirical measurements of diving with monitoring tags and reasonable assumptions of behavior based on other indicators, to spend a large majority of their lives (*i.e.,* greater than 75 percent) at depths shallower than 200 m. Their volumetric density and thus exposure to sound is therefore limited by this depth boundary. In contrast, species in the deeper-diving stratum were assumed to regularly dive deeper than 200 m and spend significant time at these greater depths. Their volumetric density and thus potential exposure to sound at or above the 160 dB rms threshold is extended from the surface to the depth at which this received level condition occurs (*i.e.,* corresponding to the 0 to greater than 200 m depth stratum). The volumetric densities are estimates of the three-dimensional distribution of animals in their typical depth strata. For shallow-diving species the volumetric density is the area density divided by 0.2 km (*i.e.,* 200 m). For deeper diving species, the volumetric density is the area density divided by a nominal value of 0.5 km (*i.e.,* 500 m). The two-dimensional and resulting three-dimensional (volumetric) densities for each species in each ecosystem area are provided in Table 11.

TABLE 11—ABUNDANCES AND VOLUMETRIC DENSITIES CALCULATED FOR EACH SPECIES IN SEFSC RESEARCH AREAS USED IN TAKE ESTIMATION

Species [1]	Abundance	Typical dive depth strata		Continental shelf area [2] density (#/km^2)	Offshore area [3] density (#/km^2)	Continental shelf area volumetric density (#/km^3)	Offshore area volumetric density (#/km^3)
		0–200 m	>200 m				
Atlantic Research Area [4]							
Fin whale	23	X			0.00005		0.00025
Sperm whale	695		X		0.00148		0.00296
Pygmy/dwarf sperm whales [5]	2,002		X		0.00426		0.00852
False killer whale	442	X			0.00094		0.00470
Beaked whales [5]	3,163		X		0.00673		0.01346
Risso's dolphin	3,053	X			0.00650		0.03248
Short-finned pilot whale	16,964		X		0.03610		0.07219
Short-beaked common dolphin	2,993	X			0.00637		0.03184
Atlantic spotted dolphin	17,917	X		0.39209	0.03812	1.96043	0.19062
Pantropical spotted dolphin	3,333	X			0.00709		0.03546
Striped dolphin	7,925	X			0.01686		0.08431
Rough-toothed dolphin	271	X			0.00058		0.00288
Bottlenose dolphin	50,766 (offshore), 31,212 (cont. shelf)	X		0.25006	0.10802	1.25028	0.54010
Gulf of Mexico Research Area							
Bryde's whale	33	X			0.00011		0.00054
Sperm whale	763		X		0.00438		0.00876
Pygmy/dwarf sperm whales [5]	184		X		0.01857		0.00101
Pygmy killer whale	152	X			0.00080		0.00400
False killer whale	Unk	X			0.00086		0.00432
Beaked whales [5 6]	149		X		0.00925		0.00081
Melon-headed whale	2,235	X			0.00487		0.02434
Risso's dolphin	2,442	X			0.00523		0.02613
Short-finned pilot whale	2,415		X		0.00463		0.00925
Atlantic spotted dolphin [7]	37,611	X		0.09971	unk	0.49854	Unk
Pantropical spotted dolphin	50,880	X			0.09412		0.47062
Striped dolphin	1,849	X			0.00735		0.03677
Rough-toothed dolphin	624	X		0.00401	0.00664	0.02006	0.03322
Clymene dolphin [8]	129	X			0.00907		0.04537
Spinner dolphin	11,441	X			0.01888		0.09439
Bottlenose dolphin	5,806 (oceanic) 51,192 (cont. shelf)	X		0.29462	0.02347	1.47311	0.11735
Caribbean Research Area [9]							
Sperm whale	763		X	na	0.00438	na	0.008761
Pygmy/dwarf sperm whales [5 6]	186		X	na	0.01857	na	0.00101
Killer whale	184	X		na	0.00000	na	0

TABLE 11—ABUNDANCES AND VOLUMETRIC DENSITIES CALCULATED FOR EACH SPECIES IN SEFSC RESEARCH AREAS USED IN TAKE ESTIMATION—Continued

Species [1]	Abundance	Typical dive depth strata		Continental shelf area [2] density (#/km^2)	Offshore area [3] density (#/km^2)	Continental shelf area volumetric density (#/km^3)	Offshore area volumetric density (#/km^3)
		0–200 m	>200 m				
Pygmy killer whale	152	X	.....	na	0.00080	na	0.003998
False killer whale	Unk	X	.....	na	0.00086	na	0.004324
Beaked whales [5 6]	149	.....	X	na	0.00925	na	0.00081
Melon-headed whale	2,235	X	.....	na	0.00487	na	0.024343
Risso's dolphin	2,442	X	.....	na	0.00523	na	0.026132
Short-finned pilot whale	2,415	.....	X	na	0.00463	na	0.009255
Pantropical spotted dolphin	50,880	X	.....	na	0.09412	na	0.470615
Striped dolphin	1,849	X	.....	na	0.00735	na	0.036771
Fraser's dolphin		X	.....	na	0.00000	na	0
Rough-toothed dolphin	624	X	.....	na	0.00664	na	0.03322
Clymene dolphin	129	X	.....	na	0.00907	na	0.045365
Spinner dolphin	11,441	X	.....	na	0.01888	na	0.094389
Bottlenose dolphin	5,806 (oceanic), 51,192 (cont. shelf)	X	.....	na	0.02347	na	0.117349

[1] Those species known to occur in the ARA and GOMRA with unknown volumetric densities have been omitted from this table. Those omitted include: for the ARA—North Atlantic right whale, minke whale, humpback whale, melon-headed whale, pygmy killer whale, long-finned pilot whale, Fraser's dolphin, spinner dolphin, Clymene dolphin, harbor porpoise, gray seal, and harbor seal; for the GOMRA—killer whale and Fraser's dolphin. This does not mean they were all omitted for take as proxy species provided in this table were used to estimate take, where applicable.

[2] Continental shelf area means 0–200 m bottom depth

[3] Offshore area means 200 m bottom depth.

[4] Abundances for cetacean stocks in western North Atlantic U.S. waters are the combined estimates from surveys conducted by the NEFSC from central Virginia to the lower Bay of Fundy and surveys conducted by the SEFSC from central Virginia to central Florida. The SEFSC primary area of research is south of central Virginia. Therefore, acoustic take estimates are based on abundance estimates from central Virginia to central Florida and are reported in the stock assessment report for each stock. However, these acoustic takes are compared to the abundance for the entire stock.

[5] Density estimates are based on the estimates of dwarf and pygmy sperm whale SAR abundances and the combined abundance estimates of all beaked whales (Mesoplodon spp. + Cuvier's beaked whale). These groups are cryptic and difficult to routinely identify to species in the field.

[6] Data from acoustic moorings in the Gulf of Mexico suggest that both beaked whales and dwarf/pygmy sperm whales are much more abundant than visual surveys suggest. Therefore, acoustic take estimates for these groups were based on abundance estimates extrapolated from acoustic mooring data (DWH–NRDAT 2016).

[7] The most reasonable estimate Atlantic spotted dolphin abundance is in the Gulf of Mexico is based on ship surveys of continental shelf waters conducted from 2000–2001. In the Gulf of Mexico the continental shelf is the Atlantic spotted dolphin's primary habitat. Ship surveys have not been conducted in shelf waters since 2001.

[8] Three previous abundance estimates for the Clymene dolphin in the Gulf of Mexico were based surveys conducted over several years and estimates ranged from 5,000 to over 17,000 dolphins. The current estimate is based on one survey in 2009 from the 200 m isobaths to the EEZ and is probably negatively biased.

[9] Estimates for the CRA are based on proxy values taken from the GOMRA where available and appropriate. Species omitted due to lack of data were humpback whale, minke whale, Bryde's whale, and Atlantic spotted dolphin.

Using area of ensonification and volumetric density to estimate exposures—Estimates of potential incidents of Level B harassment (*i.e.,* potential exposure to levels of sound at or exceeding the 160 dB rms threshold) are then calculated by using (1) the combined results from output characteristics of each source and identification of the predominant sources in terms of acoustic output; (2) their relative annual usage patterns for each operational area; (3) a source-specific determination made of the area of water associated with received sounds at either the extent of a depth boundary or the 160 dB rms received sound level; and (4) determination of a volumetric density of marine mammal species in each area. Estimates of Level B harassment by acoustic sources are the product of the volume of water ensonified at 160 dB rms or higher for the predominant sound source for each portion of the total line-kilometers for which it is used and the volumetric density of animals for each species. However, in order to estimate the additional volume of ensonified water in the deep stratum, the SEFSC first subtracted the cross-sectional ensonified area of the shallow stratum (which is already accounted for) from that of the deep stratum. Source- and stratum-specific exposure estimates are the product of these ensonified volumes and the species-specific volumetric densities (Table 12). The general take estimate equation for each source in each depth statrum is density * (ensonified volume * linear kms). If there are multiple sources of take in both depth stata, individual take estimates were summed. To illustrate, we use the ME70 and the pantropical spotted dolphin, which are found only in the 0–200 m depth stratum, as an example:

(1) ME70 ensonified volume (0–200 m) = 0.0201 km^2

(2) Total Linear kms = 1,794 km (no pantropical spotted dolphins are found on the shelf so those trackline distances are not included here)

(3) Pantropical spotted dolphin density (0–200 m) = 0.47062 dolphins/km^3

(4) Estimated exposures to sound ≥160 dB rms = 0.47062 pantropical spotted dolphin/km^3 * (0.0201 km^2 * 1,794 km) = 16.9 (rounded up) = 17 estimated pantropical spotted dolphin exposures to SPLs ≥ 160 dB rms resulting from use of the ME70.

TABLE 12—ESTIMATED SOURCE-, STRATUM-, AND SPECIES-SPECIFIC ANNUAL ESTIMATES OF LEVEL B HARASSMENT

Species	Estimated Level B Harassment (#s of animals) in 0–200 m dive depth stratum			Estimated Level B Harassment in >200 m dive depth stratum		Total calculated take
	EK60	ME70	EQ50	EK60	EQ50	
Atlantic Continental Shelf						
Bottlenose dolphin	67.00	21.43	21.43	0.00	0.00	110

TABLE 12—ESTIMATED SOURCE-, STRATUM-, AND SPECIES-SPECIFIC ANNUAL ESTIMATES OF LEVEL B HARASSMENT—Continued

Species	Estimated Level B Harassment (#s of animals) in 0–200 m dive depth stratum			Estimated Level B Harassment in >200 m dive depth stratum		Total calculated take
	EK60	ME70	EQ50	EK60	EQ50	
Atlantic Offshore						
Fin whale	0.02	0.00	0.00	0.00	0.00	1
Sperm whale	0.18	0.02	0.01	1.75	0.00	2
Pygmy/dwarf sperm whales	0.52	0.06	0.02	5.03	0.00	6
False killer whale	0.29	0.03	0.01	0.00	0.00	1
Beaked whales	0.83	0.09	0.03	7.95	0.00	9
Risso's dolphin	2.00	0.21	0.08	0.00	0.00	3
Short-finned pilot whale	4.43	0.48	0.17	42.65	0.00	48
Short-beaked common dolphin	1.96	0.21	0.07	0.00	0.00	3
Atlantic spotted dolphin	11.71	1.26	0.45	0.00	0.00	14
Pantropical spotted dolphin	2.18	0.23	0.08	0.00	0.00	3
Striped dolphin	5.18	0.56	0.20	0.00	0.00	6
Rough-toothed dolphin	0.18	0.02	0.01	0.00	0.00	1
Bottlenose dolphin	33.18	3.57	1.27	0.00	0.00	39
Gulf of Mexico Continental Shelf						
Atlantic spotted dolphin	161.80	12.95	22.75	0.00	0.00	198
Bottlenose dolphin	269.16	21.55	37.84	0.00	0.88	329
Gulf of Mexico Offshore						
Bryde's whale	0.23	0.02	0.01	0.00	0.00	1
Sperm whale	1.58	00.15	0.06	15.04	0.06	17
Pygmy/dwarf sperm whales	0.38	0.04	0.01	3.66	0.01	5
Pygmy killer whale	0.79	0.07	0.03	0.00	0.00	1
False killer whale	1.63	0.15	0.06	0.00	0.00	2
Beaked whales	0.31	0.03	0.01	2.93	0.01	4
Melon-headed whale	11.55	1.09	0.41	0.00	0.00	13
Risso's dolphin	15.78	1.49	0.55	0.00	0.00	18
Short-finned pilot whale	4.99	0.47	0.18	0.00	0.00	4
Pantropical spotted dolphin	179.45	16.97	6.31	0.00	0.00	203
Striped dolphin	14.02	1.33	0.49	0.00	0.00	16
Rough-toothed dolphin	3.23	0.30	0.11	0.00	0.00	4
Clymene dolphin	0.67	0.06	0.02	0.00	0.00	1
Spinner dolphin	59.13	5.59	2.08	0.00	0.00	67
Bottlenose dolphin	44.75	4.23	1.57	0.00	0.00	51
Caribbean Offshore						
Sperm whale	0.18	0.01	0.00	1.66	0.00	2
Pygmy/dwarf sperm whales	0.38	0.04	0.01	3.66	0.01	5
Pygmy killer whale	0.09	0.00	0.00	0.00	0.00	1
False killer whale	0.19	0.00	0.00	0.00	0.00	1
Beaked whales	0.31	0.03	0.01	2.93	0.01	4
Melon-headed whale	1.34	0.03	0.01	0.00	0.00	2
Risso's dolphin	1.83	0.04	0.02	0.00	0.00	2
Short-finned pilot whale	0.58	0.01	0.01	0.00	0.00	1
Pantropical spotted dolphin	20.80	0.50	0.23	0.00	0.00	22
Striped dolphin	1.63	0.04	0.02	0.00	0.00	2
Rough-toothed dolphin	1.47	0.04	0.02	0.00	0.00	1
Clymene dolphin	0.08	0.05	0.02	0.00	0.00	1
Spinner dolphin	6.85	0.16	0.07	0.00	0.00	8
Bottlenose dolphin	5.19	0.12	0.06	0.00	0.00	6

In some cases, the calculated Level B take estimates resulted in low numbers of animals which are known to be gregarious or travel in group sizes larger than the calculated take estimate. In those cases, we have adjusted the requested take in the application to reflect those groups sizes (see proposed take column in Table 13).

TABLE 13—CALCULATED AND PROPOSED LEVEL B TAKE ESTIMATES

Common name	MMPA stock	Calculated take	Avg. group size [1]	Proposed take
Fin whale	Western North Atlantic	1	2	4

TABLE 13—CALCULATED AND PROPOSED LEVEL B TAKE ESTIMATES—Continued

Common name	MMPA stock	Calculated take	Avg. group size [1]	Proposed take
Blue whale	Western North Atlantic	N/A	2	4
Bryde's whale	Northern Gulf of Mexico	1	2	4
Sperm whale	North Atlantic	2	2.1	4
	Northern Gulf of Mexico	17	2.6	17
	Puerto Rico and U.S. Virgin Islands	4	unk	4
Pygmy/dwarf sperm whale [1]	Western North Atlantic	6	1.9	10
	Northern Gulf of Mexico	5	2	6
	Northern Gulf of Mexico (CRA)	5	2	6
Beaked whale [2]	Western North Atlantic	9	2.3	9
	Northern Gulf of Mexico (GOMRA)	4	2	4
	Northern Gulf of Mexico (CRA)	4	2	4
Melon-headed whales	Northern Gulf of Mexico	13	99.6	100
Risso's dolphin	Western North Atlantic	3	15.4	15
	Northern Gulf of Mexico	18	10.2	10
	Puerto Rico and U.S. Virgin Island	2	10.2	10
Short-finned pilot whales	Western North Atlantic	48	16.6	48
	Northern Gulf of Mexico	6	24.9	25
	Puerto Rico and U.S. Virgin Islands	1	unk	20
Common dolphin	Western North Atlantic	3	267.2	268
Atlantic spotted dolphin	Western North Atlantic	14	37	37
	Northern Gulf of Mexico	198	22	198
	Puerto Rico and U.S. Virgin Islands	unk	unk	50
Pantropical spotted dolphin	Western North Atlantic	4	77.5	78
	Northern Gulf of Mexico	203	71.3	203
Striped dolphin	Western North Atlantic	6	74.6	75
	Northern Gulf of Mexico	16	46.1	46
Bottlenose dolphin	Western North Atlantic (offshore)	39	11.8	39
	Western North Atlantic (coastal/continental shelf).	110	10	110
	Northern Gulf of Mexico (coastal)	[2] 329	10	[2] 350
	Northern Gulf of Mexico (continental shelf)	329	10	350
	Northern Gulf of Mexico (oceanic)	51	20.6	100
	Puerto Rico and U.S. Virgin Islands	6	unk	50
Rough-toothed dolphin	Western North Atlantic	1	8	10
	Northern Gulf of Mexico	4	14.1	20
Clymene dolphin	Western North Atlantic	20	110	100
	Northern Gulf of Mexico	1	89.5	100
Spinner dolphin	Western North Atlantic	unk	unk	100
	Northern Gulf of Mexico	16	151.5	200
	Puerto Rico and U.S. Virgin Islands	n/a	unk	50
Pygmy killer whale	Northern Gulf of Mexico	1	18.5	20
False killer whale	Western North Atlantic	1	unk	20
	Northern Gulf of Mexico	n/a	27.6	20
Harbor porpoise	Gulf of Maine/Bay of Fundy	n/a	[3] 8	16

[1] Groups sizes based on Fulling *et al.,* 2003; Garrison *et al.,* 2011; Mullin *et al.,* 2003; and Mullin *et al.,* 2004.

[2] We note the SEFSC's application did not request take, by Level B harassment, of bottlenose dolphins belonging to coastal stocks; however, because surveys occur using scientific sonar in waters where coastal dolphins may occur, we are proposing to issue the same amount of Level B take as requested for the continental shelf stock.

[3] The American Cetacean Society reports average group size of harbor porpoise range from 6 to 10 individuals. We propose an average group size of 8 for the ARA which is likely conservative given the low density of animals off North Carolina. Given the short and confined spatio-temporal scale of SEFSC surveys in North Carolina during winter months, we assume two groups per year could be encountered.

Proposed Mitigation

In order to issue an incidental take authorization under Section 101(a)(5)(A or D) of the MMPA, NMFS must set forth the permissible methods of taking pursuant to such activity, ''and other means of effecting the least practicable impact on such species or stock and its habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of such species or stock for taking'' for certain subsistence uses. NMFS regulations require applicants for incidental take authorizations to include information about the availability and feasibility (economic and technological) of equipment, methods, and manner of conducting such activity or other means of effecting the least practicable adverse impact upon the affected species or stocks and their habitat (50 CFR 216.104(a)(11)).

In evaluating how mitigation may or may not be appropriate to ensure the least practicable adverse impact on species or stocks and their habitat, as well as subsistence uses where applicable, we carefully consider two primary factors:

(1) The manner in which, and the degree to which, the successful implementation of the measure(s) is expected to reduce impacts to marine mammals, marine mammal species or stocks, and their habitat. This considers the nature of the potential adverse impact being mitigated (likelihood, scope, range). It further considers the likelihood that the measure will be effective if implemented (probability of accomplishing the mitigating result if implemented as planned) the likelihood of effective implementation (probability implemented as planned). and; (2) the practicability of the measures for

applicant implementation, which may consider such things as cost, impact on operations, and, in the case of a military readiness activity, personnel safety, practicality of implementation, and impact on the effectiveness of the military readiness activity.

SEFSC Mitigation for Marine Mammals and Their Habitat

The SEFSC has invested significant time and effort in identifying technologies, practices, and equipment to minimize the impact of the proposed activities on marine mammal species and stocks and their habitat. The mitigation measures discussed here have been determined to be both effective and practicable and, in some cases, have already been implemented by the SEFSC. In addition, the SEFSC is actively conducting research to determine if gear modifications are effective at reducing take from certain types of gear; any potentially effective and practicable gear modification mitigation measures will be discussed as research results are available as part of the adaptive management strategy included in this rule. As for other parts of this rule, all references to the SEFSC, unless otherwise noted, include requirements for all partner institutions identified in the SEFSC's application.

Coordination and communication—When SEFSC survey effort is conducted aboard NOAA-owned vessels, there are both vessel officers and crew and a scientific party. Vessel officers and crew are not composed of SEFSC staff, but are employees of NOAA's Office of Marine and Aviation Operations (OMAO), which is responsible for the management and operation of NOAA fleet ships and aircraft and is composed of uniformed officers of the NOAA Commissioned Corps as well as civilians. The ship's officers and crew provide mission support and assistance to embarked scientists, and the vessel's Commanding Officer (CO) has ultimate responsibility for vessel and passenger safety and, therefore, decision authority. When SEFSC-funded surveys are conducted aboard cooperative platforms (*i.e.,* non-NOAA vessels), ultimate responsibility and decision authority again rests with non-SEFSC personnel (*i.e.,* vessel's master or captain). Decision authority includes the implementation of mitigation measures (*e.g.,* whether to stop deployment of trawl gear upon observation of marine mammals). The scientific party involved in any SEFSC survey effort is composed, in part or whole, of SEFSC staff and is led by a Chief Scientist (CS). Therefore, because the SEFSC—not OMAO or any other entity that may have authority over survey platforms used by the SEFSC—is the applicant to whom any incidental take authorization issued under the authority of these proposed regulations would be issued, we require that the SEFSC take all necessary measures to coordinate and communicate in advance of each specific survey with OMAO, and other relevant parties, to ensure that all mitigation measures and monitoring requirements described herein, as well as the specific manner of implementation and relevant event-contingent decision-making processes, are clearly understood and agreed-upon. This may involve description of all required measures when submitting cruise instructions to OMAO or when completing contracts with external entities. The SEFSC will coordinate and conduct briefings at the outset of each survey and as necessary between ship's crew (CO/master or designee(s), as appropriate) and scientific party in order to explain responsibilities, communication procedures, marine mammal monitoring protocol, and operational procedures. SEFSC will also coordinate as necessary on a daily basis during survey cruises with OMAO personnel or other relevant personnel on non-NOAA platforms to ensure that requirements, procedures, and decision-making processes are understood and properly implemented. The CS will be responsible for coordination with the Officer on Deck (OOD; or equivalent on non-NOAA platforms) to ensure that requirements, procedures, and decision-making processes are understood and properly implemented.

For fisheries research being conducted by partner entities, it remains the SEFSC's responsibility to ensure those partners are communicating and coordinating with the SEFSC, receiving all necessary marine mammal mitigation and monitoring training, and implementing all required mitigation and monitoring in a manner compliant with the proposed rule and LOA. The SEFSC will incorporate specific language into its contracts that specifies training requirements, operating procedures, and reporting requirements for protected species that will be required for all surveys conducted by research partners, including those conducted on chartered vessels. To facilitate this requirement, SEFSC would be required to hold at least one training per year with at least one representative from each partner institution (preferably chief scientists of the fishery independent surveys discussed in this rule) to review the proposed mitigation, monitoring and reporting requirements. The SEFSC would also provide consistent, timely support throughout the year to address any questions or concerns researchers may have regarding these measures.

SEFSC would also be required to establish and maintain cooperating partner working group(s) to identify circumstances of a take should it occur and any action necessary to avoid future take. Each working group shall consist of at least one SEFSC representative knowledgeable of the mitigation, monitoring and reporting requirements contained within these regulations, one or more research institution or SEFSC representative(s) (preferably researcher(s) aboard vessel when take or risk of take occurred), one or more staff from NMFS Southeast Regional Office Protected Resources Division, and one or more staff from NMFS Office of Protected Resources. At the onset of these regulations, SEFSC shall maintain the recently established SCDNR working group to identify actions necessary to reduce the amount of take from SCDNR trawling. Other working groups shall be established if a partner takes more than one marine mammal within 5 years to identify circumstances of marine mammal take and necessary action to avoid future take. Each working group shall meet at least once annually. The SEFSC will maintain a centralized repository for all working group findings to facilitate sharing and coordination.

While at sea, best professional judgement is used to determine if a marine mammal is at risk of entanglement/hooking and if and what type of actions should be taken to decrease risk of interaction. To improve judgement consistency across the region, the SEFSC will initiate a process for SEFSC and partner institution FPCs, SWLs, scientists, and vessel captains and crew to communicate with each other about their experiences with protected species interactions during research work with the goal of improving decision-making regarding avoidance of adverse interactions. The SEFSC will host at least one training annually (may be combined with other training requirements) to inform decision-makers of various circumstances that may arise during surveys, necessary action, and follow-up coordination and reporting of instances of take or possible take. The intent of this new training program would be to draw on the collective experience of people who have been making those decisions, provide a forum for the exchange of information about what went right and what went wrong, and try to determine if there are any rules-

of-thumb or key factors to consider that would help in future decisions regarding avoidance practices. The SEFSC would coordinate not only among its staff and vessel captains and crew but also with those from other fisheries science centers, research partners, the Southeast Regional Office, and other institutions with similar experience.

The SEFSC will coordinate with the local Southeast Regional Stranding Coordinator and the NMFS Stranding Coordinator for any unusual protected species behavior and any stranding, beached live/dead, or floating protected species that are encountered during field research activities. If a large whale is alive and entangled in fishing gear, the vessel will immediately call the U.S. Coast Guard at VHF Ch. 16 and/or the appropriate Marine Mammal Health and Stranding Response Network for instructions. All entanglements (live or dead) and vessel strikes must be reported immediately to the NOAA Fisheries Marine Mammal Stranding Hotline at 1–877–433–8299.

General Fishing Gear Measures

The following measures describe mitigation application to all SEFSC surveys while measures specific to gear types follow. SEFSC will take all necessary measures to avoid marine mammal interaction with fishing gear used during fishery research surveys. This includes implementing the move-on rule (when applicable), which means delaying setting gear when marine mammals are observed at or approaching the sampling site and are deemed to be at-risk of becoming entangled or hooked on any type of fishing gear, and immediately pulling gear from the water when marine mammals are deemed to be at-risk of becoming entangled or hooked on any type of fishing gear. SEFSC will, at all times, monitor for any unusual circumstances that may arise at a sampling site and use best professional judgment to avoid any potential risks to marine mammals during use of all research equipment.

In some cases, marine mammals may be attracted to the vessel during fishing. To avoid increased risk of interaction, the SEFSC will conduct fishery research sampling as soon as practicable upon arriving at a sampling station and prior to conducting environmental sampling. If fishing operations have been suspended because of the presence of marine mammals, SEFSC may resume fishing operations when interaction with marine mammals is deemed unlikely. SEFSC may use best professional judgment in making this determination. SEFSC shall coordinate with all research partners, at least once annually, to ensure mitigation, monitoring and reporting requirements, procedures and decision-making processes contained within the proposed regulations and LOA are understood. All vessels must comply with applicable and relevant take reduction plans, including any required soak time limits and gear length restrictions.

Trawl Mitigation Measures

The SEFSC and research partners use a variety of bottom trawl gears for different research purposes. These trawl types include various shrimp trawls (otter, western jib, mongoose, Falcon), high-opening bottom trawls, and flat net bottom trawls (see Table 1–1 and Appendix A in the DPEA). The SEFSC and its research partners also use modified beam trawls and benthic trawls pulled by hand that are not considered to pose a risk to protected species due to their small size and very short tow durations. Therefore, these smaller, hand pulled trawls are not subject to the mitigation measures provided here.

The following mitigation measures apply for trawl surveys:

- Limit tow times to 30 minutes (except for sea turtle research trawls);
- open codend close to deck/sorting table during haul back to avoid damage to animals that may be caught in gear and empty gear as quickly as possible after retrieval haul back;
- delay gear deployment if marine mammals are believed to be at-risk of interaction;
- retrieve gear immediately if marine mammals is believed to be entangled or at-risk of entanglement;
- implement marine mammal mitigation measures included in the NMFS ESA Scientific Research permit under which a survey may be operating;
- dedicated marine mammal observations shall occur at least 15 minutes to beginning of net deployment; this watch may include approach to the sampling station;
- at least one scientist will monitor for marine mammals while the trawl is deployed and upon haul-back;
- minimize ''pocketing'' in areas of the net where dolphin depredation evidence is commonly observed; and
- continue investigation into gear modifications (*e.g.,* stiffening lazy lines) and *e.g.,* the effectiveness of gear modification.

In 2008, standard tow durations for fishery bottom trawl surveys were reduced from 55 minutes to 30 minutes or less at target depth (excluding deployment and retrieval time). These short tow durations decrease the opportunity for curious marine mammals to find the vessel and investigate. Tow times are less than the 55 minute tow time restriction required for commercial shrimp trawlers not using turtle excluder devices (TEDs) (50 CFR 223.206). The resulting tow distances are typically one to two nm or less, depending on the survey and trawl speed. Short tow times reduce the likelihood of entangling protected species.

The move-on rule will be applied to all oceanic deep water trawls if sightings occur anywhere around vessel (within 2 nm) during a 30 minute pre-gear deployment monitoring timeframe. Vessels will move away if animals appear at risk or trawling will be delayed until marine mammals have not been sighted for 30 min or otherwise determined to no longer be at risk. If animals are still at risk after moving or 30 minutes have lapsed, the vessel will move again or the station will be skipped.

Bottom trawl surveys conducted for purposes of researching gears designed to reduce sea turtle interaction (*e.g.,* turtle exclusion device (TED) testing) and develop finfish bycatch mitigation measures for commercial trawl fisheries may have tow times of up to four hours. These exceptions to the short tow duration protocols are necessary to meet research objectives. TEDs are used in nets that are towed in excess of 55 minutes as required by 50 CFR 223.206. When research objectives prevent the installation of TEDs, tow time limits will match those set by commercial fishing regulations such as the skimmer trawl fishery which has a 55 min tow time limit. This research is covered under the authority of the ESA and the regulations governing the taking, importing, and exporting of endangered and threatened species (50 CFR parts 222–226). The SEFSC began using skimmer trawls in their TED testing in 2012. Mitigation measures in Scientific Research permit 20339, issued May 23, 2017, include:

- Trawling must not be initiated when marine mammals (except dolphins or porpoises) are observed within the vicinity of the research and the marine mammals must be allowed to either leave or pass through the area safely before trawling is initiated;
- Researchers must make every effort to prevent interactions with marine mammals and researchers must be aware of the presence and location of these animals at all times as they conduct trawling activities;

• During skimmer trawl surveys, a minimum of two staff, one on each side (port/starboard) of the vessel, must inspect the gear every five minutes to monitor for the presence of marine mammals,

• Prior to retrieving the skimmer trawl tail bags, the vessel must be slowed from the active towing speed to 0.5–1.0 kn;

• If a marine mammal enters the net, becomes entangled or dies, researchers must (a) stop trawling activities and immediately free the animal, (b) notify the appropriate NMFS Regional Stranding Coordinator as soon as possible and (c) report the incident (permitted activities will be suspended until the Permits Division has granted approval to continue research); and

• Video monitoring of the TED must be used when trawling around Duck, North Carolina, to reduce take of Atlantic sturgeon (although this requirement is not geared toward marine mammals, the camera feed can be used to observe marine mammals to inform decisions regarding implementing mitigation).

The SEFSC also holds an ESA-research permit to assess sea turtle abundance, stock identification, life history, and impacts of human activities; determine sea turtle movements, fine-scale habitat characteristics and selection, and delineation of foraging and nursery areas; and examine how sea turtle distributions correlate with temporal trends and environmental data (Scientific Research Permit 16733–04). That research permit includes a number of marine mammal conditions that must be followed and are incorporated into this proposed rule by reference:

• Trawl tow times must not exceed 30 minutes (bottom time) except in cases when the net is continuously monitored with a real-time video camera or multi-beam sonar system;

• Haul back must begin once a sea turtle or marine mammal enters the net regardless of time limits;

• Seine net pulls must not exceed 45 minutes as part of a 2-hour deployment;

• Nets must not be put in the water and trawls must not be initiated when marine mammals are observed within the vicinity of the research;

• Marine mammals must be allowed to either leave or pass through the area safely before net setting or trawling is initiated;

• Researchers must make every effort to prevent interactions with marine mammals;

• Researchers must be aware of the presence and location of these animals at all times as they conduct activities;

• During skimmer trawl surveys, a minimum of two staff, one on each side (port/starboard) of the vessel, must inspect the gear every five minutes to monitor for the presence of marine mammals;

• Prior to retrieving the skimmer trawl tail bags, the vessel must be slowed from the active towing speed to 0.5–1.0 kn;

• Should marine mammals enter the research area after the seine or tangle nets have been set, the lead line must be raised and dropped in an attempt to make marine mammals in the vicinity aware of the net;

• If marine mammals remain within the vicinity of the research area, tangle or seine nets must be removed; and

• If a marine mammal enters the trawl net, becomes entangled or captured, researchers must stop activities and immediately free the animal, notify the NMFS Southeast Regional Stranding Coordinator as soon as possible, report the incident within 2 weeks and, in addition to the written report, the Permit Holder must contact the Permits Division.

Other mitigation measures are included in research permit 16733–04 that are designed for sea turtles but also have benefits to minimizing entanglement of marine mammals. These include:

• Highly visible buoys must be attached to the float line of each net and spaced at intervals of 10 yards or less; Nets must be checked at intervals of less than 30 minutes, and more frequently whenever turtles or other organisms are observed in the net. If water temperatures are ≤10 °C or ≥30 °C, nets must be checked at less than 20-minute intervals (''net checking'' is defined as a complete and thorough visual check of the net either by snorkeling the net in clear water or by pulling up on the top line such that the full depth of the net is viewed along the entire length); The float line of all nets must be observed at all times for movements that indicate an animal has encountered the net (when this occurs the net must be immediately checked). During diver assisted gear evaluations (SEFSC Small Turtle TED Testing and Gear Evaluations), dive teams are deployed on the trawls while they are being towed. During this research, divers actively monitor the gear for protected species interactions and use emergency signal floats to notify the vessel if an interaction occurs. When the signal float is deployed the vessel terminates the tow and slows the gear down to a minimal forward speed of less than 0.5 knots, which allows divers to assist the protected species escape.

Live feed video or sonar monitoring of the trawl may be used in lieu of tow time limits. This mitigation measure is also used in addition to TEDs during some projects. Video or sonar feeds are monitored for the duration of the tow. If a TED is not installed in the trawl and a protected species is observed in the trawl then the tow is immediately terminated. If a TED is installed and a marine mammal is observed to have difficulty escaping through the TED opening, or the individual is lost from the video or sonar feed then the tow is immediately terminated. For all trawl types, the lazy line is a source of entanglement. In particular, dolphins like to rub the line. Loose lines are prone to create a half-hitch around their tail. Therefore, to mitigate this type of interaction, the SEFSC Harvesting Systems Unit (HSU) has conducted limited research examining the potential use of lazy lines constructed of alternative materials designed to reduce marine mammal entanglement with respect to material, thickness, and stiffness. Polyester rope, also known as Dacron, may be a suitable alternative to traditionally used polypropylene. Polyester rope is UV and abrasion resistant and has less elasticity than nylon, but does not lose strength when wet. Polyester, like polypropylene, does not absorb water, but has a higher specific gravity (1.38), which causes it to sink. Polyester can be constructed using a process that results in a medium or hard lay rope that that is stiff, avoids hockling (a twist in the line which gets caught in a block) and is self-coiling when loaded or unloaded off a capstan or gear hauler. The high specific gravity of this type of rope may pose a snagging or hang-up hazard when used as a lazy line in trawl operations. However, the smooth feel of the rope compared to polypropylene may reduce the attractiveness of the line to the rubbing behavior of bottlenose dolphin.

In 2007, the HSU conducted preliminary NOAA diver assisted trials with High Density Polyethylene (HDPE) rope as a replacement for traditional polypropylene. Compared to polypropylene, HDPE polyethylene has similar properties including negligible water absorption, UV resistance, and low specific gravity, which allows it to float. However, HDPE polyethylene may be constructed with a harder lay than traditional polypropylene rope. Divers found that half-hitching the line was more difficult than traditional polypropylene line. However, operational trials were not conducted to examine performance and usability

aboard the vessel during extended fishing operations.

Another alternative may be replacement of the lazy line with 3/8 in. stainless steel cable or replacement of the aft portion of the lazy line with 3/8 in. stainless steel cable. Replacement of the entire lazy line with cable would require block replacement and the use of dedicated winches for hauling the gear. Replacing the aft portion of the lazy line, where bottlenose dolphins typically interact with the line, would not require any changes as long as the rope to cable connection is able to smoothly pass through existing blocks. However, each of these changes would result in sinking and potential snagging or hang-up hazards. These modifications are also not without consequences. Lazy line modifications may require vessel equipment changes (*e.g.,* blocks on research vessels) or may change the effectiveness of the catch, precluding comparison of new data to long-term data sets. In 2017, the HSU conducted a follow-up study, funded by NMFS Office of Science and Technology, to further investigate gear modification and the potential effectiveness at reducing dolphin entanglement.

The following summarizes HSU's 2017 research efforts on shrimp trawl gear modification which was carried out to inform development of this proposed rule (the fully report can be found at *https://www.fisheries.noaa.gov/node/23111*). Gearhart and Hathaway (2018) provide the following summary of research methods and findings: From June 9–22, 2017, HSU conducted gear evaluations in Panama City, Florida, with various lazy lines and configurations. In addition to traditional polypropylene, three types of 3 strand rope were examined; Samson Ultra-Blue Medium Hard Lay (MHL); Samson SSR 100 MHL; and Samson XLR. Vertical and horizontal profiles of each rope type were measured with and without a ''sugar line'' attached in a twin-rigged trawl configuration. In addition, dolphin interactions were simulated by NMFS divers with an aluminum dolphin fluke model. Results indicate that the vertical profiles were reduced and horizontal profiles increased for all rope types when a 25 ft (7.6 m) ''sugar line'' was added. Due to differences in elasticity when compared to polypropylene, the alternative rope types experienced greater tension with vertical profiles flattening, while the polypropylene rope maintained vertical relief. Results of simulated dolphin interactions were inconclusive with divers able to introduce half-hitch loops around the model fluke with both polypropylene and the stiffest alternative rope, Samson SSR 100 MHL. However divers commented that it was more difficult to introduce the loop in the stiffer Samson SSR 100 MHL than the polypropylene line and more difficult to introduce the loop along the outer portion of the lazy line with the sugar line attached due to the increased tension on the line. Use of an alternative stiffer line with low stretch in combination with a short sugar line may reduce the potential for bottlenose dolphin takes on lazy lines. However, additional usability research is needed with these alternative rope types to see how they perform under commercial conditions. Finally, more directed dolphin/lazy line interaction behavior research is needed to better understand the modes of interaction and provide conservation engineers with the knowledge required to better formulate potential solutions.

Given the report's results and recommendations, NMFS is not requiring the SEFSC implement lazy line modifications at this time. However, as an adaptive management strategy, NMFS will be periodically assessing lazy line modification as a potential mitigation measure in this and future regulations. NMFS will continue to work with the SEFSC to determine if gear modifications such as stiffer lazy lines are both warranted and practicable to implement. Should the SEFSC volunteer to modify trawl lazy lines, NMFS will work with the researchers to identify any potential benefit and costs to doing so.

In addition to interactions with the lazy line, the SEFSC has identified that holes in trawl nets resulting from dolphin depredation are most numerous around net ''pockets'' where fish congregate. Reinforcing these more vulnerable sections of the net could help reduce entanglement. Similar to lazy line modification investigations, this potential mitigation measure will be further examined to determine its effectiveness and practicability. The proposed regulations identify ''pocketing'' of the net should be minimized.

Finally, marine mammal monitoring will occur during all trawls. Bottlenose dolphins are consistently interacting with research trawls in the estuary and nearshore waters and are seemingly attracted to the vessel, with most dolphins converging around the net during haul-back (SCDNR Working Group, pers. comm., February 2, 2016). This makes it difficult to ''lose'' dolphins, even if moving stations. Due to the known persistent behavior of dolphins around trawls in the estuary and nearshore waters, the move-on rule will not be required for such surveys. However, the chief scientist and/or vessel captain will be required to take immediate action to reduce dolphin interaction should animals appear to be at risk or are entangled in the net. For skimmer trawl research, both the lazy line and net can be monitored from the vessel. However, this is not possible for bottom trawls. Therefore, for bottom trawls, researchers should use best professional judgement to determine if gear deployment should be delayed or hauled. For example, the SCDNR has noted one instance upon which dolphins appeared distressed, evident by the entire group converging on the net during haul-back. They quickly discovered a dolphin was entangled in the net. This and similar types of overt distress behaviors should be used by researchers monitoring the net to identify potential entanglement, requiring the net be hauled-in immediately and quickly.

Pelagic trawls conducted in deep water (500–800 m deep) are typically mid-water trawls and occur in oceanic waters where marine mammal species diversity is greater increased compared to the coast or estuaries. Oceanic species often travel in very large groups and are less likely to have prior encounters and experience with trawl gear than inshore bottlenose dolphins. For these trawls, a dedicated marine mammal observer would observe around the vessel for no less than 30 minutes prior to gear deployment. If a marine mammal is observed within 2 nm of the vessel, gear deployment would be delayed until that animal is deemed to not be at risk of entanglement (*e.g.,* the animal is moving on a path away from the vessel) or the vessel would move to a location absent of marine mammals and deploy gear. If trawling operations have been delayed because of the presence of protected species, the vessel resumes trawl operations (when practicable) only when these species have not been sighted within 30 minutes or are determined to no longer be at risk (*e.g.,* moving away from deployment site). If the vessel moves, the required 30-minute monitoring period begins again. In extreme circumstances, the survey station may need to be cancelled if animals (*e.g.,* delphinids) follow the vessel. In addition to implementing the ''move-on'' rule, all trawling would be conducted first to reduce the opportunity to attract marine mammals to the vessel. However, the order of gear deployment is at the discretion of the FPC or SWL based on environmental conditions. Other activities, such as

water sampling or plankton tows, are conducted in conjunction with, or upon completion of, trawl activities.

Once the trawl net is in the water, the officer on watch, FPC or SWL, and/or crew standing watch continue to monitor the waters around the vessel and maintain a lookout for protected species as far away as environmental conditions allow. If protected species are sighted before the gear is fully retrieved, the most appropriate response to avoid incidental take is determined by the professional judgment of the FPC or SWL, in consultation with the officer on watch. These judgments take into consideration the species, numbers, and behavior of the animals, the status of the trawl net operation (net opening, depth, and distance from the stern), the time it would take to retrieve the net, and safety considerations for changing speed or course. Most marine mammals have been caught during haul-back operations, especially when the trawl doors have been retrieved and the net is near the surface and no longer under tension. In some situations, risk of adverse interactions may be diminished by continuing to trawl with the net at depth until the protected species have left the area before beginning haul-back operations. In other situations, swift retrieval of the net may be the best course of action. The appropriate course of action to minimize the risk of incidental take of protected species is determined by the professional judgment of the FPC or SWL based on all situation variables, even if the choices compromise the value of the data collected at the station. Care is taken when emptying the trawl, including opening the codend as close as possible to the deck of the checker (or sorting table) in order to avoid damage to protected species that may be caught in the gear but are not visible upon retrieval. The gear is emptied as quickly as possible after retrieval in order to determine whether or not protected species are present.

Seine Nets

The SEFSC will implement the following mitigation measures when fishing with seine nets (*e.g.,* gillnets, trammel nets):

- Conduct gillnet and trammel net research activities during daylight hours only;
- Limit soak times to the least amount of time required to conduct sampling;
- Conduct dedicated marine mammal observation monitoring beginning 15 minutes prior to deploying the gear and continue through deployment and haulback;
- Hand-check the net every 30 minutes if soak times are longer than 30 minutes or immediately if disturbance is observed;
- Pull gear immediately if disturbance in the nets is observed;
- Reduce net slack and excess floating and trailing lines;
- Repair damaged nets prior to deploying; and
- Delay or pull all gear immediately and implement the move-on rule if marine mammal is at-risk of entanglement.

The dedicated observation will be made by scanning the water and marsh edge (if visible when working in estuarine waters) 360 degrees around the vessel where the net would be set. If a marine mammal is sighted during this observation period, nets would not be deployed until the animal has left the area, is on a path away from where the net would be set, or has not been re-sighted within 15 minutes. Alternatively, the research team may move the vessel to an area clear of marine mammals. If the vessel moves, the 15 minute observation period is repeated. Monitoring by all available crew would continue while the net is being deployed, during the soak, and during haulback.

If marine mammals are sighted in the peripheral sampling area during active netting, the SEFSC will raise and lower the net leadline. If marine mammals do not immediately depart the area and the animal appears to be at-risk of entanglement (*e.g.,* interacting with or on a path towards the net), the SEFSC delay or pull all gear immediately and, if required, implement the move-on rule if marine mammal is at-risk of entanglement.

If protected species are not sighted during the 15 minute observation period, the gear may be set. Waters surrounding the net and the net itself would be continuously monitored during the soak. If protected species are sighted during the soak and appear to be at risk of interaction with the gear, then the gear is pulled immediately. If fishing operations are halted, operations resume when animal(s) have not been sighted within 15 minutes or are determined to no longer be at risk, as determined by the judgment of the FPC or SWL. In other instances, the station is moved or cancelled. If any disturbance in the gear is observed in the gear, it is immediately checked or pulled.

Hook and Line Gear Mitigation

In addition to the general mitigation measures listed above, the SEFSC will implement the following mitigation measures:

- Monitor area for marine mammals and, if present, delay setting gear until the animal is deemed not at risk.
- Immediately reel in lines if marine mammals are deemed to be at risk of interacting with gear.
- Following existing Dolphin Friendly Fishing Tips: *http://sero.nmfs.noaa.gov/protected_resources/outreach_and_education/documents/dolphin_friendly_fishing_tips.pdf.*
- Not discard leftover bait overboard while actively fishing.
- Inspect tackles daily to avoid unwanted line breaks.

When fishing with bottom or pelagic longlines, the SEFSC will: (1) Limit longline length and soak times to the minimum amount possible; (2) deploy longline gear first (after required monitoring) prior to conducting environmental sampling; (3) if any marine mammals are observed, delay deploying gear unless animal is not at risk of hooking; (4) pull gear immediately and implement the move-on rule if any marine mammal is hooked or at risk of being hooked; (5) deploy longline gear prior to environmental sampling; and (6) avoid chumming (*i.e.,* baiting water). More detail on these measures are described below.

Prior to arrival on station (but within 0.5 nautical mile), the officer, crew members, and scientific party on watch visually scan for protected species for 30 minutes prior to station arrival for pelagic longline surveys and 15 minutes prior for other surveys. Binoculars will be used as necessary to survey the area while approaching and upon arrival at the station, while the gear is deployed, and during haulback. Additional monitoring is conducted 15 minutes prior to setting longline gear by members of the scientific crew that monitor from the back deck while baiting hooks. If protected species are sighted prior to setting the gear or at any time the gear is in the water, the bridge crew and SWL are alerted immediately. Environmental conditions (*e.g.,* lighting, sea state, precipitation, fog, etc.) often limit the distance for effective visual monitoring of protected species. If marine mammals are sighted during any monitoring period, the ''move-on'' rule, as described in the trawling mitigation section above would be implemented. If longline operations have been delayed because of the presence of protected species, the vessel resumes longline operations only when these species have not been sighted within 15 minutes or otherwise determined to no longer be at risk. The risk decision is at the discretion of the FPC or SWL and is dependent on the situation. After the

required monitoring period, longline gear is always the first equipment or fishing gear to be deployed when the vessel arrives on station.

If marine mammals are detected during setting operations or while the gear is in the water and are considered to be at risk (*e.g.,* moving towards deployment site, displaying behaviors of potentially interacting with gear, etc.), the FPC or SWL in conjunction with the officer on watch may halt the setting operation or call for retrieval of gear already set. The species, number, and behavior of the protected species are considered along with the status of the ship and gear, weather and sea conditions, and crew safety factors when making decisions regarding gear deployment delay or retrieval.

There are also a number of standard measures designed to reduce hooking potential and minimize injury. In all pelagic longline sets, gangions are 110 percent as long as the drop line depth; therefore, this gear configuration allows a potentially hooked marine mammal the ability to reach the surface. SEFSC longline protocols specifically prohibit chumming reducing any attraction. Further, no stainless steel hooks are used so that in the event a hook can not be retrieved from an animal, it will corrode. Per PLTRP, the SEFSC pelagic longline survey uses the Pelagic Longline Marine Mammal Handling and Release Guidelines for any pelagic longline sets made within the Atlantic EEZ. These procedures would also be implemented in the GOMRA and CRA.

Other gears—The SEFSC deploys a wide variety of gear to sample the marine environment during all of their research cruises. Many of these types of gear (*e.g.,* chevron fish trap, eel traps, dip nets, video cameras and ROV deployments) are not considered to pose any risk to marine mammals due to their size, deployment methods, or location, and therefore are not subject to mitigation. However, at all times when the SEFSC is conducting survey operations at sea, the OOD and/or CS and crew will monitor for any unusual circumstances that may arise at a sampling site and use best professional judgment to avoid any potential risks to marine mammals during all vessel operation and use of research equipment.

Electrofishing—Electrofishing occurs on small vessels and operates with a 3000 watt pulsed direct current for 15 minutes. The electric field is less than 20 feet around the electrofishing vessel. Before the electrofishing vessel begins operating, a dedicated marine mammal observer would scan the surrounding waters for at least 15 minutes prior to fishing. If a marine mammal is observed within 50 meters of the vessel or on a path toward the vessel, electrofishing would be delayed. Fishing would not begin until the animal is outside of the 50 m safety zone or on a consistent path away from the vessel. Alternatively, if animals do not leave the area, the vessel could move to another sampling station. If the vessel moves, the 15 minutes observation period is repeated. During electrofishing, the research crew would also monitor for marine mammals. If animals are observed within or a path toward the 50 m safety zone, electrofishing would be terminated and not resume until the animal is clear of and on a path away from the 50 m safety zone. All samples collected during electrofishing are to remain on the vessel and not discarded until all electrofishing is completed to avoid attracting protected species.

Vessel speed—Vessel speed during active sampling is less than 5 kn (average 2–3 kn) while transit speeds to and from sampling sites vary from 6–14 kn but average 10 kn. These low vessel speeds minimize the potential for ship strike (see ''Potential Effects of the Specified Activity on Marine Mammals and Their Habitat'' for an in-depth discussion of ship strike). At any time during a survey or in transit, if a crew member standing watch or dedicated marine mammal observer sights marine mammals that may intersect with the vessel course that individual will immediately communicate the presence of marine mammals to the bridge for appropriate course alteration or speed reduction, as possible, to avoid incidental collisions.

While transiting in areas subjected to the North Atlantic ship strike rule, all SEFSC- affiliated research vessels (NOAA vessels, NOAA chartered vessels, and research partner vessels) will abide by the required speed restrictions and sighting alert protocols. The ship strike rule for the southeast U.S. seasonal management area (SMA) requires that, from November 15 through April 15, all vessels 65 feet or longer must slow to 10 kn or less in the right whale calving and nursery grounds which are bounded to the north by latitude 31°27′ N, to the south by 29°45′ N, and to the east by 80°51′36″ W. Mid-Atlantic SMAs include several port or bay entrances from northern Georgia to Rhode Island between November 1 and April 30. In addition, dynamic management areas (DMAs) are temporary areas created around right whale sightings, the size of which depends on the number of whales sighted. Voluntary speed reductions may apply when no SMA is in effect. All NOAA research vessels operating in North Atlantic right whale habitat participate in the Right Whale Early Warning System.

SEFSC research vessel captains and crew watch for marine mammals while underway during daylight hours and take necessary actions to avoid them. There are currently no Marine Mammal Observers (MMOs) aboard the vessels dedicated to watching for marine mammals to minimize the risk of collisions, although the large NOAA vessels (*e.g.,* NOAA Ship *Pisces*) operated by the NOAA Office of Marine and Aviation Operations (OMAO) include one bridge crew dedicated to watching for obstacles at all times, including marine mammals. At any time during a survey or in transit, any bridge personnel that sights marine mammals that may intersect with the vessel course immediately communicates their presence to the helm for appropriate course alteration or speed reduction as soon as possible to avoid incidental collisions, particularly with large whales (*e.g.,* North Atlantic right whales).

The Right Whale Early Warning System is a multi-agency effort that includes the SEFSC, the Florida Fish and Wildlife Conservation Commission (FWCC), U.S. Coast Guard, U.S. Navy, and volunteer observers. Sightings of the critically endangered North Atlantic right whale are reported from aerial surveys, shipboard surveys, whale watch vessels, and opportunistic sources (U.S. Coast Guard, commercial ships, fishing vessels, and the general public). Whale sightings are reported in real time to the Right Whale Early Warning System network and information is disseminated to mariners within a half hour of a sighting. The program was designed to reduce collisions between ships and North Atlantic right whales by alerting mariners to the presence of the whales in near real time. Under the proposed rule, all NOAA-affiliated vessels operating in North Atlantic right whale habitat will be required to participate in the Right Whale Early Warning System.

Acoustic and Visual Deterrent Devices—Acoustic and visual deterrents include, but are not limited; to pingers, recordings of predator vocalizations, light sticks, and reflective twine/rope. Pingers are underwater sound-emitting devices attached to gear that have been shown to decrease the probability of interacuetions with certain species of marine mammals. Pingers have been shown to be effective in deterring some marine mammals, particularly harbor porpoises, from interacting with gillnet gear (Nowacek et al. 2007, Carretta and

Barlow 2011). Multiple studies have reported large decreases in harbor porpoise mortality (approximately eighty to ninety percent) in bottom-set gillnets (nets composed of vertical panes of netting, typically set in a straight line and either anchored to the bottom or drifting) during controlled experiments (*e.g.,* Kraus *et al.,* 1997; Trippel *et al.,* 1999; Gearin *et al.,* 2000). Using commercial fisheries data rather than a controlled experiment, Palka *et al.* (2008) reported that harbor porpoise bycatch rates in the northeast U.S gillnet fishery when fishing without pingers was about two to three times higher compared to when pingers were used. After conducting a controlled experiment in a California drift gillnet fishery during 1996–97, Barlow and Cameron (2003) reported significantly lower bycatch rates when pingers were used for all cetacean species combined, all pinniped species combined, and specifically for short-beaked common dolphins (85 percent reduction) and California sea lions (69 percent reduction). While not a statistically significant result, catches of Pacific white-sided dolphins (which are historically one of the most frequently captured species in SEFSC surveys; see Table 4) were reduced by seventy percent. Carretta *et al.* (2008) subsequently examined nine years of observer data from the same drift gillnet fishery and found that pinger use had eliminated beaked whale bycatch. Carretta and Barlow (2011) assessed the long-term effectiveness of pingers in reducing marine mammal bycatch in the California drift gillnet fishery by evaluating fishery data from 1990–2009 (with pingers in use beginning in 1996), finding that bycatch rates of cetaceans were reduced nearly fifty percent in sets using a sufficient number of pingers. However, in a behavioral response study investigating bottlenose dolphin behavior around gillnets outfitted with acoustic alarms in North Carolina, there was no significant difference is number of dolphins or closest approach between nets with alarms and nets without alarms (Cox *et al.,* 2003). Studies of acoustic deterrents in a trawl fishery in Australia concluded that pingers are not likely to be effective in deterring bottlenose dolphins, as they are already aware of the gear due to the noisy nature of the fishery (Stephenson and Wells 2008, Allen et al. 2014). Acoustic deterrents were also ineffective in reducing bycatch of common dolphins in the U.K. bass pair trawl fishery (Mackay and Northridge 2006).

The use and effectiveness of acoustic deterrent devices in fisheries in which bottlenose dolphins have the potential to interact has been approached with caution. Two primary concerns expressed with regard to pinger effectiveness in reducing marine mammal bycatch relate to habituation (*i.e.,* marine mammals may become habituated to the sounds made by the pingers, resulting in increasing bycatch rates over time; Dawson, 1994; Cox *et al.,* 2001; Carlström *et al.,* 2009) and the ''dinner bell effect'' (Dawson, 1994; Richardson *et al.,* 1995), which implies that certain predatory marine mammal species may come to associate pingers with a food source (*e.g.,* fish caught in nets) with the result that bycatch rates may be higher in nets with pingers than in those without.

The BDTRP, after years of directed investigation, found pingers are not effective at deterring bottlenose dolphins from depredating on fish captured by trawls and gillnets. During research driven by the BDTRT efforts to better understand the effectiveness of pingers on bottlenose dolphins, one became entangled and drowned in a net outfitted with a pinger. Dolphins can become attracted to the sound of the pinger because they learn it signals the presence of fish (*i.e.,* the ''dinner bell effect''), raising concerns about potential increased entanglement risks (Cox et al., 2003; Read et al., 2004 and 2006; and Read and Waples 2010). Due to the lack of evidence that pingers are effective at deterring bottlenose dolphins coupled with the potential dinner-bell effect, the BDTRP does not recommend them for use in SEFSC for bottlenose dolphins.

The effectiveness of acoustic and visual deterrents for species encountered in the ARA, GOMRA, and CRA is uncertain. Therefore, the SEFSC will not be required to outfit gear with deterrent devices but is encouraged to undertake investigations on the efficacy of these measures where unknown (*i.e.,* not for surveys in which bottlenose dolphins are primary bycatch) in order to minimize potential for take.

Disentanglement Handling Procedures—The SEFSC will implement a number of handling protocols to minimize potential harm to marine mammals that are incidentally taken during the course of fisheries research activities. In general, protocols have already been prepared for use on commercial fishing vessels. Although commercial fisheries are known to take a larger number of marine mammals than fisheries research, the nature of entanglements are similar. Therefore, the SEFSC would adopt commercial fishery disentanglement protocols, which are expected to increase post-release survival. Handling or disentangling marine mammals carries inherent safety risks, and using best professional judgment and ensuring human safety is paramount.

Captured live or injured marine mammals are released from research gear and returned to the water as soon as possible with no gear or as little gear remaining on the animal as possible. Animals are released without removing them from the water if possible, and data collection is conducted in such a manner as not to delay release of the animal(s) or endanger the crew. SEFSC is responsible for training SEFSC and partner researchers on how to identify different species; handle and bring marine mammals aboard a vessel; assess the level of consciousness; remove fishing gear; and return marine mammals to water. Human safety is always the paramount concern.

At least two persons aboard SEFSC ships and one person aboard smaller vessels, including vessels operated by partners where no SEFSC staff are present, will be trained in marine mammal handling, release, and disentanglement procedures. If a marine mammal is entangled or hooked in fishery research gear and discovered alive, the SEFSC or affiliate will follow safe handling procedures. To facilitate this training, SEFSC would be required to ensure relevant researchers attend the NMFS Highly Migratory Species/Protected Species Safe Handling, Release, and Identification Workshop *www.nmfs.noaa.gov/sfa/hms/compliance/workshops/protected_species_workshop/index.html* or other similar training. The SEFSC shall provide SEFSC scientists and partner institutions with the Protected Species Safe Handling and Release Manual (see Appendix D is SEFSC's application) and advise researchers to follow this manual, in addition to lessons learned during training, should a marine mammal become entangled during a survey. For those scientists conducting longline surveys, the SEFSC shall provide training on the Pelagic Longline Take Reduction Team Marine Mammal Handling and Release Guidelines.

Based on our evaluation of the applicant's proposed measures, as well as other measures considered by NMFS, NMFS has preliminarily determined that the proposed mitigation measures provide the means of effecting the least practicable impact on the affected species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance.

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TPWD Mitigation for Marine Mammals and Their Habitat

The TPWD would undertake a number of measures to minimize risk of entangling bottlenose dolphins. Only new or fully repaired gill nets will be used thereby eliminating holes. Gill nets will be set with minimal slack and a very short marker buoy attached to the deep end of the net. This reduction in slack and float buoy length is designed to reduce possible entanglement. The TPWD would also modify the nets to greatly reduce or eliminate any gaps between the float/lead line and the net. As currently configured, nets are tied to the lines every eight in. creating a gap between the net and line of approximately six to eight in. depending on the mesh size. TPWD field crews report that entanglement has typically occurred in the float or lead lines in or near the gap in question. TPWD would tie the net to the lines at no more than 4 in. intervals, reducing the gap size to less than four in. should help prevent getting a tail, pectoral, or fluke fin getting caught in these gaps.

Prior to setting nets, dedicated marine mammal observations will be conducted by at least one researcher trained in marine mammal detection techniques. If dolphins are observed around or on a path toward the sampling site, TPWD would delay setting the net until the animal has moved and is on a path away from the site. If an animal is observed around and on a path toward the sampling area while setting the net, the net will be hauled back aboard until the animal has moved on. If animals remain in the area, TPWD will move on to another site not in the animal's path without setting the net. When a net is set, TPWD would minimize soak time by utilizing the ''last out/first in'' strategy for gill nets set in sites where marine mammals have been encountered within the last 5 years. A net set in this manner will be deployed last and retrieved first, reducing soak times by an average of 1.35 hours but a maximum of 6.6 hours.

TPWD researchers will immediately respond to net disturbances when setting and retrieving nets to determine if a dolphin is entangled and, if so, will release the dolphin immediately. All nets set the night before will be inspected for the presence of bottlenose dolphins and sea turtles before any nets are retrieved. If these animals are observed they will be released immediately. At least one TPWD research aboard gillnetting survey vessels will be trained in NMFS-approved Marine Mammal Handling Procedures.

The TPWD would remove fishing grids from their sampling areas where dolphins have been taken on more than one occasion or where multiple adjacent grids have had at least one dolphin encounter. To date, grids which meet one or both of these criteria are (1) Aransas Bay, just south of Allyn's Bight (grid #'s 280, 290, 291, 301, see Fig.3 in TPWD's application), (2) Corpus Christi Bay, south of Ingleside shoreline (CC grid #132, see Fig. 4 in TPWD's application), and (3) Lower Laguna Madre, in Redfish Bay (LLM grid #47, see Fig 5 in TPWD's application).

Based on our evaluation of the TPWD's proposed measures, as well as other measures considered by NMFS, NMFS has preliminarily determined that the proposed mitigation measures provide the means effecting the least practicable impact on the affected species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance.

Proposed Monitoring and Reporting

In order to issue an incidental take authorization for an activity, section 101(a)(5)(A) of the MMPA states that NMFS must set forth ''requirements pertaining to the monitoring and reporting of such taking.'' The MMPA implementing regulations at 50 CFR 216.104 (a)(13) require that requests for incidental take authorizations must include the suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species and of the level of taking or impacts on populations of marine mammals that are expected to be present in the proposed action area.

Monitoring and reporting requirements prescribed by NMFS should contribute to improved understanding of one or more of the following:

- Occurrence of marine mammal species or stocks in the action area (*e.g.,* presence, abundance, distribution, density);
- Nature, scope, or context of likely marine mammal exposure to potential stressors/impacts (individual or cumulative, acute or chronic), through better understanding of: (1) Action or environment (*e.g.,* source characterization, propagation, ambient noise); (2) affected species (*e.g.,* life history, dive patterns); (3) co-occurrence of marine mammal species with the action; or (4) biological or behavioral context of exposure (*e.g.,* age, calving or feeding areas).
- Individual marine mammal responses (behavioral or physiological) to acoustic stressors (acute, chronic, or cumulative), other stressors, or cumulative impacts from multiple stressors;
- How anticipated responses to stressors impact either: (1) Long-term fitness and survival of individual marine mammals; or (2) populations, species, or stocks;
- Effects on marine mammal habitat (*e.g.,* marine mammal prey species, acoustic habitat, or other important physical components of marine mammal habitat); and
- Mitigation and monitoring effectiveness.

SEFSC Proposed Monitoring and Reporting

The SEFSC plans to make more systematic its training, operations, data collection, animal handling and sampling protocols, etc. in order to improve its ability to understand how mitigation measures influence interaction rates and ensure its research operations are conducted in an informed manner and consistent with lessons learned from those with experience operating these gears in close proximity to marine mammals. We propose the monitoring requirements described below.

Marine mammal watches are a standard part of conducting fisheries research activities and are implemented as described previously in ''Proposed Mitigation.'' Dedicated marine mammal observations occur as described (1) for some period prior to deployment of most research gear; (2) throughout deployment and active fishing of all research gears; (3) for some period prior to retrieval of gear; and (4) throughout retrieval of research gear. Observers should record the species and estimated number of animals present and their behaviors, which may be valuable information towards an understanding of whether certain species may be attracted to vessels or certain survey gears. Separately, on white boats, marine mammal watches are conducted by watch-standers (those navigating the vessel and other crew; these will typically not be SEFSC personnel) at all times when the vessel is being operated. The primary focus for this type of watch is to avoid striking marine mammals and to generally avoid navigational hazards. These watch-standers typically

have other duties associated with navigation and other vessel operations and are not required to record or report to the scientific party data on marine mammal sightings, except when gear is being deployed or retrieved.

Training

The SEFSC anticipates that additional information on practices to avoid marine mammal interactions can be gleaned from training sessions and more systematic data collection standards. The SEFSC will conduct annual trainings for all chief scientists and other personnel who may be responsible for conducting dedicated marine mammal visual observations to explain mitigation measures and monitoring and reporting requirements, mitigation and monitoring protocols, marine mammal identification, recording of count and disturbance observations (relevant to AMLR surveys), completion of datasheets, and use of equipment. Some of these topics may be familiar to SEFSC staff, who may be professional biologists, The SEFSC shall determine the agenda for these trainings and ensure that all relevant staff have necessary familiarity with these topics. The first such training will include three primary elements:

First, the course will provide an overview of the purpose and need for the authorization, including mandatory mitigation measures by gear and the purpose for each, and species that the SEFSC is authorized to incidentally take.

Second, the training will provide detailed descriptions of reporting, data collection, and sampling protocols. This portion of the training will include instruction on how to complete new data collection forms such as the marine mammal watch log, the incidental take form (*e.g.,* specific gear configuration and details relevant to an interaction with protected species), and forms used for species identification and biological sampling. The biological data collection and sampling training module will include the same sampling and necropsy training that is used for the Southeast Regional Observer training.

The SEFSC will also dedicate a portion of training to discussion of best professional judgment (which is recognized as an integral component of mitigation implementation; see ''Proposed Mitigation''), including use in any incidents of marine mammal interaction and instructive examples where use of best professional judgment was determined to be successful or unsuccessful. We recognize that many factors come into play regarding decision-making at sea and that it is not practicable to simplify what are inherently variable and complex situational decisions into rules that may be defined on paper. However, it is our intent that use of best professional judgment be an iterative process from year to year, in which any at-sea decision-maker (*i.e.,* responsible for decisions regarding the avoidance of marine mammal interactions with survey gear through the application of best professional judgment) learns from the prior experience of all relevant SEFSC personnel (rather than from solely their own experience). The outcome should be increased transparency in decision-making processes where best professional judgment is appropriate and, to the extent possible, some degree of standardization across common situations, with an ultimate goal of reducing marine mammal interactions. It is the responsibility of the SEFSC to facilitate such exchange.

Handling Procedures and Data Collection

Improved standardization of handling procedures were discussed previously in ''Proposed Mitigation.'' In addition to the benefits implementing these protocols are believed to have on animals through increased post-release survival, SEFSC believes adopting these protocols for data collection will also increase the information on which ''serious injury'' determinations (NMFS, 2012a, b) are based and improve scientific knowledge about marine mammals that interact with fisheries research gears and the factors that contribute to these interactions. SEFSC personnel will be provided standard guidance and training regarding handling of marine mammals, including how to identify different species, bring an individual aboard a vessel, assess the level of consciousness, remove fishing gear, return an individual to water and log activities pertaining to the interaction.

The SEFSC will record interaction information on either existing data forms created by other NMFS programs or will develop their own standardized forms. To aid in serious injury determinations and comply with the current NMFS Serious Injury Guidelines, researchers will also answer a series of supplemental questions on the details of marine mammal interactions.

Finally, for any marine mammals that are killed during fisheries research activities, when practicable, scientists will collect data and samples pursuant to Appendix D of the SEFSC DEA, ''Protected Species Handling Procedures for SEFSC Fisheries Research Vessels.''

SEFSC Reporting

As is normally the case, SEFSC will coordinate with the relevant stranding coordinators for any unusual marine mammal behavior and any stranding, beached live/dead, or floating marine mammals that are encountered during field research activities. The SEFSC will follow a phased approach with regard to the cessation of its activities and/or reporting of such events, as described in the proposed regulatory text following this preamble. In addition, Chief Scientists (or cruise leader, CS) will provide reports to SEFSC leadership and to the Office of Protected Resources (OPR). As a result, when marine mammals interact with survey gear, whether killed or released alive, a report provided by the CS will fully describe any observations of the animals, the context (vessel and conditions), decisions made and rationale for decisions made in vessel and gear handling. The circumstances of these events are critical in enabling the SEFSC and OPR to better evaluate the conditions under which takes are most likely occur. We believe in the long term this will allow the avoidance of these types of events in the future.

The SEFSC will submit annual summary reports to OPR including:

(1) Annual line-kilometers surveyed during which the EK60, ME70, SX90 (or equivalent sources) were predominant (see ''Estimated Take by Acoustic Harassment'' for further discussion), specific to each region;

(2) Summary information regarding use of all trawl, net, and hook and line gear, including number of sets, tows, hook hours, etc., specific to each research area and gear;

(3) Accounts of all incidents of marine mammal interactions, including circumstances of the event and descriptions of any mitigation procedures implemented or not implemented and why;

(4) Summary information related to any disturbance of marine mammals and distance of closest approach;

(5) A written description of any mitigation research investigation efforts and findings (*e.g.,* lazy line modifications);

(6) A written evaluation of the effectiveness of SEFSC mitigation strategies in reducing the number of marine mammal interactions with survey gear, including best professional judgment and suggestions for changes to the mitigation strategies, if any; and

(7) Details on marine mammal-related training taken by SEFSC and partner scientists.

The period of reporting will be annually, beginning one year post-issuance of any LOA, and the report must be submitted not less than ninety days following the end of a given year.

Submission of this information is in service of an adaptive management framework allowing NMFS to make appropriate modifications to mitigation and/or monitoring strategies, as necessary, during the proposed five-year period of validity for these regulations.

Should an incidental take occur, the SEFSC, or affiliated partner involved in the taking, shall follow the NMFS Final Take Reporting and Response Procedures, dated January 15, 2016. NMFS has established a formal incidental take reporting system, the PSIT database, requiring that incidental takes of protected species be reported within 48 hours of the occurrence. The PSIT generates automated messages to NMFS leadership and other relevant staff, alerting them to the event and to the fact that updated information describing the circumstances of the event has been inputted to the database. The PSIT and CS reports represent not only valuable real-time reporting and information dissemination tools but also serve as an archive of information that may be mined in the future to study why takes occur by species, gear, region, etc.

The SEFSC will also collect and report all necessary data, to the extent practicable given the primacy of human safety and the well-being of captured or entangled marine mammals, to facilitate serious injury (SI) determinations for marine mammals that are released alive. The SEFSC will require that the CS complete data forms and address supplemental questions, both of which have been developed to aid in SI determinations. The SEFSC understands the critical need to provide as much relevant information as possible about marine mammal interactions to inform decisions regarding SI determinations. In addition, the SEFSC will perform all necessary reporting to ensure that any incidental M/SI is incorporated as appropriate into relevant SARs.

TPWD Proposed Monitoring and Reporting

Issuance of the proposed regulations would require TPWD to monitor for marine mammals starting 0.5 miles (800 meters) from sampling site and for 15 minutes at sampling site prior to setting the net. Should a marine mammal be observed within 0.5 miles (800 meters) of the site and is on a path toward the site, the net would not be deployed. Should a marine mammal be observed during the 15-minute observation period at the site, the net would not be deployed. The net may only be deployed if marine mammals are observed on a path away from the site consistently for 15 minutes or are not re-sighted within 15 minutes.

TPWD currently reports marine mammal entanglements to NMFS Southeast Regional Office (SERO). However, reporting is not standardized and, in the past, has led to questions regarding the circumstances of the take and disposition of the animal. The proposed regulations would standardize a comprehensive reporting scheme and require TPWD to report all incidents of marine mammal interaction to OPR and NMFS SERO within 48 hours of occurrence. Also within 48 hours, TPWD shall log the incident in NMFS' Protected Species Incidental Take (PSIT) database and provide any supplemental information to OPR and SERO upon request. Information related to marine mammal interaction (animal captured or entangled in research gear) must include the following:

- Time, date, and location (latitude/longitude) of the incident;
- Monitoring conducted prior to and occurring at the time of incident;
- Environmental conditions (*e.g.,* wind speed and direction, Beaufort sea state, cloud cover, visibility);
- Description of the animal(s) involved (*e.g.,* size, age class);
- Water depth and net location where entangled;
- Nature of the entanglement (*i.e.,* part of animal entangled, where in net entangled)
- Fate of the animal(s);
- Detailed description of events, including how animals was disentangled and behavior upon release, including signs of injury (if alive);
- Photographs or video footage of the animal(s).

TPWD would also be required to submit an annual report to OPR not later than ninety days following the end of the fall sampling season. TPWD would provide a final report within thirty days following resolution of comments on the draft report. These reports shall contain, at minimum, the following:

- Locations and time/date of all net sets;
- all instances of marine mammal observations and descriptions of any mitigation procedures implemented or not implemented and why;
- all incidents of marine mammal interactions, including all information required in § 219.86(b);
- A written evaluation of the effectiveness of TPWD mitigation strategies in reducing the number of marine mammal interactions with survey gear, including gear modifications and best professional judgment and suggestions for changes to the mitigation strategies, if any;
- A summary of all relevant marine mammal training.

Negligible Impact Analyses and Determinations

Introduction—NMFS has defined negligible impact as an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival (50 CFR 216.103). A negligible impact finding is based on the lack of likely adverse effects on annual rates of recruitment or survival (*i.e.,* population-level effects). An estimate of the number of takes alone is not enough information on which to base an impact determination. In addition to considering estimates of the number of marine mammals that might be ''taken'' by mortality, serious injury, and Level A or Level B harassment, we consider other factors, such as the likely nature of any behavioral responses (*e.g.,* intensity, duration), the context of any such responses (*e.g.,* critical reproductive time or location, migration), as well as effects on habitat, and the likely effectiveness of mitigation. We also assess the number, intensity, and context of estimated takes by evaluating this information relative to population status. Consistent with the 1989 preamble for NMFS's implementing regulations (54 FR 40338; September 29, 1989), the impacts from other past and ongoing anthropogenic activities are incorporated into this analysis via their impacts on the environmental baseline (*e.g.,* as reflected in the regulatory status of the species, population size and growth rate where known, ongoing sources of human-caused mortality, and specific consideration of take by M/SI previously authorized for other NMFS research activities).

We note here that the takes from potential gear interactions enumerated below could result in non-serious injury, but their worse potential outcome (mortality) is analyzed for the purposes of the negligible impact determination.

We discuss here the connection, and differences, between the legal mechanisms for authorizing incidental take under section 101(a)(5) for activities such as SEFSC's research activities, and for authorizing incidental take from commercial fisheries. In 1988, Congress amended the MMPA's provisions for addressing incidental take of marine mammals in commercial fishing operations. Congress directed NMFS to develop and recommend a new long-term regime to govern such

incidental taking (see MMC, 1994). The need to develop a system suited to the unique circumstances of commercial fishing operations led NMFS to suggest a new conceptual means and associated regulatory framework. That concept, Potential Biological Removal (PBR), and a system for developing plans containing regulatory and voluntary measures to reduce incidental take for fisheries that exceed PBR were incorporated as sections 117 and 118 in the 1994 amendments to the MMPA.

PBR is defined in Section 3 of the MMPA as the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population (OSP) and, although not controlling, can be one measure considered among other factors when evaluating the effects of M/SI on a marine mammal species or stock during the section 101(a)(5)(A) process. OSP is defined in section 3 of the MMPA as the number of animals which will result in the maximum productivity of the population or the species, keeping in mind the carrying capacity of the habitat and the health of the ecosystem of which they form a constituent element. A primary goal of the MMPA is to ensure that each species or stock of marine mammal is maintained at or returned to its OSP.

PBR values are calculated by NMFS as the level of annual removal from a stock that will allow that stock to equilibrate within OSP at least 95 percent of the time, and is the product of factors relating to the minimum population estimate of the stock (N_{min}); the productivity rate of the stock at a small population size; and a recovery factor. Determination of appropriate values for these three elements incorporates significant precaution, such that application of the parameter to the management of marine mammal stocks may be reasonably certain to achieve the goals of the MMPA. For example, calculation of the minimum population estimate (N_{min}) incorporates the precision and variability associated with abundance information, while also providing (typically the 20th percentile of a log-normal distribution of the population estimate) reasonable assurance that the stock size is equal to or greater than the estimate (Barlow *et al.,* 1995). In general, the three factors are developed on a stock-specific basis in consideration of one another in order to produce conservative PBR values that appropriately account for both imprecision that may be estimated as well as potential bias stemming from lack of knowledge (Wade, 1998).

Congress called for PBR to be applied within the management framework for commercial fishing incidental take under section 118 of the MMPA. As a result, PBR cannot be applied appropriately outside of the section 118 regulatory framework without consideration of how it applies within section 118 framework, as well as how other statutory management frameworks in the MMPA differ from the framework in section 118. PBR was not designed and is not used as an absolute threshold limiting commercial fisheries. Rather, it serves as a means to evaluate the relative impacts of those activities on marine mammal stocks. Even where commercial fishing is causing M/SI at levels that exceed PBR, the fishery is not suspended. When M/SI exceeds PBR in the commercial fishing context under section 118, NMFS may develop a take reduction plan, usually with the assistance of a take reduction team. The take reduction plan will include measures to reduce and/or minimize the taking of marine mammals by commercial fisheries to a level below the stock's PBR. That is, where the total annual human-caused M/SI exceeds PBR, NMFS is not required to halt fishing activities contributing to total M/SI but rather utilizes the take reduction process to further mitigate the effects of fishery activities via additional bycatch reduction measures. In other words, under section 118 of the MMPA, PBR does not serve as a strict cap on the operation of commercial fisheries that may incidentally take marine mammals.

Similarly, to the extent PBR may be relevant when considering the impacts of incidental take from activities other than commercial fisheries, using it as the sole reason to deny (or issue) incidental take authorization for those activities would be inconsistent with Congress's intent under section 101(a)(5) and the use of PBR under section 118. The standard for authorizing incidental take under section 101(a)(5) continues to be, among other things, whether the total taking will have a negligible impact on the species or stock. When Congress amended the MMPA in 1994 to add section 118 for commercial fishing, it did not alter the standards for authorizing non-commercial fishing incidental take under section 101(a)(5), implicitly acknowledging that the negligible impact under section 101(a)(5) is a separate from the PBR metric under section 118. In fact, in 1994, Congress also amended section 101(a)(5)(E) (a separate provision governing commercial fishing incidental take for species listed under the Endangered Species Act) to add compliance with the new section 118 but kept the requirement for a negligible impact finding. Congress thus understood that the determination of negligible impact and application of PBR may share certain features but are, in fact, different.

Since the introduction of PBR, NMFS has used the concept almost entirely within the context of implementing sections 117 and 118 and other commercial fisheries management-related provisions of the MMPA. Although there are a few examples where PBR has informed agency deliberations under other sections of the MMPA, where PBR has been raised, it has been a consideration and not dispositive to the issue at hand. Further, the agency's thoughts regarding the potential role of PBR in relation to other programs of the MMPA have evolved since the agency's earlier applications to section 101(a)(5) decisions. The MMPA requires that PBR be estimated in stock assessment reports and that it be used in applications related to the management of take incidental to commercial fisheries (*i.e.,* the take reduction planning process described in section 118 of the MMPA and the determination of whether a stock is ''strategic'' (16 U.S.C. 1362(19))), but nothing in the MMPA requires the application of PBR outside the management of commercial fisheries interactions with marine mammals.

Nonetheless, NMFS recognizes that as a quantitative metric, PBR may be useful in certain instances as a consideration when evaluating the impacts of other human-caused activities on marine mammal stocks. Outside the commercial fishing context, and in consideration of all known human-caused mortality, PBR can help inform the potential effects of M/SI caused by activities authorized under 101(a)(5)(A) on marine mammal stocks. As noted by NMFS and the USFWS in our implementation regulations for the 1986 amendments to the MMPA (54 FR 40341, September 29, 1989), the Services consider many factors, when available, in making a negligible impact determination, including, but not limited to, the status of the species or stock relative to OSP (if known); whether the recruitment rate for the species or stock is increasing, decreasing, stable, or unknown; the size and distribution of the population; and existing impacts and environmental conditions. In this multi-factor analysis, PBR can be a useful indicator for when, and to what extent, the agency should take an especially close look at the circumstances associated with the potential mortality, along with any other

factors that could influence annual rates of recruitment or survival.

When considering PBR during evaluation of effects of M/SI under section 101(a)(5)(A), we first calculate a metric for each species or stock that incorporates information regarding ongoing anthropogenic M/SI into the PBR value (*i.e.,* PBR minus the total annual anthropogenic mortality/serious injury estimate), which is called ''residual PBR'' (Wood *et al.,* 2012). We focus our analysis on residual PBR because it incorporates anthropogenic mortality occurring from other sources. We then consider how the anticipated potential incidental M/SI from the activities being evaluated compares to residual PBR utilizing the following framework.

Where a specified activity could cause (and NMFS is contemplating authorizing) incidental M/SI that is less than 10 percent of residual PBR (the ''insignificance threshold, see below), we consider M/SI from the specified activities to represent an insignificant incremental increase in ongoing anthropogenic M/SI for the marine mammal stock in question that alone (*i.e.,* in the absence of any other take) will not adversely affect annual rates of recruitment and survival. As such, this amount of M/SI would not be expected to affect rates of recruitment or survival in a manner resulting in more than a negligible impact on the affected stock unless there are other factors that could affect reproduction or survival, such as Level A and/or Level B harassment, or considerations such as information that illustrates the uncertainty involved in the calculation of PBR for some stocks. In a prior incidental take rulemaking, this threshold was identified as the ''significance threshold,'' but it is more accurately labeled an insignificance threshold, and so we use that terminology here. Assuming that any additional incidental take by Level A or Level B harassment from the activities in question would not combine with the effects of the authorized M/SI to exceed the negligible impact level, the anticipated M/SI caused by the activities being evaluated would have a negligible impact on the species or stock. However, M/SI above the 10 percent insignificance threshold does not indicate that the M/SI associated with the specified activities is approaching a level that would necessarily exceed negligible impact. Rather, the 10 percent insignificance threshold is meant only to identify instances where additional analysis of the anticipated M/SI is not required because the negligible impact standard clearly will not be exceeded on that basis alone.

Where the anticipated M/SI is near, at, or above residual PBR, consideration of other factors (positive or negative), including those outlined above, as well as mitigation are especially important to assessing whether the M/SI will have a negligible impact on the species or stock. PBR is a conservative metric and not sufficiently precise to serve as an absolute predictor of population effects upon which mortality caps would appropriately be based. For example, in some cases stock abundance (which is one of three key inputs into the PBR calculation) is underestimated because marine mammal survey data within the U.S. EEZ are used to calculate the abundance even when the stock range extends well beyond the U.S. EEZ. An underestimate of abundance could result in an underestimate of PBR. Alternatively, we sometimes may not have complete M/SI data beyond the U.S. EEZ to compare to PBR, which could result in an overestimate of residual PBR. M/SI that exceeds PBR may still potentially be found to be negligible in light of other factors that offset concern, especially when robust mitigation and adaptive management provisions are included.

This action is similar to the Navy's authorization under the MMPA litigated in *Conservation Council for Hawaii* v. *National Marine Fisheries Service,* 97 F. Supp.3d 1210, 1225 (D. Haw. 2015) because both authorize mortalities of marine mammals. *Conservation Council for Hawaii* v. *National Marine Fisheries Service* concerned a challenge to NMFS' issuance of letters of authorization to the Navy for activities in an area of the Pacific Ocean known as the HSTT Study Area, and the Court reached a different conclusion regarding the relationship between PBR and negligible impact, stating, ''[b]ecause any mortality level that exceeds PBR will not allow the stock to reach or maintain its OSP, such a mortality level could not be said to have only a 'negligible impact' on the stock.'' As described above, the Court's statement fundamentally misunderstands the two terms and incorrectly indicates that these concepts (PBR and ''negligible impact'') are directly connected, when in fact nowhere in the MMPA is it indicated that these two terms are equivalent.

Specifically, PBR was designed as a tool for evaluating mortality and is defined as the number of animals that can be removed while allowing the stock to reach or maintain OSP, with the formula for PBR designed to ensure that growth towards OSP is not reduced by more than 10 percent (or equilibrate to OSP 95 percent of the time). Separately, and without reference to PBR, NMFS' long-standing MMPA implementing regulations state that take will have a negligible impact when it does not adversely affect the species or stock through effects on annual rates of recruitment or survival. OSP (to which PBR is linked) is defined in the statute as a population which falls within a range from the population level that is the largest supportable within the ecosystem to the population level that results in maximum net productivity. OSP is an aspirational goal of the overall statute and PBR is designed to ensure minimal deviation from this overarching goal. The ''negligible impact'' determination and finding protects against ''adverse impacts on the affected species and stocks'' when evaluating specific activities.

For all these reasons, even where M/SI exceeds residual PBR, it is still possible for the take to have a negligible impact on the species or stock. While ''allowing a stock to reach or maintain OSP'' would ensure that NMFS approached the negligible impact standard in a conservative and precautionary manner so that there were not ''adverse effects on affected species or stocks,'' it is equally clear that in some cases the time to reach this aspirational OSP could be slowed by more than 10 percent *(i.e.,* total human-caused mortality in excess of PBR could be allowed) without adversely affecting a species or stock. Another difference between the two standards is the temporal scales upon which the terms focus. That is, OSP contemplates the incremental, 10 percent reduction in the rate to approach a goal that is tens or hundreds of years away. The negligible impact analysis, on the other hand, necessitates an evaluation of annual rates of recruitment or survival to support the decision of whether to issue five-year regulations.

Accordingly, while PBR is useful for evaluating the effects of M/SI in section 101(a)(5)(A) determinations, it is just one consideration to be assessed in combination with other factors and should not be considered determinative. The accuracy and certainty around the data that feed any PBR calculation (*e.g.,* the abundance estimates) must be carefully considered. This approach of using PBR as a trigger for concern while also considering other relevant factors provides a reasonable and appropriate means of evaluating the effects of potential mortality on rates of recruitment and survival, while demonstrating that it is possible to exceed PBR by some small amount and still make a negligible impact

determination under section 101(a)(5)(A).

Our evaluation of the M/SI for each of the species and stocks for which mortality could occur follows. In addition, all mortality authorized for some of the same species or stocks over the next several years pursuant to our final rulemakings for NEFSC has been incorporated into the residual PBR.

We first consider maximum potential incidental M/SI for each stock (Table 14 and 15) in consideration of NMFS's threshold for identifying insignificant M/SI take (10 percent of residual PBR (69 FR 43338; July 20, 2004)). By considering the maximum potential incidental M/SI in relation to residual PBR and ongoing sources of anthropogenic mortality, we begin our evaluation of whether the potential incremental addition of M/SI through SEFSC research activities may affect the species' or stock's annual rates of recruitment or survival. We also consider the interaction of those mortalities with incidental taking of that species or stock by harassment pursuant to the specified activity.

Negligible Impact Analysis and Determinations for the SEFSC

We methodically examined each stock above the insignificance threshold to determine if the amount and degree of proposed taking would have effects to annual rates of recruitment or survival (*i.e.,* have a negligible impact on the population). These rates are inherently difficult to quantify for marine mammals because adults of long-lived, birth-pulse populations (*e.g.,* many cetaceans, polar bears and walrus) may not breed every year because of parental care, long gestation periods or nutritional constraints (Taylor et al., 1987). Therefore, we pursued a combination of quantitative and qualitative analyses to inform our determinations.

First we compiled data to assess the baseline population status of each stock for which the SEFSC is requesting take. These data were pulled from the most recent SARs (Hayes *et al.,* 2017) and, where information was unknown or undetermined in the SARs, we consulted marine mammal experts at the SEFSC and on TRTs to fill data gaps to the best of our ability based on the best available science. Data pulled from these sources include population size and demographics (where known), PBR, known mortality and serious injury from commercial and recreational fishing and other human-caused sources (*e.g.,* direct shootings), stock trends (*i.e.,* declining, stable, or increasing), threats, and other sources of potential take M/SI (*e.g.,* MMPA 101(a)(5)(A or D) applications and scientific research permit applications). In addition, we looked at ongoing management actions (*e.g.,* TRT gear restrictions) to identify where efforts are being focused and are successful at reducing incidental take.

Estuarine and Coastal Bottlenose Dolphins

For estuarine bottlenose dolphin stocks, reaching our preliminary negligible impact determination required a hard examination of the status of each of the 7 ARA and 11 GOMRA stocks for which we propose to authorize take. We recognize that PBR is technically undetermined for many stocks because abundance data is more than eight years old. Therefore, we consulted with marine mammal experts at the SEFSC to derive best estimates of PBR based on the available data. Overall, PBR is low (less than one animal) because stock sizes are generally small (tens to hundreds) in southeast estuaries (with notable exceptions such as Mississippi Sound). Stock sizes are expected to be small because the abundance of a dolphin stock in an estuary is bounded by the capabilities of the bays and estuarine systems to support that stock (*i.e.,* carrying capacity of the system) due to the residential nature of these stocks, among other things. With respect to rates of annual M/SI, we note some fisheries in the GoM (*e.g.,* shrimp fishery) do not have full observer coverage. Estimates of take from these fisheries are both extrapolated and aggregated to the state level, making total M/SI rates from commercial fisheries applicable to any given stock rather than all stocks within a state not possible.

We approached the issue of outdated abundance information by working closely with SEFSC experts and have developed estimated abundance data and PBR values. The resulting values follow the general trend of small stock sizes and are very conservative in some cases. For example, recent abundance surveys in Barataria Bay and Terrebonne Bay revealed stock numbers were in the thousands compared to the previously estimated populations of approximately 200–300 animals (Hayes et al., 2018). In addition, three stocks, including the Perdido Bay stock have population estimates showing zero. However, it is well documented dolphins inhabit these areas. We also consulted with the NMFS Southeast Regional Office (SERO) bottlenose dolphin conservation coordinator to better understand the nature of the takes identified in the SARs M/SI values (*i.e.,* the source of take such as commercial fishery or research). That is, if we relied solely on the SAR annual M/SI values reported in the SARs and added the proposed M/SI take to these numbers, we would be double-counting M/SI as some takes were attributed to the research for which we are proposing to authorize take. Therefore, where M/SI takes were contributed to SEFSC research, we have adjusted annual M/SI values from Table 3b above so as not to ''double count'' potential take. Table 14 reflects these adjustments.

In the ARA, all estuarine and coastal stocks for which we are proposing to authorize take are below the insignificance threshold (10 percent r-PBR) except for the Northern South Carolina Estuarine, Northern Georgia/Southern South Carolina Estuarine, Central Georgia Estuarine, and Southern Georgia Estuarine stocks (Table 14). The latter two stocks are only slightly above the insignificance threshold (11.76 and 10.35 percent, respectively). The proposed take for the Northern Georgia/Southern South Carolina stock constitutes 28.57 percent of r-PBR. Sources of anthropogenic mortality for this stock include hook and line and crab pot/trap fisheries. The proposed M/SI take (0.2/year) of the Northern South Carolina stock is 50 percent of PBR. However, considering an average of one animal every 5 years is taken in commercial fisheries (likely gillnet or crab pot/trap), the proposed take and annual M/SI constitute 100 percent of r-PBR. The Northern South Carolina Estuarine System stock is delimited as dolphins inhabiting estuarine waters from Murrells Inlet, South Carolina, southwest to Price Inlet, South Carolina, the northern boundary of Charleston Estuarine System stock. The region has little residential, commercial, and industrial development and contains the Cape Romain National Wildlife Refuge. As such, the stock is not facing heavy anthropogenic pressure, and there are no identified continuous indirect stressors threatening the stock.

Of the nine estuarine stocks in the GOMRA for which we are proposing to authorize take by M/SI, three are below the insignificance threshold (10% r-PBR): Terrebonne Bay/Timbalier Bay; St. Vincent Sound/Apalachicola Bay/St. George Sound, and Apalachee Bay. The three coastal stocks are also below the insignificance threshold. Four stocks are between 14 and 40 percent r-PBR. The Mississippi Sound stock is already above PBR in absence of the proposed authorization, while authorizing take in Mobile Bay would put the stock above PBR (Table 14).

TABLE 14—SUMMARY INFORMATION OF ESTUARINE AND COASTAL BOTTLENOSE DOLPHIN STOCKS RELATED TO SEFSC PROPOSED M/SI TAKE IN THE ARA, GOMRA, AND CRA

Stock	Stock abundance (N_{best})	Proposed M/SI take (annual)	PBR	Annual M/SI	NEFSC authorized take by M/SI (annual)	r-PBR [2]	Proposed M/SI take/r-PBR (%) [3]
Atlantic							
Northern South Carolina Estuarine Stock	[1] 50	0.2	[1] 0.4	0.2	0	0.2	100.00
Charleston Estuarine System Stock	[1] 289	0.2	[1] 2.8	0.2	0	2.6	7.69
Northern Georgia/Southern South Carolina Estuarine	[1] 250	0.2	[1] 2.1	1.4	0	0.7	28.57
Central Georgia Estuarine	192	0.2	1.9	0.2	0	1.7	11.76
Southern Georgia Estuarine	194	0.2	1.9	0	0	1.9	10.53
Jacksonville Estuarine System	[1] 412	0.2	[1] 3.9	1.2	0	2.7	7.41
Florida Bay	[1] 514	0.2	[1] 4.5	0	0	4.5	4.44
South Carolina/Georgia Coastal	[1] 6,027	0.6	[1] 46	1.0–1.4	0	44.6–45	1.35
Northern Florida Coastal	[1] 877	0.6	[1] 6	0.6	0	5.4	11.11
Central Florida Coastal	[1] 1,218	0.6	[1] 9.1	0.2	0	8.9	6.74
Northern Migratory Coastal	6,639	0.6	48	6.1–13.2	1.6	33.2–43.5	0.4–0.6
Southern Migratory Coastal	3,751	0.6	23	14.3	1.6	7.1	8.45
Gulf of Mexico							
Terrebonne Bay, Timbalier Bay	3,870	0.2	27	0.2	0	26.8	0.75
Mississippi River Delta	332	0.2	1.4	[4] 0	0	1.4	14.29
Mississippi Sound, Lake Borgne, Bay Boudreau [5]	3,046	.02 (M/SI), 0.2 (Level A)	23	310	0	−281	Neg.
Mobile Bay, Bonsecour Bay	122	0.2	[1] 0.9	[5] 0.8	0	0.1	Neg.
St. Andrew Bay	124	0.2	[1] 0.9	0.2	0	0.7	28.57
St. Joseph Bay	152	0.2	1.41	0.4	0	1.01	19.80
St. Vincent Sound, Apalachicola Bay, St. George Sound	439	0.2	[1] 3.91	0	0	3.91	5.12
Apalachee Bay	491	0.2	[1] 3.61	0	0	3.61	5.54
Waccasassa Bay, Withlacoochee Bay, Crystal Bay	[1] 100	0.2	[1] 0.5	0	0	0.5	40.00
Northern Gulf of Mexico Western Coastal Stock	20,161	0.6	175	0.6	0	174.4	0.34
Northern Gulf of Mexico Northern Coastal Stock	7,185	0.6	60	0.4	0	59.6	1.01
Northern Gulf of Mexico Eastern Coastal Stock	12,388	0.6	111	1.6	0	109.4	0.55

[1] For many estuarine stocks, the draft 2018 SAR has unknown abundance estimates and undetermined PBRs. Where this occurred, we used either the most recent estimates (even if more than 8 years old) or we consulted with SEFSC marine mammal experts for best judgement (pers. comm., K. Mullin).

[2] r-BPR = PBR − (annual M/I + NEFSC authorized take). For example, for the southern migratory coastal stock r-PBR = 23 − (14.3 + 1.6).

[3] Values in the column reflect what the proposed take represents as a percentage of r-PBR. The insignificance threshold is 10 percent.

[4] The annual M/SI in the draft 2018 SAR is 0.2 for the Mississippi River stock; however, the takes considered were from gillnet fishery research; therefore, we reduced M/SI to 0.

[5] The annual M/SI in the draft 2018 SAR is 1.0; however, one take used in those calculations is from fisheries research for which we propose to authorize take; therefore, we reduced M/SI to 0.8.

For the Mississippi Sound stock, we evaluated various aspects of stock status. According to this stock's 2017 SAR, the mean annual fishery-related mortality and serious injury during 2012–2015 for observed fisheries and strandings and at-sea observations identified as fishery-caused related is 1.0. Additional mean annual mortality and serious injury during 2011–2015 due to other human-caused actions (fishery research, sea turtle relocation trawling, gunshot wounds, and DWH oil spill) is 309 with the majority sourced from DWH. Projected annual M/SI over the next five years from commercial fishing and DWH are 6 and 1539, respectively. Management and research actions, including ongoing health assessments and Natural Resource Damage Plan efforts designed to restore injury to the stock, are anticipated to improve the status of the stock moving forward. Further, marine mammal population modeling indicates Barataria Bay dolphin should begin recovery nine years post spill (NRDA Trustees, 2016; DWH MMIQT 2015). Applying that model to the Mississippi Sound stock, we should begin to see the population recover during the life of the proposed regulations. We note the three research-related mortalities discussed in the 2017 SAR for this stock are from the specified activities for which we are now proposing to authorize take. Therefore, the proposed take would not be in addition to but would account for these research-related takes.

Our proposal to authorize one M/SI take from the Mobile Bay stock over 5 years would result in the stock being above r-PBR. The known takes of this stock includes one mortality in blue crab trap/pot gear in 2015, one mortality in stranding data where cause of death could not be determined and the animal could have been from the Northern Coastal stock, and one SI interaction in 2016. As with other estuarine stocks where abundance data is severely outdated, the population estimate is small compared to other estuarine stocks more recently and thoroughly studied. This could be a result of sampling methods. For example, the abundance estimate of 122 animals for Mobile Bay is based on aerial survey data collected during September through October in 1992 and 1993 with 16 percent of animals observed in bay (Blaylock and Hoggard, 1994). Sounds and estuaries were eliminated from the analysis. Murky water in GoM estuaries and dark, grey animals makes it very difficult to detect dolphins from aerial surveys. Further, Mobile Bay is a large estuarine system (approximately 456 km^2), similar in size to Barataria Bay where the population estimate is over 2,000 animals based on vessel-based surveys. Therefore, it is reasonable to assume the population of dolphin in Mobile Bay and other places, such as Perdido Bay, are higher than estimated in old surveys using aerial observations. Looking beyond the quantitative abundance and PBR data, we also considered non-quantitative factors to determine the effects of the proposed authorization on estuarine dolphin stocks in the ARA and GOMRA.

We consider qualitative information such as population dynamics and

context to determine if the proposed amount of take of estuarine and coastal bottlenose dolphins in the ARA and GOMRA would have a negligible impact on annual rates of survival and reproduction. Marine mammals are K-selected species, meaning they have few offspring, long gestation and parental care periods, and reach sexual maturity later in life. Therefore, between years, reproduction rates vary based on age and sex class ratios. As such, population dynamics is a driver when looking at reproduction rates. We focus on reproduction here because we conservatively consider inter-stock reproduction is the primary means of recruitment for these stocks. We note this is a conservative assumption, as some individuals are known to travel, and there is some mixing between the estuarine stocks and adjacent coastal stocks (Hayes *et al,* 2017). Given reproduction is the primary means of recruitment and females play a significantly larger role in their offspring's reproductive success (also known as Bateman's Principle), the mortality of females rather than males is, in general, more likely to influence recruitment rate. Several studies have purported that male bottlenose dolphins are more likely to engage in depredation or related behaviors with trawls and recreational fishing (Corkeron *et al.,* 1990; Powell & Wells, 2011) or become entangled in gear (Reynolds *et al.,* 2000; Adimey *et al.,* 2014). Male bias has also been reported for strandings with evidence of fishery interaction (Stolen *et al.,* 2007; Fruet *et al.,* 2012; Adimey *et al.,* 2014) and for *in situ* observations of fishery interaction (Corkeron *et al.,* 1990; Finn *et al.,* 2008; Powell & Wells, 2011). Byrd and Hohn (2017) examined stranding data to determine whether there was differential risk of bycatch based on sex and age class from gillnet fisheries in North Carolina. They found more males than females stranded. However, the relative gillnet bycatch risk was not different for males and females. In summary, these data suggest the risk of gear interaction from trawls and hook and line is likely higher for males while gillnet interactions may pose equal risk for males and females. For this rulemaking, the majority of historical gear interactions are from trawls. Therefore, we believe males (which are less likely to influence recruitment rate) are more likely at risk than females.

Understanding the population dynamics of each bottlenose dolphin stock considered in this rulemaking is not possible as the data simply do not exist for each stock. Therefore, we considered a well-studied population, the Sarasota Bay stock, as a proxy for assessing population dynamics of other estuarine stocks throughout the ARA and GOMRA. The Sarasota Bay stock is the most data rich population of bottlenose dolphins in the United States. The Sarasota Bay Research Program (SBRP) possesses 40 years of data on the resident dolphin population. Research topics include, but are not limited to, population structure and dynamics, health and physiology, and human interaction and impacts.

The Sarasota Bay stock demonstrates high recruitment and survival rates. Wells *et al.* (2014) found 83 percent (95 percent CI = 0.52 to 0.99) of detected pregnancies were documented as resulting in live births. Eight of the 10 calves (80 percent) resulting from documented pregnancies survived through the calendar year of their birth and, therefore, were considered to have been successfully recruited into the Sarasota Bay bottlenose dolphin population. This value compares favorably with the 81 percent first year survival reported by Wells & Scott (1990) for Sarasota Bay bottlenose dolphins. Thus, approximately 66 percent of documented pregnancies led to successful recruitment. Mann *et al.* (2000) found dolphin interbirth intervals for surviving calves are between 3 and 6.2 years, resulting in annual variability in reproductive rates. With respect to survival, Wells and Scott (1990) calculated a mean annual survival rate of Sarasota Bay dolphins at 96.2 percent. In comparison, a mark-recapture study of dolphins near Charleston, South Carolina reported an apparent annual survival rate of 95.1 percent (95 percent CI: 88.2–100) (Speakman *et al.,* 2010). In summary, survival rate and reproductive success of the Sarasota Bay stock is high and, except for those stocks for which we know individual marine mammal health and reproductive success are compromised from the Deepwater Horizon oil spill (*e.g.,* Mississippi Sound stock), we consider estuarine bottlenose stocks in the ARA and GOMRA to have similar rates of recruitment and survival.

For stocks that are known to be experiencing levels of stress from fishing and other anthropogenic sources (*e.g..,* annual rates of human-caused mortality and serious injury reach or exceed PBR levels in absence of the requested take from the SEFSC), we look toward the ongoing management actions and research designed to reduce those pressures when considering our preliminary negligible impact determination. Overall, many estuarine bottlenose dolphin stocks are facing anthropogenic stressors such as commercial and recreational fishing, coastal development, habitat degradation (*e.g.,* oil spills, harmful algal blooms), and directed violence (intentional killing/injury) and have some level of annual M/SI. NOAA, including the SEFSC, is dedicated to reducing fishery take, both in commercial fisheries and research surveys. For example, the Atlantic BDTRT is in place to decrease M/SI in commercial fisheries and scientists at NOAA's National Center for Coastal Ocean Science (NCCOS) in Charleston, South Carolina, are undertaking research and working with local fishermen to reduce crab pot/trap and trawling entanglement (*e.g.,* McFee et al., 2006, 2007; Greenman and McFee, 2014). In addition, through this rulemaking, the SEFSC has invested in developing measures that may be adopted by commercial fisheries to reduce bycatch rates, thereby decreasing the rate of fishing-related M/SI. For example, in 2017, the SEFSC executed the previously described Lazy Line Modification Mitigation Work Plan (see *Potential Effects* section) and the SEFSC is investigating the feasibility of applying gear modifications to select research trawl surveys. Also as a result of this rulemaking process, the SEFSC has a heightened awareness of the risk of take and a commitment to not only implement the mitigation measures proposed in this rulemaking but to develop additional mitigation measures beyond this rule they find effective and practicable. Because all NMFS Science Centers are dedicated to decreasing gear interaction risk, each Science Center is also committed to sharing information about reducing marine mammal bycatch, further educating fishery researchers on means by which is make best professional judgements and minimize risk of take.

Region-wide, Gulf of Mexico states, in coordination with Federal agencies, are taking action to recover from injury sustained during the DWH spill. Funds from the spill have been allocated specifically for marine mammal restoration to the Florida, Alabama, Mississippi, Louisiana, Texas, Open Ocean, and Region-wide Trustee Implementation Groups (TIGs). In June 2017, the Trustees released their Strategic Framework for Marine Mammal Restoration Activities. The framework includes a number of marine mammal restoration goals which would improve marine mammal populations over the course of the proposed regulations. These goals include, but are

not limited to, (1) collecting and using monitoring information, such as population and health assessments, and spatiotemporal distribution information; (2) implementing an integrated portfolio of restoration approaches to restore injured bay, sound, and estuarine (BSE); coastal; shelf; and oceanic marine mammals across the diverse habitats and geographic ranges they occupy; (3) identifying and implementing actions that support ecological needs of the stocks; (4) improving resilience to natural stressors; and (5) addressing direct human-caused threats such as bycatch in commercial fisheries, vessel collisions, noise, industrial activities, illegal feeding and harassment, and hook-and-line fishery interactions. The Alabama TIG has made the most progress on executing this strategic framework. In 2018, the Alabama TIG committed to three projects designed to restore marine mammals: (1) Enhancing Capacity for the Alabama Marine Mammal Stranding Network; (2) Assessment of Alabama Estuarine Bottlenose Dolphin Populations & Health (including the Mobile Bay stock); and (3) Alabama Estuarine Bottlenose Dolphin Protection: Enhancement & Education.

Offshore Pelagic Stocks

For all offshore pelagic stocks where PBR is known, except for gray seal, the level of taking is less than 10 percent of r-PBR after considering other sources of human-caused mortality (Table 15). Again, for those stocks with total incidental M/SI less than the significance threshold (*i.e.,* ten percent of residual PBR), we consider the effects of the specified activity to represent an insignificant incremental increase in ongoing anthropogenic M/SI and need not consider other factors in making a negligible impact determination except in combination with additional incidental take by acoustic harassment.

TABLE 15—SUMMARY INFORMATION OF PELAGIC STOCKS RELATED TO PROPOSED M/SI TAKE TO THE SEFSC IN THE ARA, GOMRA, AND CRA

Species	Stock	Proposed M/SI take (annual)	PBR	Annual M/SI (SAR)	NEFSC authorized take by M/SI (annual)	r-PBR	Proposed MI/SI take/r-PBR (%)
Risso's dolphin	Western North Atlantic	0.2	126	49.9	0.6	75.5	0.26
	N Gulf of Mexico	0.2	16	7.9	0	8.1	2.47
	Puerto Rico/USVI	0.2	15	0.5	0	14.5	1.38
Melon headed whale	N Gulf of Mexico	0.6	13	0	0	13	4.62
Short-finned pilot whale	Western North Atlantic	0.2	236	168	0	68	0.29
	N Gulf of Mexico	0.2	15	0.5	0	14.5	1.38
	Puerto Rico/USVI	0.2	unk	unk	0	unk	unk
Common dolphin	Western North Atlantic	0.8	557	406	1.4	149.6	0.53
Atlantic spotted dolphin	Western North Atlantic	0.8	316	0	0.4	315.6	0.25
	N Gulf of Mexico	0.8	undet	42	0	unk	unk
	Puerto Rico/USVI	0.2	unk	unk	0	unk	unk
Pantropical spotted dolphin	Western North Atlantic	0.2	17	0	0	17	1.18
	N Gulf of Mexico	0.8	407	4.4	0	402.6	0.20
Striped dolphin	Western North Atlantic	0.6	428	0	0	428	0.14
	N Gulf of Mexico	0.6	10	0	0	10	6.00
Spinner dolphin	Western North Atlantic	0	unk	0	0	unk	.....
	N Gulf of Mexico	0.6	62	0	0	62	0
	Puerto Rico/USVI	0	unk	unk	0	unk	0
Rough-toothed dolphin	Western North Atlantic	0	1.3	0	0	1.3	0
	N Gulf of Mexico	0.2	3	0.8	0	2.2	9.09
Bottlenose dolphin	Western North Atlantic Offshore	0.8	561	39.4	1.6	520	0.15
	N Gulf of Mexico Oceanic	0.8	60	0.4	0	59.6	1.34
	N Gulf of Mexico Continental Shelf	0.8	469	0.8	0	468.2	0.17
	Puerto Rico/USVI	0.2	unk	0	0	unk	unk
Harbor porpoise	Gulf of Maine/Bay of Fundy	0.2	706	437	0	269	0.07
Unidentified delphinid	Western North Atlantic	0.2	—	—	0.6	n/a	n/a
	N Gulf of Mexico	0.2	—	—	0	n/a	n/a
	Puerto Rico/USVI	0.2	—	—	0	n/a	n/a
Harbor seal	Western North Atlantic	0.2	2,006	389	12	1,605	0.01
Gray seal	Western North Atlantic	0.2	1,389	5,688		−4,299	N/A

Gray seals are the only stock where, at first look, annual M/SI is above PBR (Table 15). However, the minimum abundance estimate provided in the SAR is based on the U.S. population estimate of 23,158 and does not include the Canada population. The total estimated Canadian gray seal population in 2016 was estimated to be 424,300 (95% CI=263,600 to 578,300) (DFO 2017). This would be acceptable except that the annual M/SI rate of 5,688 includes M/SI from both the U.S. and Canada populations. Therefore, we should compare population to population. The draft 2018 indicates the annual M/SI for the U.S. population is 878. That equates to an r-PBR of 511. Considering the SEFSC is requesting one take, by M/SI, of gray seal over 5 years (or 0.2 animals per year), this results in a percentage of 0.003, well under the 10 percent insignificance threshold. Further, given the proposed M/SI of one animal over five years, this amount of take can be considered discountable given the large population size.

We note that for all stocks, we have conservatively considered in this analysis that any gear interaction would result in mortality or serious injury when it has been documented that some gear interactions may result in Level A harassment (injury) or no injury at all, as serious injury determinations are not made in all cases where the disposition of the animal is ''released alive'' and, in some cases, animals are disentangled from nets without any injury observations (*e.g.,* no wounds, no blood in water, etc).

Level B Take From Acoustic Sources

As described in greater depth previously (see ''Acoustic Effects''), we do not believe that SEFSC use of active acoustic sources has the likely potential

to result in Level A harassment, serious injury, or mortality. In addition, for the majority of species, the proposed annual take by Level B harassment is very low in relation to the population abundance estimate (less than one percent). We have produced what we believe to be precautionary estimates of potential incidents of Level B harassment (Table 13). The procedure for producing these estimates, described in detail in ''Estimated Take Due to Acoustic Harassment,'' represents NMFS' best effort towards balancing the need to quantify the potential for occurrence of Level B harassment due to production of underwater sound with a general lack of information related to the specific way that these acoustic signals, which are generally highly directional and transient, interact with the physical environment and to a meaningful understanding of marine mammal perception of these signals and occurrence in the areas where the SEFSC operates. The sources considered here have moderate to high output frequencies (10 to 180 kHz), generally short ping durations, and are typically focused (highly directional with narrow beam width) to serve their intended purpose of mapping specific objects, depths, or environmental features. In addition, some of these sources can be operated in different output modes (*e.g.,* energy can be distributed among multiple output beams) that may lessen the likelihood of perception by and potential impacts on marine mammals in comparison with the quantitative estimates that guide our proposed take authorization.

As described previously, there is some minimal potential for temporary effects to hearing capabilities within specific frequency ranges for select marine mammals, but most effects would likely be limited to temporary behavioral disturbance. If individuals are in close proximity to active acoustic sources they may temporarily increase swimming speeds (presumably swimming away from the source) and surface time or decrease foraging effort (if such activity were occurring). These reactions are considered to be of low severity due to the short duration of the reaction. Individuals may move away from the source if disturbed. However, because the source is itself moving and because of the directional nature of the sources considered here, it is unlikely any temporary displacement from areas of significance would occur, and any disturbance would be of short duration. In addition, because the SEFSC survey effort is widely dispersed in space and time, repeated exposures of the same individuals would be very unlikely. For these reasons, we do not consider the proposed level of take by acoustic disturbance to represent a significant additional population stressor when considered in context with the proposed level of take by M/SI for any species. Further, we note no take by harassment is proposed for estuarine bottlenose dolphins; therefore, only M/SI is incorporated into our negligible impact analysis for those stocks. For Level B take of coastal stocks in both the ARA and GOMRA, it is not possible to quantify take per stock given overlap in time and space. However, we consider the anticipated amount of take to have the potential to occur from some combination of coastal stocks.

Summary of Negligible Impact Determination for SEFSC

In summary, we consider the proposed authorization would not impact annual rates or recruitment or survival on any of the stocks considered here because: (1) The possibility of injury, serious injury, or mortality from the use of active acoustic devices may reasonably be considered discountable; (2) the anticipated incidents of Level B harassment from the use of active acoustic devices consist of, at worst, temporary and relatively minor modifications in behavior; (3) the predicted number of incidents of potential mortality are at insignificant levels (*i.e.,* below ten percent of residual PBR) for select stocks; (4) consideration of more detailed data for gray seals do not reveal cause for concern; (5) for stocks above the insignificance threshold, the loss of one animal over five years, especially if it is male (the sex more likely to interact with trawls), is not likely to contribute to measurable changes in annual rates of recruitment or survival; (7) some stocks are subjected to ongoing management actions designed to improve stock understanding and reduce sources of M/SI from other anthropogenic stressors (*e.g.,* BDTRT management actions, pelagic longline TRT); (8) the efforts by the DHW Trustees are designed to restore for injury and address ongoing stressors such as commercial fishery entanglement which would improve stock conditions; (9) implementation of this proposed rule would build upon research designed to reduce fishery related mortality (*e.g.,* NCCOS crap pot/trap and trawl interaction research; HSU lazy line research); and (10) the presumed efficacy of the planned mitigation measures in reducing the effects of the specified activity to the level of least practicable adverse impact.

Based on the analysis contained herein of the likely effects of the specified activity on marine mammals and their habitat, and taking into consideration the implementation of the proposed monitoring and mitigation measures, NMFS preliminarily finds that the total marine mammal take from SEFSC fisheries research activities will have a negligible impact on affected marine mammal species or stocks.

Negligible Impact Analysis and Determination—TPWD

Similar to the SEFSC approach of considering the proposed M/SI take relative to r-PBR, we looked at known M/SI as identified in the SARs (excluding those from the proposed TPWD surveys) to estimate annual rates of M/SI (Table 16). No Level B harassment of estuarine bottlenose dolphins is proposed to be authorized to the TPWD; therefore, our analysis is limited to take by M/SI.

The stocks for which we propose to authorize take by TPWD are grouped in the Gulf of Mexico BSE SAR. Abundance data show all but 2 of the 27 stocks grouped into the SAR are more than 8 years old and, therefore, PBR is undetermined. Similar to the SEFSC, we consulted marine mammal experts at the SEFSC to derive abundance and PBRs for all stocks. Similar to other areas in the Gulf, annual rates of BSE dolphin M/SI are aggregated for the entire state of Texas (which contains seven stocks) in the Gulf of Mexico BSE SAR. Therefore, we again used information, where available, for each stock from the SAR and Southeast Marine Mammal Stranding Database to calculate but are described in text for each of the sources of M/SI (*e.g.* hook and line, crab pot fishery). Two stocks are positively identified in the 2016 SAR (Hayes *et al.,* 2017) as subject to fishing pressure (other than gillnet research for which we are proposing take): The Copano Bay/Aransas Bay/San Antonio Bay/Redfish Bay/Espiritu Santo Bay stock and the Nueces Bay/Corpus Christi Bay stock. For the first stock, in 2010, a calf was disentangled by stranding network personnel from a crab trap line wrapped around its peduncle. The animal swam away with no obvious injuries but was considered seriously injured because it is unknown whether it was reunited with its mother (Maze-Foley and Garrison, 2016). Hayes et al. (2016) also notes hook and line fisheries have taken animals from this stock; however, the exact number of animals is not provided. Therefore, we used the Marine Mammal Stranding Database for more information on these takes and the

Nueces Bay stock because they were implicated in the hook and line takes. For the Copano Bay et al. stock, one animal was a serious injury and two were mortality from hook and line interaction. For the Nueces Bay stock, one animal was taken by mortality in 2010 and one in 2013 from hook and line interaction.

TABLE 16—SUMMARY INFORMATION OF ESTUARINE BOTTLENOSE DOLPHIN STOCKS RELATED TO TPWD GILLNET FISHERY SURVEYS

Stock	Stock abundance (Nbest) [1]	Proposed M/SI take (annual)	PBR [1]	Estimated annual M/SI [2]	Residual PBR [3]	Proposed take/R–PBR (%)
Laguna Madre	80	0.2	0.3	0	0.3	66.67
Nueces Bay, Corpus Christi Bay [4]	150	0.2	1.3	0.4	0.9	22.22
Copano Bay, Aransas Bay, San Antonio Bay, Redfish Bay, Espiritu Santo Bay [5]	250	0.2	2.1	0.8	0.9	22.2
Matagorda Bay, Tres Palacios Bay, Lavaca Bay [6]	150	0.2	1.3	0	1.1	18.18

[1] In all cases, population estimates for these stocks are greater than 8 years old (last survey year was 1992); therefore, abundance and PBR are unknown. We solicited expert opinion of the SEFSC to gather the best available data to generate a population estimate for each stock and then calculated PBR using the estimated N_{best}.

[2] The estimated annual M/SI reflects the estimated M/SI less the takes for which M/SI take authorization is now proposed (*i.e.,* it does not include historical takes from TPWD gillnet fishing). Annual M/SI was derived from the SAR and consulting the NMFS Southeast Marine Mammal Stranding database.

[3] Residual PBR (r-PBR) = PBR—annual M/SI. No other M/SI is authorized for Texas BSE dolphin stocks.

[4] The SEFSC conducted stock structure research (biopsy sampling surveys) from 2012–2014. During the biopsy sampling, photos were taken for photo-ID and 285 individual dolphins with distinct dorsal fins were identified within this stock boundaries (NMFS SEFSC, UNPUBLISHED DATA). The N_{best} and PBR values reflect these data.

[5] The SEFSC conducted stock structure research (biopsy sampling surveys) from 2012–2014. During the biopsy sampling, photos were taken for photo-ID and 524 individual dolphins with distinct dorsal fins were identified within this stock boundaries (NMFS SEFSC, UNPUBLISHED DATA). The N_{best} and PBR values reflect these data.

[6] The SEFSC conducted stock structure research (biopsy sampling surveys) from 2012–2014. During the biopsy sampling, photos were taken for photo-ID and 323 individual dolphins with distinct dorsal fins were identified within this stock boundaries (NMFS SEFSC, UNPUBLISHED DATA). The N_{best} and PBR values reflect these data.

The proposed take exceeds the insignificance threshold (10 percent r-PBR) for all four Texas stocks. However, it does not exceed r-PBR when considering other sources of M/SI for any stock. For two stocks (Laguna Madre and Matagorda Bay, Tres Palacios Bay, Lavaca Bay), there is no other known source of M/SI according to the SAR. The driving factor behind the higher percentages of r-PBR is the small stock size which results in a low PBR. For example, the Laguna Madre stocks has a population estimate of 80 individuals resulting in low PBR (0.3). This is a similar scenario to some of the estuarine stocks for which we propose to issue take to the SEFSC. TPWD would implement mitigation designed to reduce the potential for take, including research investigating the effectiveness of reducing gaps between the lead lines and net. Further, as discussed earlier, dolphins are K-selected species with variable reproductive rates, and estuarine stocks are not discretely closed populations with few animals migrating to and from coastal areas and adjacent waterbodies. The loss of one animal over 5 years is unlikely to result in more than a negligible impact to the stock's recruitment and survival rates.

Based on the analysis contained herein of the likely effects of the specified activity on marine mammals and their habitat, and taking into consideration the implementation of the proposed monitoring and mitigation measures, NMFS preliminarily finds that the total marine mammal take from TPWD's gillnet fishing surveys will have a negligible impact on affected marine mammal species or stocks.

Small Numbers

As noted above, only small numbers of incidental take may be authorized under Section 101(a)(5)(D) of the MMPA for specified activities other than military readiness activities. The MMPA does not define small numbers and so, in practice, where estimated numbers are available, NMFS compares the number of individuals taken to the most appropriate estimation of abundance of the relevant species or stock in our determination of whether an authorization is limited to small numbers of marine mammals. Additionally, other qualitative factors may be considered in the analysis, such as the temporal or spatial scale of the activities.

Small Numbers Analysis—SEFSC

The total amount of take proposed for all estuarine and coastal bottlenose dolphin stocks is less than one percent of each estuarine stock and less than 12 percent of all coastal stocks (Table 17; we note this 12 percent is conservatively high because it considers that all Level B take would come from any given single stock). For pelagic stocks, the total amount of take is less than 13 percent of the estimated population size (Table 18).

TABLE 17—AMOUNT OF PROPOSED TAKING OF ESTUARINE AND COASTAL BOTTLENOSE DOLPHIN STOCKS IN THE ARA AND GOMRA RELATED TO STOCK ABUNDANCE

Stock	Stock abundance (Nbest)	Proposed level B Take	Proposed M/SI take (annual)	Proposed take % population
Atlantic				
Northern South Carolina Estuarine Stock [1]	50	0	0.2	0.40
Charleston Estuarine System Stock [1]	289		0.2	0.07
Northern Georgia/Southern South Carolina Estuarine System Stock [1]	250		0.2	0.08
Central Georgia Estuarine System	192		0.2	0.10
Southern Georgia Estuarine System Stock	194		0.2	0.10
Jacksonville Estuarine System Stock [1]	412		0.2	0.05
Florida Bay Stock [1]	514		0.2	0.04

TABLE 17—AMOUNT OF PROPOSED TAKING OF ESTUARINE AND COASTAL BOTTLENOSE DOLPHIN STOCKS IN THE ARA AND GOMRA RELATED TO STOCK ABUNDANCE—Continued

Stock	Stock abundance (Nbest)	Proposed level B Take	Proposed M/SI take (annual)	Proposed take % population
South Carolina/Georgia Coastal Stock	6,027		0.6	0.01
Northern Florida Coastal Stock	877	110	0.6	12.61
Central Florida Coastal Stock	1,218		0.6	9.08
Northern Migratory Coastal Stock	6,639		0.6	1.67
Southern Migratory Coastal Stock	3,751		0.6	2.95
Gulf of Mexico				
Terrebonne Bay, Timbalier Bay [1]	100	0	0.2	0.20
Mississippi River Delta [1]	332		0.2	0.06
Mississippi Sound, Lake Borgne, Bay Boudreau [3]	3,046		0.2 (M/SI), 0.2 (Level A)	0.01
Mobile Bay, Bonsecour Bay [1]	122		0.2	0.16
St. Andrew Bay [1]	124		0.2	0.16
St. Joseph Bay	152		0.2	0.13
St. Vincent Sound, Apalachicola Bay, St. George Sound [1]	439		0.2	0.05
Apalachee Bay [1]	491		0.2	0.04
Waccasassa Bay, Withlacoochee Bay, Crystal Bay [1]	100		0.2	0.20
Northern Gulf of Mexico Western Coastal Stock	20,161	350	0.6	1.74
Northern Gulf of Mexico Northern Coastal Stock	7,185		0.6	4.88
Northern Gulf of Mexico Eastern Coastal Stock	12,388		0.6	2.83

TABLE 18—AMOUNT OF PROPOSED TAKING OF PELAGIC STOCKS IN THE ARA, GOMRA, AND CRA TO THE SEFSC RELATED TO STOCK ABUNDANCE

Species	Stock	Abundance (Nbest)	Proposed level B take (annual)	Proposed M/SI take (annual)	Total proposed take % population
N Atlantic right whale	Western North Atlantic	451	4	0	0.89
Fin whale	Western North Atlantic	1,618	4	0	0.25
Sei whale	Western North Atlantic	357	4	0	1.12
Humpback whale	Gulf of Maine	896	4	0	0.45
Minke whale	Western North Atlantic	2,591	4	0	0.15
Bryde's whale	Northern Gulf of Mexico	33	4	0	12.12
Sperm whale	North Atlantic	2,288	4	0	0.17
	Northern Gulf of Mexico	763	17	0	2.23
	Puerto Rico/USVI	unk	4	0	unk
Risso's dolphin	Western North Atlantic	18,250	15	0.2	0.08
	N Gulf of Mexico	2,442	10	0.2	0.42
	Puerto Rico/USVI	21,515	10	0.2	0.05
Kogia	Western North Atlantic	3,785	10	0	0.26
	N Gulf of Mexico	186	12	0	6.45
Beaked whales	Western North Atlantic	7,092	9	0	0.13
	N Gulf of Mexico	149	8	0	5.37
Melon headed whale	N Gulf of Mexico	2,235	100	0.6	4.50
Short-finned pilot whale	Western North Atlantic	28,924	48	0.2	0.17
	N Gulf of Mexico	2,415	25	0.2	1.04
	Puerto Rico/USVI	unk	20	0.2	unk
Common dolphin	Western North Atlantic	70,184	268	0.8	0.38
Atlantic spotted dolphin	Western North Atlantic	44,715	37	0.8	0.08
	N Gulf of Mexico	unk	198	0.8	unk
	Puerto Rico/USVI	unk	50	0.2	unk
Pantropical spotted dolphin	Western North Atlantic	3,333	78	0.2	2.35
	N Gulf of Mexico	50,807	203	0.8	0.40
Striped dolphin	Western North Atlantic	54,807	75	0.6	0.14
	N Gulf of Mexico	1,849	46	0.6	2.52
Spinner dolphin	Western North Atlantic	unk	100	0	unk
	N Gulf of Mexico	11,441	200	0.6	1.75
	Puerto Rico/USVI	unk	50	0	unk
Rough-toothed dolphin	Western North Atlantic	136	10	0	7.35
	N Gulf of Mexico	624	20	0.2	3.24
Bottlenose dolphin	Western North Atlantic Offshore	77,532	39	0.8	0.05
	N Gulf of Mexico Oceanic	5,806	100	0.8	1.74
	N Gulf of Mexico Continental Shelf	51,192	350	0.8	0.69
	Puerto Rico/USVI	unk	50	0.2	unk
Harbor porpoise	Gulf of Maine/Bay of Fundy	79,833	0	0.2	0.00

TABLE 18—AMOUNT OF PROPOSED TAKING OF PELAGIC STOCKS IN THE ARA, GOMRA, AND CRA TO THE SEFSC RELATED TO STOCK ABUNDANCE—Continued

Species	Stock	Abundance (Nbest)	Proposed level B take (annual)	Proposed M/SI take (annual)	Total proposed take % population
Unidentified delphinid	Western North Atlantic.	n/a	0	0.2	n/a
	N Gulf of Mexico			0.2	
	Puerto Rico/USVI			0.2	
Harbor seal	Western North Atlantic	75,834	0	0.2	0.00
Gray seal	Western North Atlantic	27,131	0	0.2	0.00

The majority of stocks would see take less than 5 percent of the population taken with the greatest percentage being 12 from Bryde's whales in the Gulf of Mexico. However, this is assuming all takes came from the same stock of beaked whales which is unlikely. Where stock numbers are unknown, we would expect a similar small amount of take relative to population sizes.

Based on the analysis contained herein of the proposed activity (including the proposed mitigation and monitoring measures) and the anticipated take of marine mammals, NMFS preliminarily finds that small numbers of marine mammals will be taken relative to the population size of the affected species or stocks.

Small Numbers Analysis—TPWD

As noted above, only small numbers of incidental take may be authorized under Section 101(a)(5)(A) of the MMPA for specified activities. The MMPA does not define small numbers and so, in practice, where estimated numbers are available, NMFS compares the number of individuals taken to the most appropriate estimation of abundance of the relevant species or stock in our determination of whether an authorization is limited to small numbers of marine mammals. Additionally, other qualitative factors may be considered in the analysis, such as the temporal or spatial scale of the activities.

Table 19 provides information relating to this small numbers analysis for the proposed authorization to TPWD. The total annual amount of taking proposed for authorization is less than one percent for affected Texas estuarine dolphin stocks.

TABLE 19—AMOUNT OF PROPOSED TAKING OF TEXAS BOTTLENOSE DOLPHIN STOCKS RELATIVE TO STOCK ABUNDANCE

Stock	Abundance (Nbest)	Proposed M/SI take (annual)	Proposed take % Population
Laguna Madre [4]	80	0.2	0.25
Nueces Bay, Corpus Christi Bay [5]	150	0.2	0.13
Copano Bay, Aransas Bay, San Antonio Bay, Redfish Bay, Espirtu Santo Bay [6]	250	0.2	0.08
Matagorda Bay, Tres Palacios Bay, Lavaca Bay [7]	150	0.2	0.13

Based on the analysis contained herein of the proposed activity (including the proposed mitigation and monitoring measures) and the anticipated take of marine mammals, NMFS preliminarily finds that small numbers of marine mammals will be taken relative to the population size of the affected species or stocks.

Unmitigable Adverse Impact Analysis and Determination

There are no relevant subsistence uses of the affected marine mammal stocks or species implicated by the issuance of regulations to the SEFSC or TPWD. Therefore, NMFS has determined that the total taking of affected species or stocks would not have an unmitigable adverse impact on the availability of such species or stocks for taking for subsistence purposes.

Adaptive Management

The proposed regulations governing the take of marine mammals incidental to SEFSC fisheries research survey operations contain an adaptive management component which is both valuable and necessary within the context of five-year regulations for activities that have been associated with marine mammal mortality. The use of adaptive management allows OPR to consider new information from different sources to determine (with input from the SEFSC and TPWD regarding practicability) on an annual or biennial basis if mitigation or monitoring measures should be modified (including additions or deletions). The coordination and reporting requirements in this proposed rule are designed to provide OPR with data to allow consideration of whether any changes to mitigation and monitoring is necessary. OPR and the SEFSC or TPWD will meet annually to discuss the monitoring reports and current science and whether mitigation or monitoring modifications are appropriate. Decisions will also be informed by findings from any established working groups, investigations into gear modifications and dolphin-gear interactions, new stock data, and coordination efforts between all NMFS Fisheries Science Centers. Mitigation measures could be modified if new data suggest that such modifications would have a reasonable likelihood of reducing adverse effects to marine mammals and if the measures are practicable. In addition, any M/SI takes by the SEFSC or TPWD and affiliates are required to be submitted within 48 hours to the PSIT database and OPR will be made aware of the take. If there is an immediate need to revisit monitoring and mitigation measures based on any given take, OPR and SEFSC or TPWD would meet as needed.

The following are some of the possible sources of applicable data to be considered through the adaptive management process: (1) Results from monitoring reports, as required by MMPA authorization; (2) results from general marine mammal and sound research; (3) any information which reveals that marine mammals may have been taken in a manner, extent, or

number not authorized by these regulations or subsequent LOAs; and (4) findings from any mitigation research (*e.g.,* gear modification). In addition, developments on the effectiveness of mitigation measures as discovered through research (*e.g.,* stiffness of lazy lines) will inform adaptive management strategies. Finally, the SEFSC–SCDNR working group is investigating the relationships between SCDNR research surveys and marine mammal takes. Any report produced by that working group will inform improvements to marine mammal monitoring and mitigation.

Endangered Species Act (ESA)

On May 9, 2016, NMFS Southeast Regional Office (SERO) issued a Biological Opinion on Continued Authorization and Implementation of National Marine Fisheries Service's Integrated Fisheries Independent Monitoring Activities in the Southeast Region. The Biological Opinion found independent fishery research is not likely to adversely affect the following ESA-listed species: Blue whales, sei whales, sperm whales, fin whales, humpback whales, North Atlantic right whales, gulf sturgeon and all listed corals in the action area. NMFS amended this Biological Opinion on June 4, 2018, updating hearing group information based on the best available science and adding NMFS OPR as an action agency. Similar to the previous finding, the amended Biological Opinion concluded SEFSC independent fishery research is not likely to adversely affect listed marine mammals.

Bottlenose dolphins are not listed under the ESA; therefore, consultation under section 7 of the ESA is not warranted for the issuance of regulations and associated LOA to the TPWD.

Request for Information

NMFS requests interested persons to submit comments, information, and suggestions concerning the NWFSC request and the proposed regulations (see **ADDRESSES**). All comments will be reviewed and evaluated as we prepare final rules and make final determinations on whether to issue the requested authorizations. This notice and referenced documents provide all environmental information relating to our proposed action for public review.

Classification

Pursuant to the procedures established to implement Executive Order 12866, the Office of Management and Budget has determined that this proposed rule is not significant.

Pursuant to section 605(b) of the Regulatory Flexibility Act (RFA), the Chief Counsel for Regulation of the Department of Commerce has certified to the Chief Counsel for Advocacy of the Small Business Administration that this proposed rule, if adopted, would not have a significant economic impact on a substantial number of small entities. The SEFSC and TPWD are the sole entities that would be subject to the requirements in these proposed regulations, and the SEFSC and TPWD are not small governmental jurisdictions, small organizations, or small businesses, as defined by the RFA. Because of this certification, a regulatory flexibility analysis is not required and none has been prepared.

The proposed rule for the SEFSC does not contain a collection-of-information requirement subject to the provisions of the Paperwork Reduction Act (PRA) because the applicant is a Federal agency. However, the TWPD is not a federal agency. Notwithstanding any other provision of law, no person is required to respond to nor shall a person be subject to a penalty for failure to comply with a collection of information subject to the requirements of the PRA unless that collection of information displays a currently valid OMB control number. The proposed rule for TPWD contains collection-of-information requirements subject to the provisions of the PRA. These requirements have been approved by OMB under control number 0648–0151 and include applications for regulations, subsequent LOAs, and reports.

List of Subjects in 50 CFR Part 219

Endangered and threatened species, Fish, Marine mammals, Reporting and recordkeeping requirements, Wildlife.

Dated: February 13, 2019.

Samuel D. Rauch III,

Deputy Assistant Administrator for Regulatory Programs, National Marine Fisheries Service.

For reasons set forth in the preamble, 50 CFR part 219 is proposed to be amended as follows:

PART 219—REGULATIONS GOVERNING THE TAKING AND IMPORTING OF MARINE MAMMALS

■ 1. The authority citation for part 219 continues to read as follows:

Authority: 16 U.S.C. 1361 *et seq.*

■ 2. Add subpart H to part 219 to read as follows:

Subpart H—Taking Marine Mammals Incidental to Southeast Fisheries Science Center Fisheries Research in the Atlantic Ocean, Gulf of Mexico, and Caribbean Sea

Sec.

Subpart H—Taking Marine Mammals Incidental to Southeast Fisheries Science Center Fisheries Research in the Atlantic Ocean, Gulf of Mexico, and Caribbean Sea

§ 219.71 Specified activity and specified geographical region.

(a) Regulations in this subpart apply only to the National Marine Fisheries Service's (NMFS) Southeast Fisheries Science Center (SEFSC) and those persons it authorizes or funds to conduct fishery-independent research surveys on its behalf for the taking of marine mammals that occurs in the area outlined in paragraph (b) of this section and that occurs incidental to SEFSC and partner research survey program operations.

(b) The taking of marine mammals by the SEFSC and partners may be authorized in a 5-year Letter of Authorization (LOA) only if it occurs during fishery research surveys in the Atlantic Ocean, Gulf of Mexico, and Caribbean Sea.

§ 219.72 Effective dates.

Regulations in this subpart are effective from [EFFECTIVE DATE OF FINAL RULE] through [DATE 5 YEARS AFTER EFFECTIVE DATE OF FINAL RULE].

§ 219.73 Permissible methods of taking.

(a) Under a LOA issued pursuant to §§ 216.106 of this chapter and 219.77, the Holder of the LOA (hereinafter ''SEFSC'') may incidentally, but not intentionally, take marine mammals within the areas described in § 219.71 by Level A harassment, serious injury, or mortality associated with fisheries research gear including trawls, gillnets, and hook and line, and Level B harassment associated with use of active acoustic systems provided the activity is in compliance with all terms, conditions, and requirements of the regulations in this subpart and the relevant LOA.

§ 219.74 Prohibitions.

Notwithstanding takings contemplated in § 219.73 and authorized by a LOA issued under §§ 216.106 of this chapter and 219.77, no person in connection with the activities described in § 219.71 may:

(a) Violate, or fail to comply with, the terms, conditions, and requirements of this subpart or a LOA issued under §§ 216.106 of this chapter and 219.77;

(b) Take any marine mammal species or stock not specified in the LOA;

(c) Take any marine mammal in any manner other than as specified in the LOA;

(d) Take a marine mammal specified in such LOA in numbers exceeding those for which NMFS determines results in more than a negligible impact on the species or stocks of such marine mammal; or

(e) Take a marine mammal specified in such LOA if NMFS determines such taking results in an unmitigable adverse impact on the species or stock of such marine mammal for taking for subsistence uses.

§ 219.75 Mitigation requirements.

When conducting the activities identified in § 219.71, the mitigation measures contained in any LOA issued under §§ 216.106 of this chapter and 219.77 must be implemented. These mitigation measures shall include but are not limited to:

(a) *General conditions.* (1) SEFSC shall take all necessary measures to coordinate and communicate in advance of each specific survey with the National Oceanic and Atmospheric Administration's (NOAA) Office of Marine and Aviation Operations (OMAO) or other relevant parties on non-NOAA platforms to ensure that all mitigation measures and monitoring requirements described herein, as well as the specific manner of implementation and relevant event-contingent decision-making processes, are clearly understood and agreed upon;

(2) SEFSC shall coordinate and conduct briefings at the outset of each survey and as necessary between ship's crew (Commanding Officer/master or designee(s), as appropriate) and scientific party in order to explain responsibilities, communication procedures, marine mammal monitoring protocol, and operational procedures;

(3) SEFSC shall coordinate, on an annual basis, with all partners to ensure that requirements, procedures, and decision-making processes are understood and properly implemented.

(4) Where appropriate, SEFSC shall establish and maintain cooperating partner working group(s) to identify circumstances of a take should it occur and any action necessary to avoid future take.

(i) Working groups shall be established if a partner takes more than one marine mammal within 5 years to identify circumstances of marine mammal take and necessary action to avoid future take. Each working group shall meet at least once annually.

(ii) Each working group shall consist of at least one SEFSC representative knowledgeable of the mitigation, monitoring and reporting requirements contained within these regulations, one or more research institution or SEFSC representative(s) (preferably researcher(s) aboard vessel when take or risk of take occurred), one or more staff from NMFS Southeast Regional Office Protected Resources Division, and one or more staff from NMFS Office of Protected Resources.

(5) When deploying any type of sampling gear at sea, SEFSC shall at all times monitor for any unusual circumstances that may arise at a sampling site and use best professional judgment to avoid any potential risks to marine mammals during use of all research equipment.

(6) SEFSC shall implement handling and/or disentanglement protocols as specified in the guidance that shall be provided to survey personnel. At least two persons aboard SEFSC ships and one person aboard smaller vessels, including vessels operated by partners where no SEFSC staff are present, will be trained in marine mammal handling, release, and disentanglement procedures.

(7) For all research surveys using trawl, hook and line, or seine net gear in open-ocean waters (as defined from the coastline seaward), the SEFSC must implement move-on rule mitigation protocol upon observation of any marine mammal other than dolphins and porpoises attracted to the vessel. If marine mammals (other than dolphins or porpoises) are observed within 500 m of the planned location in the 10 minutes before setting gear, or are considered at risk of interacting with the vessel or research gear, or appear to be approaching the vessel and are considered at risk of interaction, the SEFSC shall move on to another sampling location or remain on site but delay gear deployment until the animals departs the area or appears to no longer be at risk of interacting with the vessel or gear. Once the animal is no longer considered a risk, another 10-minute observation shall be conducted. If no marine mammals are observed during this subsequent observation period or the visible animal(s) still does not appear to be at risk of interaction, then the set may be made. If the vessel is moved to a different section of the sampling area, the move-on rule mitigation protocol would begin anew. If, after moving on, marine mammals remain at risk of interaction, the SEFSC shall move again or skip the station. Marine mammals that are sighted further than 500 m from the vessel shall be monitored to determine their position and movement in relation to the vessel to determine whether the move-on rule mitigation protocol should be implemented. The SEFSC may use best professional judgment, in accordance with this paragraph, in making decisions related to deploying gear.

(8) SEFSC shall maintain visual monitoring effort during the entire period of time that trawl, hook and line, and seine net gear is in the water (*i.e.,* throughout gear deployment, fishing, and retrieval). If marine mammals are sighted before the gear is fully removed from the water, SEFSC shall take the most appropriate action to avoid marine mammal interaction. SEFSC may use best professional judgment in making this decision.

(9) If research operations have been suspended because of the presence of marine mammals, SEFSC may resume operations when practicable only when the animals are believed to have departed the area. SEFSC may use best professional judgment in making this determination;

(b) *Trawl and seine survey mitigation.* In addition to the general conditions provided in § 219.75(a), the following measures must be implemented during trawl and seine surveys:

(1) SEFSC shall conduct fishing operations as soon as is practicable upon arrival at the sampling station and prior to other environmental sampling not involving trawl nets.

(2) The SEFSC shall limit tow times to 30 minutes (except for sea turtle research trawls);

(3) The SEFSC shall, during haul back, open cod end close to deck/sorting table to avoid damage to animals that may be caught in gear and empty gear as quickly as possible after retrieval haul back;

(4) The SEFSC shall delay gear deployment if any marine mammals are believed to be at-risk of interaction;

(5) The SEFSC shall retrieve gear immediately if any marine mammals are believed to be entangled or at-risk of entanglement;

(6) Dedicated marine mammal observations shall occur at least 15 minutes prior to the beginning of net deployment. This watch may include

approach to the sampling station. Marine mammal watches should be conducted by systematically scanning the surrounding waters and marsh edge (if visible) 360 degrees around the vessel. If dolphin(s) are sighted and believed to be at-risk of interaction (*e.g.,* moving in the direction of the vessel/gear; moms/calves close to the gear; etc.), gear deployment should be delayed until the animal(s) are no longer at risk or have left the area on their own. If species other than dolphins are sighted, trawling must not be initiated and the marine mammal(s) must be allowed to either leave or pass through the area safely before trawling is initiated. All marine mammal sightings must be logged and reported per 219.76 of this section.

(7) Retrieve gear immediately if marine mammals are believed to be captured/entangled and follow disentanglement protocols.

(8) The SEFSC shall minimize ''pocketing'' in areas of trawl nets where dolphin depredation evidence is commonly observed;

(9) When conducting research under an ESA section 10(a)(1)(A) scientific research permit issued by NMFS, all marine mammal monitoring protocol contained within that permit must be implemented.

(10) SEFSC shall implement standard survey protocols to minimize potential for marine mammal interactions, including maximum tow durations at target depth and maximum tow distance, and shall carefully empty the trawl as quickly as possible upon retrieval. Trawl nets must be cleaned prior to deployment.

(11) The SEFSC shall continue investigation into gear modifications (*e.g.,* stiffening lazy lines) and the effectiveness of gear modification.

(c) *Hook and line (including longline) survey mitigation*—In addition to the General Conditions provided in paragraph(a) of this section, the following measures must be implemented during hook and line surveys:

(1) SEFSC shall deploy hook and line gear as soon as is practicable upon arrival at the sampling station.

(2) SEFSC shall initiate marine mammal watches (visual observation) no less than 30 minutes prior to both deployment and retrieval of longline gear. Marine mammal watches shall be conducted by scanning the surrounding waters with the naked eye and range-finding binoculars (or monocular). During nighttime operations, visual observation shall be conducted using the naked eye and available vessel lighting.

(3) SEFSC shall implement the move-on rule mitigation protocol, as described in § paragraph(a)(6) of this section.

(4) SEFSC shall maintain visual monitoring effort during the entire period of gear deployment and retrieval. If marine mammals are sighted before the gear is fully deployed or retrieved, SEFSC shall take the most appropriate action to avoid marine mammal interaction. SEFSC may use best professional judgment in making this decision.

(5) If deployment or retrieval operations have been suspended because of the presence of marine mammals, SEFSC may resume such operations when practicable only when the animals are believed to have departed the area. SEFSC may use best professional judgment in making this decision.

(6) SEFSC shall implement standard survey protocols, including maximum soak durations and a prohibition on chumming.

§ 219.76 Requirements for monitoring and reporting.

(a) *Compliance coordination.* SEFSC shall designate a compliance coordinator who shall be responsible for ensuring and documenting compliance with all requirements of any LOA issued pursuant to §§ 216.106 of this chapter and 219.77 and for preparing for any subsequent request(s) for incidental take authorization.

(b) *Visual monitoring program.* (1) Marine mammal visual monitoring shall occur prior to deployment of trawl, net, and hook and line gear, respectively; throughout deployment of gear and active fishing of research gears (not including longline soak time); prior to retrieval of longline gear; and throughout retrieval of all research gear.

(2) Marine mammal watches shall be conducted by watch-standers (those navigating the vessel and/or other crew) at all times when the vessel is transiting to avoid ship strike.

(c) *Training.* (1) SEFSC must conduct annual training for all SEFSC and affiliate chief scientists and other personnel who may be responsible for conducting dedicated marine mammal visual observations to explain mitigation measures and monitoring and reporting requirements in the LOA, mitigation and monitoring protocols, marine mammal identification, completion of datasheets, and use of equipment. SEFSC may determine the agenda for these trainings.

(2) SEFSC shall also dedicate a portion of training to discussion of best professional judgment, including use in any incidents of marine mammal interaction and instructive examples where use of best professional judgment was determined to be successful or unsuccessful.

(3) SEFSC shall coordinate with NMFS' Office of Science and Technology to ensure training and guidance related to handling procedures and data collection is consistent with other fishery science centers, where appropriate.

(d) *Handling procedures and data collection.* (1) SEFSC must implement standardized marine mammal handling, disentanglement, and data collection procedures. These standard procedures will be subject to approval by NMFS' Office of Protected Resources (OPR).

(2) For any marine mammal interaction involving the release of a live animal, SEFSC shall collect necessary data to facilitate a serious injury determination.

(3) SEFSC shall provide its relevant personnel with standard guidance and training regarding handling of marine mammals, including how to identify different species, bring an individual aboard a vessel, assess the level of consciousness, remove fishing gear, return an individual to water, and log activities pertaining to the interaction.

(4) SEFSC shall record such data on standardized forms, which will be subject to approval by OPR. SEFSC shall also answer a standard series of supplemental questions regarding the details of any marine mammal interaction.

(e) *Reporting.* (1) Marine mammal capture/entanglements (live or dead) must be reported immediately to the Southeast Region Marine Mammal Stranding Hotline at 1–877–433–8299 and SEFSC and to OPR and NMFS Southeast Regional Office (SERO, 727–551–5780) within 48 hours of occurrence. Also within 48 hours, SEFSC shall log the incident in NMFS' Protected Species Incidental Take (PSIT) database and provide any supplemental information to OPR and SERO upon request. Information related to marine mammal interaction (animal captured or entangled in research gear) must include details of research survey, monitoring conducted prior to interaction, full descriptions of any observations of the animals, the context (vessel and conditions), decisions made, and rationale for decisions made in vessel and gear handling.

(2) Annual reporting:

(i) SEFSC shall submit an annual summary report to OPR not later than ninety days following the end of a given year. SEFSC shall provide a final report within thirty days following resolution of comments on the draft report;

(ii) These reports shall contain, at minimum, the following:

(A) Annual line-kilometers and locations surveyed during which the EK60, ME70, SX90 (or equivalent sources) were predominant and associated pro-rated estimates of actual take;

(B) Summary information regarding use of all trawl, gillnet, and hook and line gear, including location, number of sets, hook hours, tows, etc., specific to each gear;

(C) Accounts of surveys where marine mammals were observed during sampling but no interactions occurred;

(D) All incidents of marine mammal interactions, including circumstances of the event and descriptions of any mitigation procedures implemented or not implemented and why and, if released alive, serious injury determinations;

(E) A written evaluation of the effectiveness of SEFSC mitigation strategies in reducing the number of marine mammal interactions with survey gear, including gear modifications and best professional judgment and suggestions for changes to the mitigation strategies, if any;

(F) A summary of all relevant training provided by SEFSC and any coordination with NMFS Office of Science and Technology and the Southeast Regional Office; and

(G) A summary of meetings and workshops outcomes with the South Carolina Department of Natural Resources designed to reduce the number of marine mammal interactions

(f) *Reporting of injured or dead marine mammals.* (1) In the unanticipated event that the activity defined in § 219.71(a) clearly causes the take of a marine mammal in a prohibited manner, SEFSC personnel engaged in the research activity shall immediately cease such activity until such time as an appropriate decision regarding activity continuation can be made by the SEFSC Director (or designee). The incident must be reported immediately to OPR and SERO. OPR and SERO will review the circumstances of the prohibited take and work with SEFSC to determine what measures are necessary to minimize the likelihood of further prohibited take. The immediate decision made by SEFSC regarding continuation of the specified activity is subject to OPR concurrence. The report must include the information included in paragraph (f)(2) of this section.

(2) SEFSC or partner shall report all injured or dead marine mammals observed during fishery research surveys that are not attributed to the specified activity to the Southeast Regional Stranding Coordinator within 24 hours. If the discovery is made by a partner, the report shall also be submitted to the SEFSC Environmental Compliance Coordinator. The following information shall be provided:

(i) Time, date, and location (latitude/longitude) of the incident;

(ii) Description of the incident including, but not limited to, monitoring prior to and occurring at time of incident;

(iii) Environmental conditions (*e.g.,* wind speed and direction, Beaufort sea state, cloud cover, visibility);

(iv) Description of all marine mammal observations in the 24 hours preceding the incident;

(v) Species identification or description of the animal(s) involved;

(vi) Status of all sound source or gear used in the 24 hours preceding the incident;

(vii) Water depth;

(viii) Fate of the animal(s) (*e.g.,* dead, injured but alive, injured and moving, blood or tissue observed in the water, status unknown, disappeared, etc.); and

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

(3) In the event of a ship strike of a marine mammal by any SEFSC or partner vessel involved in the activities covered by the authorization, SEFSC or partner shall immediately report the information in paragraph (f)(2) of this section, as well as the following additional information:

(i) Vessel's speed during and leading up to the incident;

(ii) Vessel's course/heading and what operations were being conducted,

(iii) Status of all sound sources in use,

(iv) Description of avoidance measures/requirements that were in place at the time of the strike and what additional measures were taken, if any, to avoid strike.

(v) Estimated size and length of animal that was struck;

(vi) Description of the behavior of the marine mammal immediately preceding and following the strike.

§ 219.77 Letters of Authorization.

(a) To incidentally take marine mammals pursuant to these regulations, SEFSC must apply for and obtain an LOA.

(b) An LOA, unless suspended or revoked, may be effective for a period of time not to exceed the expiration date of these regulations.

(c) In the event of projected changes to the activity or to mitigation and monitoring measures required by an LOA, SEFSC must apply for and obtain a modification of the LOA as described in § 219.78.

(d) The LOA shall set forth:

(1) Permissible methods of incidental taking;

(2) Means of effecting the least practicable adverse impact (*i.e.,* mitigation) on the species, its habitat, and on the availability of the species for subsistence uses; and

(3) Requirements for monitoring and reporting.

(e) Issuance of the LOA shall be based on a determination that the level of taking will be consistent with the findings made for the total taking allowable under these regulations.

(f) Notice of issuance or denial of an LOA shall be published in the **Federal Register** within thirty days of a determination.

§ 219.78 Renewals and modifications of Letters of Authorization.

(a) An LOA issued under §§ 216.106 of this chapter and 219.77 for the activity identified in § 219.71(a) shall be renewed or modified upon request by the applicant, provided that:

(1) The proposed specified activity and mitigation, monitoring, and reporting measures, as well as the anticipated impacts, are the same as those described and analyzed for these regulations (excluding changes made pursuant to the adaptive management provision in paragraph (c)(1) of this section), and

(2) OPR determines that the mitigation, monitoring, and reporting measures required by the previous LOA under these regulations were implemented.

(b) For an LOA modification or renewal requests by the applicant that include changes to the activity or the mitigation, monitoring, or reporting (excluding changes made pursuant to the adaptive management provision in paragraph (c)(1) of this section) that do not change the findings made for the regulations or result in no more than a minor change in the total estimated number of takes (or distribution by species or years), OPR may publish a notice of proposed LOA in the **Federal Register**, including the associated analysis of the change, and solicit public comment before issuing the LOA.

(c) An LOA issued under §§ 216.106 of this chapter and 219.77 for the activity identified in § 219.71(a) may be modified by Office of Protected Resources (OPR) under the following circumstances:

(1) *Adaptive management.* OPR may modify or augment the existing mitigation, monitoring, or reporting measures (after consulting with SEFSC regarding the practicability of the modifications) if doing so creates a

reasonable likelihood of more effectively accomplishing the goals of the mitigation and monitoring set forth in the preamble for these regulations.

(i) If, through adaptive management, the modifications to the mitigation, monitoring, or reporting measures are substantial, OPR will publish a notice of proposed LOA in the **Federal Register** and solicit public comment.

(ii) [Reserved]

(2) *Emergencies.* If OPR determines that an emergency exists that poses a significant risk to the well-being of the species or stocks of marine mammals specified in LOAs issued pursuant to §§ 216.106 of this chapter and 219.77, an LOA may be modified without prior notice or opportunity for public comment. Notice would be published in the **Federal Register** within thirty days of the action.

§§ 219.79—219.80 [Reserved]

PART 219—REGULATIONS GOVERNING THE TAKING AND IMPORTING OF MARINE MAMMALS

■ 3. The authority citation for part 219 continues to read as follows:

Authority: 16 U.S.C. 1361 *et seq.*

■ 4. Add subpart I to part 219 to read as follows:

Subpart I—Taking Marine Mammals Incidental to Texas Parks and Wildlife Department Gillnet Fisheries Research in the Gulf of Mexico

Sec.

Subpart I—Taking Marine Mammals Incidental to Texas Parks and Wildlife Department Gillnet Fisheries Research in the Gulf of Mexico

§ 219.81 Specified activity and specified geographical region.

(a) Regulations in this subpart apply only to the Texas Parks and Wildlife Department (TPWD) and those persons acting under its authority during gillnet fishery research surveys for the taking of marine mammals that occurs in the area outlined in paragraph (b) of this section and that occurs incidental to research survey program operations.

(b) The taking of marine mammals by TPWD may be authorized in a 5-year Letter of Authorization (LOA) only if the taking occurs within the following Texas bays: East Matagorda, Matagorda, San Antonio, Aransas, Corpus Christi, upper Laguna Madre and lower Laguna Madre.

§ 219.82 Effective dates.

Regulations in this subpart are effective from [EFFECTIVE DATE OF FINAL RULE] through [DATE 5 YEARS AFTER EFFECTIVE DATE OF FINAL RULE].

§ 219.83 Permissible methods of taking.

Under a LOA issued pursuant to §§ 216.106 of this chapter and 219.87, the Holder of the LOA (hereinafter ''TPWD'') may incidentally, but not intentionally, take marine mammals within the areas described in § 219.81 by Level A harassment, serious injury, or mortality associated with gillnet fisheries research gear provided the activity is in compliance with all terms, conditions, and requirements of the regulations in this subpart and the relevant LOA.

§ 219.84 Prohibitions.

Notwithstanding takings contemplated in § 219.103 and authorized by a LOA issued under §§ 216.106 of this chapter and 219.87, no person in connection with the activities described in § 219.81 may:

(a) Violate, or fail to comply with, the terms, conditions, and requirements of this subpart or a LOA issued under §§ 216.106 of this chapter and 219.87;

(b) Take any marine mammal species or stock not specified in the LOA;

(c) Take any marine mammal in any manner other than as specified in the LOA;

(d) Take a marine mammal specified in such LOA in numbers exceeding those for which NMFS determines results in more than a negligible impact on the species or stocks of such marine mammal; or

(e) Take a marine mammal specified in such LOA if NMFS determines such taking results in an unmitigable adverse impact on the species or stock of such marine mammal for taking for subsistence uses.

§ 219.85 Mitigation requirements.

When conducting the activities identified in § 219.81(a), the mitigation measures contained in any LOA issued under §§ 216.106 of this chapter and 219.87 must be implemented. These mitigation measures shall include but are not limited to:

(a) Only new or fully repaired gillnets shall be used. No holes greater than six inches are permitted.

(b) Upon close approach to the site and prior to setting the net, researchers shall conduct a dedicated observation for marine mammals for 15 minutes. If no marine mammals are observed during this time, the net may be set. If marine mammals are observed during this time or while setting the net, the net shall not be deployed or will be immediately removed from the water until such time as the animals has left the area and is on a path away from the net site.

(c) TPWD shall not set gillnets in dolphin ''hot spots'' defined as grids where dolphins have been taken on more than one occasion or where multiple adjacent grids have had at least one dolphin encounter.

(d) TPWD shall tie the float line/lead line to the net at no more than 4-inch intervals.

(e) Captured live or injured marine mammals shall be released from research gear and returned to the water as soon as possible with no gear or as little gear remaining on the animal as possible. Animals are released without removing them from the water.

(f) At least one person aboard TPWD gillnet vessel shall be trained in NMFS-approved marine mammal handling, release, and disentanglement procedures via attendance at NMFS Highly Migratory Species/Protected Species Safe Handling, Release, and Identification Workshop (*www.nmfs.noaa.gov/sfa/hms/compliance/workshops/protected_species_workshop/index.html*) or other similar training.

(g) Each TPWD gillnet researcher shall be familiar with NMFS Protected Species Safe Handling and Release Manual.

§ 219.86 Requirements for monitoring and reporting.

(a) *Marine mammal monitoring.* TPWD shall monitor for marine mammals upon 0.5 miles from sampling site and for 15 minutes at sampling site prior to setting the net. Should a marine mammal be observed within 0.5 miles of the site and is on a path toward the site, the net will not be deployed. The net may only be deployed if marine mammals are observed on a path away from the site consistently for 15 minutes or are not re-sighted within 15 minutes. Should a marine mammal be observed within 0.5 miles of the site and is on a path toward the site, the net will not be deployed. Should a marine mammal be observed during the 15-minute observation period at the site, the net shall not be deployed. The net may only be deployed if marine mammals are observed on a path away from the site

consistently for 15 minutes or are not re-sighted within 15 minutes.

(b) *Reporting of injured or dead marine mammals.* (1) In the unanticipated event that the activity defined in § 219.81(a) clearly causes the take of a marine mammal in a prohibited manner, NMFS Office of Protected Resources (OPR) and NMFS Southeast Regional Office (SERO). TPWD shall not set any more nets until such time as an appropriate decision regarding activity continuation can be made by NMFS OPR and SERO. OPR and SERO will review the circumstances of the prohibited take and work with SEFSC to determine what measures are necessary to minimize the likelihood of further prohibited take. The report must include the information included in paragraph (b)(2) of this section, details of research survey, monitoring conducted prior to interaction, full descriptions of any observations of the animals, the context (vessel and conditions), decisions made, and rationale for decisions made in vessel and gear handling.

(2) TPWD shall report all injured or dead marine mammals observed during fishery research surveys that are not attributed to the specified activity to the Southeast Regional Stranding Coordinator within 24 hours. The following information shall be provided:

(i) Time, date, and location (latitude/longitude) of the incident;

(ii) Description of the incident including, but not limited to, monitoring prior to and occurring at time of incident;

(iii) Environmental conditions (*e.g.,* wind speed and direction, Beaufort sea state, cloud cover, visibility);

(iv) Description of all marine mammal observations in the 24 hours preceding the incident;

(v) Species identification or description of the animal(s) involved;

(vi) Status of all sound source or gear used in the 24 hours preceding the incident;

(vii) Water depth;

(viii) Fate of the animal(s) (*e.g.* dead, injured but alive, injured and moving, blood or tissue observed in the water, status unknown, disappeared, etc.); and

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

(c) *Annual reporting.* (1) TPWD shall submit an annual summary report to OPR not later than ninety days following the end of the fall sampling season. TPWD shall provide a final report within thirty days following resolution of comments on the draft report.

(2) These reports shall contain, at minimum, the following:

(i) Locations and time/date of all net sets;

(ii) All instances of marine mammal observations and descriptions of any mitigation procedures implemented or not implemented and why;

(iii) All incidents of marine mammal interactions, including all information required in paragraph (b) of this section;

(iv) A written evaluation of the effectiveness of TPWD mitigation strategies in reducing the number of marine mammal interactions with survey gear, including gear modifications and best professional judgment and suggestions for changes to the mitigation strategies, if any;

(v) A summary of all relevant marine mammal training and any coordination with OPR and SERO.

§ 219.87 Letters of Authorization.

(a) To incidentally take marine mammals pursuant to these regulations, SEFSC must apply for and obtain an LOA.

(b) An LOA, unless suspended or revoked, may be effective for a period of time not to exceed the expiration date of these regulations.

(c) In the event of projected changes to the activity or to mitigation and monitoring measures required by an LOA, TPWD must apply for and obtain a modification of the LOA as described in § 219.88.

(d) The LOA shall set forth:

(1) Permissible methods of incidental taking;

(2) Means of effecting the least practicable adverse impact (*i.e.,* mitigation) on the species, its habitat, and on the availability of the species for subsistence uses; and

(3) Requirements for monitoring and reporting.

(e) Issuance of the LOA shall be based on a determination that the level of taking will be consistent with the findings made for the total taking allowable under these regulations.

(f) Notice of issuance or denial of an LOA shall be published in the **Federal Register** within thirty days of a determination.

§ 219.88 Renewals and modifications of Letters of Authorization.

(a) An LOA issued under §§ 216.106 of this chapter and 219.87 for the activity identified in § 219.81(a) shall be renewed or modified upon request by the applicant, provided that:

(1) The proposed specified activity and mitigation, monitoring, and reporting measures, as well as the anticipated impacts, are the same as those described and analyzed for these regulations (excluding changes made pursuant to the adaptive management provision in paragraph (c)(1) of this section); and

(2) OPR determines that the mitigation, monitoring, and reporting measures required by the previous LOA under these regulations were implemented;

(b) For an LOA modification or renewal requests by the applicant that include changes to the activity or the mitigation, monitoring, or reporting (excluding changes made pursuant to the adaptive management provision in paragraph (c)(1) of this section) that do not change the findings made for the regulations or result in no more than a minor change in the total estimated number of takes (or distribution by species or years), OPR may publish a notice of proposed LOA in the **Federal Register**, including the associated analysis of the change, and solicit public comment before issuing the LOA.

(c) An LOA issued under §§ 216.106 of this chapter and 219.87 for the activity identified in § 219.71(a) may be modified by Office of Protected Resources (OPR) under the following circumstances:

(1) *Adaptive Management.* OPR may modify or augment the existing mitigation, monitoring, or reporting measures (after consulting with SEFSC regarding the practicability of the modifications) if doing so creates a reasonable likelihood of more effectively accomplishing the goals of the mitigation and monitoring set forth in the preamble for these regulations.

(i) If, through adaptive management, the modifications to the mitigation, monitoring, or reporting measures are substantial, OPR will publish a notice of proposed LOA in the **Federal Register** and solicit public comment.

(ii) [Reserved]

(2) *Emergencies.* If OPR determines that an emergency exists that poses a significant risk to the well-being of the species or stocks of marine mammals specified in LOAs issued pursuant to §§ 216.106 of this chapter and 219.87, an LOA may be modified without prior notice or opportunity for public comment. Notice would be published in the **Federal Register** within thirty days of the action.

§ 219.89–219.90 [Reserved]

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