STATE OF ALABAMA
DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES
MARINE RESOURCES DIVISION
POST OFFICE BOX 189
DAUPHIN ISLAND, ALABAMA 36528
TEL (251) 861-2882
FAX (251) 861-8741
marine.resources@dcnr.alabama.gov

Our mission is to manage the State's marine fishery resources through research, enforcement, and education for the maximum benefit of the resources and the citizens of Alabama.

M. Scott Bannon
Director
MARINE RESOURCES DIVISION

April 12, 2024

Jolie Harrison
Division Chief
Permits and Conservation Division
Office of Protected Resources
NOAA Fisheries
1315 East-West Highway, F/PR1 Room 13805
Silver Spring, MD 20910

Re: Application submission for the Incidental Take Authorization of Bottlenose Dolphins for Alabama Department of Conservation and Natural Resources (ADCNR) Marine Resources Division (MRD) Field Activities

Ms. Jolie Harrison,

A request for an incidental take authorization under section 101(a)(5) of the Marine Mammal Protection Act of 1972, as amended, for the take of bottlenose dolphins incidental to field sampling activities conducted by ADCNR MRD staff was emailed to PR.ITP.applications@noaa.gov. The activities listed in the application are needed to manage and monitor marine resources, primarily finfish. Because these activities have the potential to cause incidental take of bottlenose dolphins, we are requesting the promulgation of Incidental Take Regulations and a Letters of Authorization.

We look forward to working with you and your staff to answer any questions you may have about this application. Please feel free to contact Mr. Chase Katechis (chase.katechis@dcnr.alabama.gov, (251) 968-9732), if you have additional questions. The application was prepared with assistance from Mr. Darren Ireland (direland@lgl.com) at LGL Ecological Research Associates, LLC.

Sincerely,

M. Scott Bannon, Director
Marine Resources Division

cc: Mr. Kevin Anson
Mr. Chase Katechis

Petition for Promulgation of Regulations and Request for Letter of Authorization Pursuant to Section 101(a)(5) of the Marine Mammal Protection Act for the Take of Marine Mammals Incidental to the Fisheries-Independent Monitoring Program by the Alabama Department of Conservation and Natural Resources

Submitted To:

National Marine Fisheries Service
Office of Protected Resources
Silver Spring, MD

Submitted By:

Alabama Department of Conservation and Natural Resources (DCNR)

Prepared By:

LGL Ecological Research Associates, Inc.

LGL Document TX702

April 2024

TABLE OF CONTENTS

Page

LIST OF FIGURES

Page

LIST OF TABLES

Page

NATURE OF THE REQUEST

The Alabama Department of Conservation and Natural Resources (DCNR), pursuant to Section 101(a)(5) of the Marine Mammal Protection Act (MMPA), 16 United States Code (USC) §1371(a)(5); 50 Code of Federal Regulations (CFR) §216, Subpart I, petitions the National Marine Fisheries Service (NMFS) to promulgate incidental take regulations (ITRs) for takes of marine mammals incidental to its fisheries-independent monitoring (FIM) program in inshore and coastal waters of Alabama for a 5-year period pending approval of the letter of authorization (LOA) expected to be final in 2024. By conducting the FIM program, the DCNR produces scientific information necessary for the management and conservation of living marine resources in that area.

The regulations sought would allow the incidental, but not intentional, "taking" of one species of marine mammal under the jurisdiction of NMFS, namely the common bottlenose dolphin (*Tursiops truncatus truncatus*). This is the only species expected to occur in the proposed project area in Mobile Bay and adjacent waters. Bottlenose dolphins regularly occur in the region throughout the year. The DCNR has proposed monitoring and mitigation measures to reduce the likelihood of impacts to marine mammals during the planned activities. Potential impacts of the planned fishing activities are most likely to result from equipment such as nets that are placed in the water. However, the DCNR does not anticipate that activities will result in the "taking" of significant numbers of marine mammals. Accordingly, this Petition has been filed for the purpose of ensuring that the activities described herein are conducted in compliance with the MMPA when marine mammals are taken incidentally and unintentionally during the course of FIM survey work.

The items required to be addressed pursuant to 50 C.F.R. § 216.104, "Submission of Requests", are set forth below. They include descriptions of the specific activities to be conducted, the marine mammals occurring in the project area, proposed measures to mitigate against any potential injurious effects on marine mammals, and a plan to monitor any behavioral effects of the activities on those marine mammals.

INFORMATION SUBMITTED IN ACCORDANCE WITH 50 CFR §216.104

NMFS regulations governing the issuance of Incidental Take Regulations (ITRs) and Letters of Authorization (LOAs) authorizing incidental takes under certain circumstances are codified at 50 CFR Part 216, Subpart I (216.101 – 216.106). Section 216.104 sets out 14 specific items that must be addressed in requests for rulemaking pursuant to Section 101(a) (5) of the MMPA. Each of these items is addressed below.

1 DESCRIPTION OF SPECIFIED ACTIVITY

The DCNR proposes to continue their FIM survey work throughout the inshore and coastal waters of Alabama, in the northern Gulf of Mexico (GoM), to produce scientific information necessary for the management and conservation of living marine resources in that area. Locations of previous FIM sampling are shown in Figure 1 to provide context to where the proposed activities are likely to occur. Table 1 describes the proposed DCNR activities, general areas of operation, gear, and equipment during the 5-year ITR period. During this period, the need for additional surveys could arise, or some of the identified surveys could be eliminated or reduced in effort. Therefore, activities described in this application are not specifically limited to the surveys shown in Table 1 but would use similar gear and would be similar in scope and area of activity. The vessels listed in Table 1 that may be used to conduct the various activities are further described in Table 2. A breakdown of gear type and number of times it is expected to be used during each FIM activity is shown in Table 3.

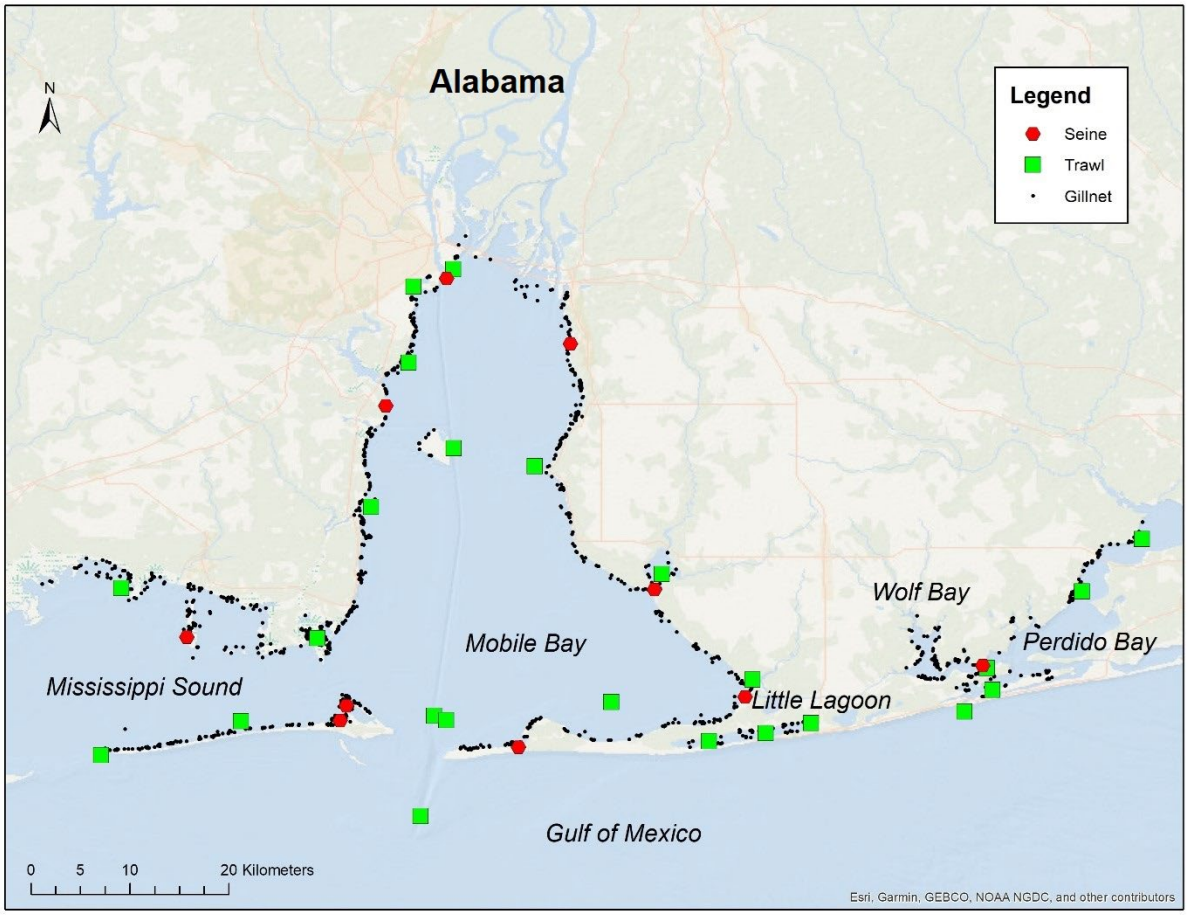

FIGURE 1. Map of the project area in Alabama showing locations of past fisheries-independent monitoring sampling locations. Black dots represent gillnet sets made between 2018 and 2022, red hexagons indicate beach seine sampling stations in 2021, and green squares are trawl sampling stations in 2021.

Although plankton tows using a beam trawl have been conducted in the past by the DCNR, these are not expected to occur in the future. If they were, they would be unlikely to take marine mammals. In the sections below, we also provide a brief summary of potential future modifications to existing activities (e.g., lower effort otter trawls, oyster tongs).

1.1 Project Components

TABLE 1. Summary of DCNR FIM activities. Activities that have the potential to interact with marine mammals are highlighted gray.

Activity/ Survey Name	Purpose/ Need	General Area of Operation	Season/ Frequency	Potential Vessel to Be Used	Gear Type	Gear Details	Number of Samples
Fishery-Independent Gillnet Sampling	Monitors fish populations in Alabama coastal waters.	Mississippi Sound, Mobile Bay, Perdido Bay, Wolf Bay, and Little Lagoon	Year-round sampling each month	Buskens, Striker, SeaArk, Nautic Star	Large and small mesh multi-panel gillnet	Small mesh nets: 8 ft x 750 ft composed of five 150 ft sections with 2 to 4 in. stretch mesh. Large mesh nets: 8 ft x 600 ft composed of four 150 ft panels with 4.5 to 6 in. mesh by 1/2 in. increments.	Target of 240 1-hr sets/year. Half of sets are made with small mesh, and half with large mesh nets.
Fishery-Independent Beach Seines	Helps determine the status of populations of marine organisms throughout Alabama coastal waters.	Mississippi Sound, Mobile Bay, Perdido Bay, Wolf Bay, and Little Lagoon	Year-round sampling each month	Nautic Star, Sea Ark, Striker, Buskens, Cape Horn	Seine	50-ft seine with 3/16 in. Nylon-coated mesh pulled from 60 ft offshore to the beach.	Target of 120 seines/year.
Fishery-Independent Trawls	Helps determine the status of populations of marine organisms throughout Alabama coastal waters.	Mississippi Sound, Mobile Bay, Perdido Bay, Wolf Bay, Little Lagoon, and Alabama's territorial sea	Year-round sampling each month	Bio 1, Parker, Nautic Star, Buskens	Otter trawl, in-situ water quality instrument	16-ft otter trawl with 1 3/8 in. Nylon-coated rope webbing and a 3/16 in. liner inside the bag towed at 2-2.5 knots. 10-min. tows.	Target of 288 tows/year with 24 tows/month.
Outreach Event Trawls	Collection of marine organisms kept for outreach events/touch tanks.	Mississippi Sound, Mobile Bay, Perdido Bay, Wolf Bay, Little Lagoon, and Alabama's territorial sea	Year-round, concentrated around public events	Buskens, Nautic Star	Otter trawl	16-ft otter trawl with 1 3/8 in. Nylon-coated rope webbing and a 3/16 in. liner inside the bag towed at 2 to 2.5 knots; 10-min. tows.	Target of 480 tows/year; in the past five years, effort ranged from 96 to 432 tows/year.

Activity/ Survey Name	Purpose/ Need	General Area of Operation	Season/ Frequency	Potential Vessel to Be Used	Gear Type	Gear Details	Number of Samples
National Coastal Condition Assessment (NCCA) Fish Tissue Sampling	Collection of fish tissue samples. These data are used by the Alabama Department of Environmental Management (ADEM) in completing their contribution to the NCCA report.	Mississippi Sound, Mobile Bay, Perdido Bay, Wolf Bay, and Little Lagoon	Every 5 years, late spring through July	Nautic Star, Sea Ark, Striker, Buskens, Cape Horn, Bio1, Parker	Gillnet, otter trawl, and hook and line fishing	See fishery-independent gillnet and otter trawl gear descriptions. Also, hook and line fishing with natural (live and dead) bait pieces and artificial lures.	NCCA sampling is estimated to be ~10 days of effort over 3 months from May to July. Sampling effort occurs at up to 20 sites for up to 20 1-hr gillnets, 100 10-min. trawls, and 20 hours of hook and line fishing.
Hatchery Brood Stock Fishing Collections	Shoreline and boat hook and line fishing efforts to collect broodstock for the state's marine stocking program.	Mississippi Sound, Mobile Bay, Perdido Bay, Wolf Bay, Little Lagoon, and Alabama's territorial sea	Year-round	Buskens, Nautic Star, and Flats Cat	Hook and line fishing	Hook and line fishing with (live and dead) bait pieces and artificial lures.	Two anglers/day fishing up to 6 hr/day (144 hr).
Hydrologic Sampling	Sampling collects environmental data from the bottom at specific inshore reefs and other specified locations.	Mississippi Sound, Mobile Bay, Perdido Bay, Wolf Bay, and Little Lagoon	Year-round sampling each month	Nautic Star, Sea Ark, Striker, Buskens, Cape Horn	Iin-situ water quality instrument	PVC capsule is dropped to the bottom to collect water then raised to the surface. Water quality parameters are measured immediately with a YSI© multiparameter meter.	Water samples are collected 108 times/year or ~9 times/month for hydro sampling only locations; samples also collected at 288 fishery-independent trawl site.
Continuous Water Quality Sonde Monitoring	Long-term monitoring of water quality parameters at stationary piling locations.	Mobile Bay and Mississippi Sound	Year-round	Nautic Star, Parker, Sea Ark, Bio 1, Bathymetry	YSI© Exo Multiparameter Sonde	A long ~5-in. diameter PVC tube with large, drilled holes is attached to inshore reef pilings. A multi-parameter data sonde is secured and suspended inside the tube and logs water quality parameters.	Sonde retrievals and deployments are expected to occur up to 40 times/year. Sonde exchanges happen every 2 to 4 weeks. Up to 4 sondes will be mounted in different locations.

Activity/ Survey Name	Purpose/ Need	General Area of Operation	Season/ Frequency	Potential Vessel to Be Used	Gear Type	Gear Details	Number of Samples
Habitat Mapping with Multibeam Sonar	Data used to map artificial reef material; evaluate sedimentation patterns across natural oyster reefs; and evaluate bathymetry over time.	Mississippi Sound, Mobile Bay, Perdido Bay, Wolf Bay, Little Lagoon, and Alabama's territorial sea	Typically, during spring, summer, and early fall	Bathymetry	R2Sonic 2022 Multibeam Sonar	The multibeam sonar transducer is mounted to a davit on the port side of the vessel ~30 cm below the waterline. The multibeam sonar can operate at frequencies of 170 kHz-450 kHz; so far, all surveys have used 400 kHz.	~5 days each year totaling ~25 hr of active sonar usage per year.
Habitat Mapping with Side Scan Sonar	Side scan sonar data assists with identification of ecologically sensitive habitat, water bottoms suitable for restoration/enhancement activities, and to monitor existing artificial reefs and oyster reef habitats.	Mississippi Sound, Mobile Bay, Perdido Bay, Wolf Bay, Little Lagoon, and Alabama's territorial sea	Typically, during Spring, Summer, and early fall	Geo Catamaran	Klein® 3000H digital side scan sonar	A bow mount is used in waters less than 15 m in depth. The towfish is pulled behind the vessel on a cable at ~10 m above the seabed in water >15 m deep. The sonar is dual frequency: 100 kHz, 500 kHz	~5 days/year totaling 25 hr of active sonar usage/year.
Oyster Monitoring Dive Quadrats	Assesses oyster populations, also used for monitoring of cultch plantings and cultivated sites to estimate spat settlement rates.	Mobile Bay and Mississippi Sound	Typically, June to August each year	Nautic Star, Parker	SCUBA oyster quadrats	A 300 ft line with 10 burlap sacks attached is laid on the bottom. Scuba divers collect all cultch within a 1 yd^2 quadrat by hand and place it in the sacks.	Between 150 and 250 (average 189) 1-yd^2 quadrats/year.
Oyster Monitoring Patent Tongs	Patent tongs will be used in 2024 to assess oyster populations. After side-by-side surveys with quadrat sampling, it is anticipated that annual reef samples will be collected.	Mobile Bay and Mississippi Sound	Typically, June to August each year	Oyster Barge	Hydraulic patent tongs	Hydraulic patent tongs will be deployed over side of survey vessel via winch, activated to close and collect reef material and brought back on board the vessel. The aperture of the tongs is ~0.25 m^2.	Between 150 and 250 samples/year. The aperture for the patent tongs will collect ~0.25 m^2.

Activity/ Survey Name	Purpose/ Need	General Area of Operation	Season/ Frequency	Potential Vessel to Be Used	Gear Type	Gear Details	Number of Samples
Oyster Monitoring Hand Dredge	Conducted in conjunction with quadrat/patent tong surveys to spot check reef material on specific reefs.	Mobile Bay and Mississippi Sound	Typically, June to August each year	Nautic Star, Parker	Hand dredge	The hand dredges are small 1-toothed with a 1 $in.^2$ wire mesh bag (20-in. wide at the tooth, ~8 kg). They are towed for 90 seconds behind the vessel. Length of the tow line is ~3:1 line to depth. It is then pulled back on board and the sample is processed onboard.	10 to 40 hand dredge samples per 100 acres of inshore oyster reef; 300/year.
Finfish Stocking	Stocking of hatchery-raised fingerling fish.	Mississippi Sound, Mobile Bay, Perdido Bay, Wolf Bay, and Little Lagoon	Typically, March to October	Flats Cat	N/A	Fish stocking tank mounted to the boat with oxygen aeration onboard. Fish are released through a siphon hose while vessel idles in water less than 4 ft deep.	Four stocking events/year.

Notes: "~" means "approximately". ppt = parts per thousand. min. = minute. in. = inch. hr = hour.

TABLE 2. Description of vessels used by DNR to conduct FIM surveys.

Vessel Name	Year Built	Vessel Manufacturer	Vessel Length (ft)	Outboard (Y/N)	Engine Manufacturer	Number of Engines	Engine Size (horsepower)
Buskens	1986	Buskens	21	Y	Yamaha	1	150
Bio 1	2006	PSI	27	Y	Yamaha	2	150
Cape Horn	1997	Cape Horn	17	Y	Yamaha	1	115
Bathymetry	2006	Silverships Custom	32	Y	Suzuki	2	325
Geo Catamaran	2011	Geo Shipyard	32	Y	Yamaha	2	300
Striker	2007	PSI	23	Y	Yamaha	1	200
Nautic Star	2008	Nautic Star	20	Y	Yamaha	1	150
Parker	2011	Parker	25	Y	Yamaha	2	115
Sea Ark	2015	SeaArk	20	Y	Yamaha	2	50
Oyster Barge	2012	Endurance	45	Y	Yamaha	2	250
Flats Cat	2011	Flats Cat	21	Y	Yamaha	1	150

TABLE 3. Types of FIM surveys and the mean number of samples collected annually by gear type.

Survey / Gear Type	Gillnet (1 hr sets)	Otter Trawl (10 min. trawls)	Beach Seine (60 ft tows)	Hook and Line (Angler hours)
Fishery Independent Sampling	240	288	120	—
Fish Tissue Sampling*	20	100	—	20
Outreach and Education	—	480	—	—
Hatchery Broodstock Collection	—	—	—	144
Total	**260**	**868**	**120**	**164**

Notes:

* Fish tissue sampling only occurs once every five years, so the totals will be lower in most years.

— not applicable

1.2 Activities with Potential Incidental Take of Marine Mammals

The activities with potential to take marine mammals are described here. To minimize risk of encounters with marine mammals that may occur in the project area, the DCNR implements monitoring and mitigation measures which are described in detail in Sections 11 and 13.

1.2.1 Fishery-Independent Monitoring Program (FIM)

The FIM program uses sampling gear including gillnets, seines, and otter trawls to assess marine organisms in different habitats and trophic levels and provides data about post-larval, juvenile, and adult populations of marine organisms in Alabama inshore and coastal waters. The collective data is used by fisheries scientists to monitor growth, seasonal and geographical distribution, changes in population structures, and correlation of abundance with some abiotic factors for all Alabama marine fauna. The FIM program includes fishery-independent gillnets, trawls, seines, and hydrologic sampling. Only fishery-independent gillnets, trawls, and seines are described here, as they are the only activities that have a higher likelihood of impacting marine mammals. Hydrologic sampling is described in section 1.3.1.

Fishery-Independent Gillnet Sampling

Fishery-independent gillnet sampling is used to monitor fish populations in Alabama coastal waters and aids managers in the decision-making regarding gear regulations, catch limits, and lengths limits to ensure self-sustaining populations of fishes. Gillnet sampling is conducted with two multi-panel gillnets a 'small mesh' and a 'large mesh' net. Small mesh nets are 8 ft wide and 750 ft long and are composed of five 150 ft sections with mesh sizes that increase at 1/2-in. increments, starting at 2-in. mesh and ending at 4-in. mesh. Small mesh gillnets are typically set perpendicular to shore. Large mesh gillnets are 8 ft wide and 600 ft long and composed of four 150 ft long panels with mesh sizes increasing in 1/2-in. intervals, starting at 4.5-in. mesh and ending at 6-in. mesh. Large mesh gillnets are usually set parallel to the shoreline. All gillnet sampling occurs in depths less than 8 ft.

Once fully deployed, net sets are typically 1-hr long but can ranged from 30 to 60 min. The gear is tended by staff while deployed. Months with the highest effort (up to 26 net sets) occur during the spring, summer, and fall; gillnet sampling effort is less during the winter months, with 8 large mesh and 8 small mesh sets a month during December–March. The number of sets completed each month are predetermined on a pattern, but the 'subarea' they are set in is stratified randomly (e.g., 3A,2C,1D, see Figure 2). Net set effort over the last 5 years ranged from 234 to 251 sets per year. Gillnet sampling sites for 2018–2022 are shown in Figure 1.

Fishery-Independent Beach Seines

Seine hauls are used to target juvenile life stages of various marine organisms utilizing shoreline habitats. Seining is conducted by two samplers. The seine is 50-ft wide with 3/16 in. Nylon-coated mesh, each end of the net is attached to a 6-ft pole. Samplers carry the seine into the water to a location 60 ft from the shoreline. There they unfurl the seine net and each sampler drags one side of the opened net towards the shoreline while keeping the bottom of the net in contact with the substrate. When the shoreline is reached, the net is dragged onto the shore, and all specimens are collected from the net and placed into sampling bags for freezing/analysis. If any of the specimens collected are listed under the Endangered Species Act (ESA), the specimen is identified, enumerated, measured, weighed, and recorded on the hydrologic data sheet for the appropriate site and returned alive to the water. The target sampling effort for seines is 120 sets/year; all sampling occurs in depths less than 5 ft.

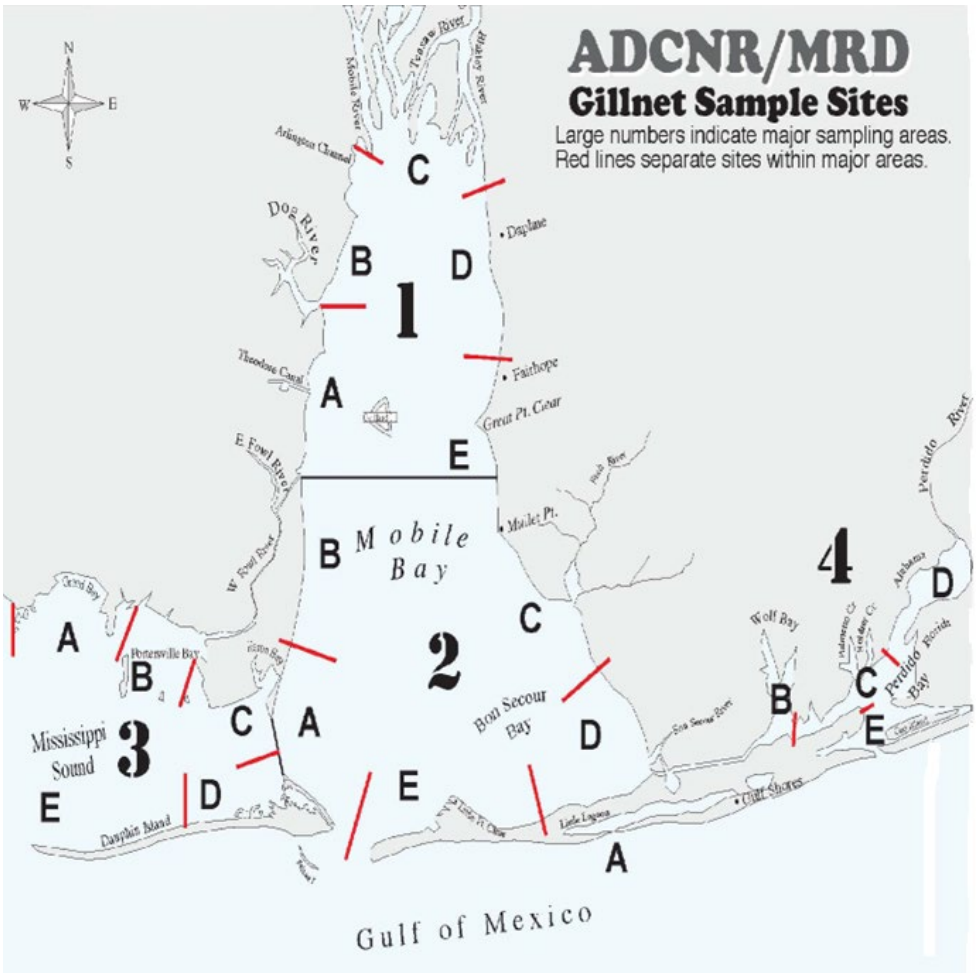

FIGURE 2. Gillnet sampling areas 1-4 and subsampling areas A-E.

Fishery-Independent Trawls

Otter trawls are used to target juvenile and adult stages of finfish and invertebrates occurring within deeper waters. Sampling is typically accomplished as early in the month as possible to allow for equipment, personnel, and weather delays. Sampling days are generally designated by area: Mississippi Sound including Petit Bois Pass, Upper Mobile Bay, and Lower Mobile Bay including Mobile Pass, Perdido system including Perdido Pass, Little Lagoon, and the territorial sea. Selection of the sampling area will depend on weather and sea conditions. If weather permits, sampling will begin as early as possible in the day. Once the sampling area is selected, a logical station order will be determined according to weather conditions.

Upon arriving at each station, the trawl is examined for twists and other fouling problems (at stations over 30 ft in depth, extra line is added to the trawl to ensure proper gear deployment). With the boat at idle speed, the trawl is set out cod end first, followed by the net being fed out to the doors which are set so they are uncrossed and not twisted. The bridle and tow lines (100 ft) are fed out with constant, light tension until all line is out and then boat speed increases to 2–2.5 kts. This is considered the start of trawling and the time is recorded. After 10 min., the trawl is retrieved. Personnel observe the doors, head rope, bottom rope,

and cod end during retrieval to assess if the gear is fouled. In the event of fouled gear, the catch is discarded, and additional trawls are conducted until a correct sampling event is achieved. Once a 'good' trawl is back on board, the cod end is emptied onto the sorting table or tub and trash is removed. The sample is then placed into a Ziploc bag and labeled to indicate the date and sample site. The trawl and liner are examined for any gilled or stuck specimens, which, if present, are removed and added to the sampling bag for later freezing/analysis. If any of the specimens collected are listed under the ESA, or if it is too large to transport back to the laboratory, the specimen is identified, enumerated, measured, weighed, and recorded on the hydrologic data sheet for the appropriate site and returned alive to the water.

Fishery-independent trawling is conducted using a 16-ft wide otter trawl. The trawl is constructed of Nylon-coated rope webbing with 1 3/8 in. mesh and contains a 3/16 in. mesh liner inside the bag. The otter trawl is lowered from the stern of the research vessel and towed along the bottom at speeds of 2–2.5 knots. The maximum depth sampled by trawls is 50 ft. Each tow lasts 10-min.; 24 tows are conducted each month for a target of 288 tows/year. During 2021 and 2022, 288 and 286 tows were completed, respectively.

1.2.2 Outreach Otter Trawls

Outreach trawling is conducted before public events to collect marine organisms, which are kept for educational display at education or outreach events, or for touch tanks. The gear and methods used for outreach trawls are mostly identical to those used in FIM trawls. A 16-ft otter trawl is towed at 2–2.5 knots for 10 min. Total effort varies each year and ranged from 96 to 432 tows/year over the past 5 years.

1.2.3 National Coastal Condition Assessment (NCCA) Fish Tissue Sampling

NCCA fish tissue sampling consists of the collection of fish tissue samples from specific coastal fish species. These data assist the Alabama Department of Environmental Management (ADEM) in completing their contribution to the NCCA report. The survey occurs once every 5 years. Fish collections are made with gillnets, otter trawls, and hook and line fishing. See the FIM gillnet and otter trawl gear descriptions and methods. Hook and line fishing is done with rod and reel gear and natural (live and dead) bait pieces and artificial lures that targets specific species. NCCA sampling is estimated to take ~10 days over 3 months, from May–July. Sampling effort occurs at up to 20 sites provided by ADEM for up to 20 1-hr gillnets, 100 10-min. trawls, and 20 hr of hook and line fishing.

1.2.4 Hatchery Brood Stock Fishing Collections

Broodstock used in hatcheries for the State of Alabama's marine stocking program are collected by hook and line fishing conducted both from the shoreline and from boats. Hook and line fishing is done with live bait, dead bait pieces, and artificial lures, and targets specific species. Collection efforts consist of two anglers fishing each day for up to 6 hr. The total effort is not expected to exceed 144 hr/year.

1.3 Activities Not Expected to Result in Incidental Take of Marine Mammals

1.3.1 Fishery-Independent Monitoring Program

Hydrologic Sampling

Hydrologic sampling includes collection of water samples for measuring salinity, pH, conductivity, dissolved oxygen, and temperature. Water samples are collected from the bottom at specific inshore reefs and other specified locations using a custom bottom water sampler and in-situ water quality instrument. A properly calibrated sonde or handheld YSI© data logger is used to measure variables at a location slightly

off the bottom. In the event the sonde or YSI© cable is unable to reach the seabed, a water sample is taken using the water collection sampler. The sampler, comprised of a PVC capsule, is lowered to the bottom and remains there until completely filled with water. Once back on deck, water quality parameters are measured immediately with a YSI© multiparameter meter for dissolved oxygen in mg/L, temperature in °C, and salinity in ppt. Water samples are collected 108 times/year or roughly 9 times/month for locations where only hydrologic sampling is conducted. However, additional samples (~288) are also collected at every fishery-independent trawl site, at the beginning or end of a trawl. Hydrologic sampling also occurs at beach seine and gillnet locations, but these samples are taken at the water surface.

1.3.2 Continuous Water Quality Sonde Monitoring

Continuous water quality monitoring occurs at select sites for measurement of water quality parameters at specific depths, relative to inshore reef habitats. The water quality sondes are intended to stay for several months at a time, tracking changes in water quality parameters. A YSI© Exo Multiparameter Sonde is placed in a long 5-in. diameter PVC tube with large, drilled holes, and the bottom and top are capped off with a threaded PVC cap. The PVC tube is attached to a previously installed piling marking inshore reef sites with metal straps. The sonde is secured and suspended inside the tube at a specified depth relative to the reef where it is located and measures and stores water quality parameters for up to a month or more depending on time of year and frequency of testing. Sonde exchanges happen every 2 weeks in the summer months, every 3 weeks in the fall and spring, and once a month in the winter; the sonde mounts are removed and cleaned every 6 months. Sonde retrievals and deployments are conducted using a vessel and expected to occur up to 40 times/year. Up to 4 sondes will be mounted to pilings in different locations at the same time, and up to 4 sondes can be exchanged in the same day.

1.3.3 Oyster Monitoring

Prior to the annual commercial season, oyster reefs are sampled by collecting reef material, oysters, and associated cultch (which is substrate on which oyster spat attach) to assess the quantity of harvestable-sized oysters, undersized oysters, and spat, which are oyster larvae that have settled onto substrate. These surveys are also used for pre- and post-monitoring of cultch plantings and cultivated sites to estimate spat settlement rates. Oyster monitoring is done with three gear types, and all survey activities occur in depths less than 25 ft.

Scuba Quadrat Surveys

Scuba quadrat surveys are conducted by first deploying a 300 ft line with 10 burlap sacks attached at random intervals which is stretched out and laid on the bottom (Figure 3). After deployment, Scuba divers follow the line – when a sack is reached, a 1-yd^2 quadrat made of steel rebar is manually placed on the bottom by the diver. All reef material within the quadrat is collected by hand and placed in the sack. Total sampling effort is generally between 150 and 250 (average 189) 1-yd^2 quadrats/year. It is anticipated that the Scuba quadrats will be replaced with patent tongs in the coming years with similar total effort.

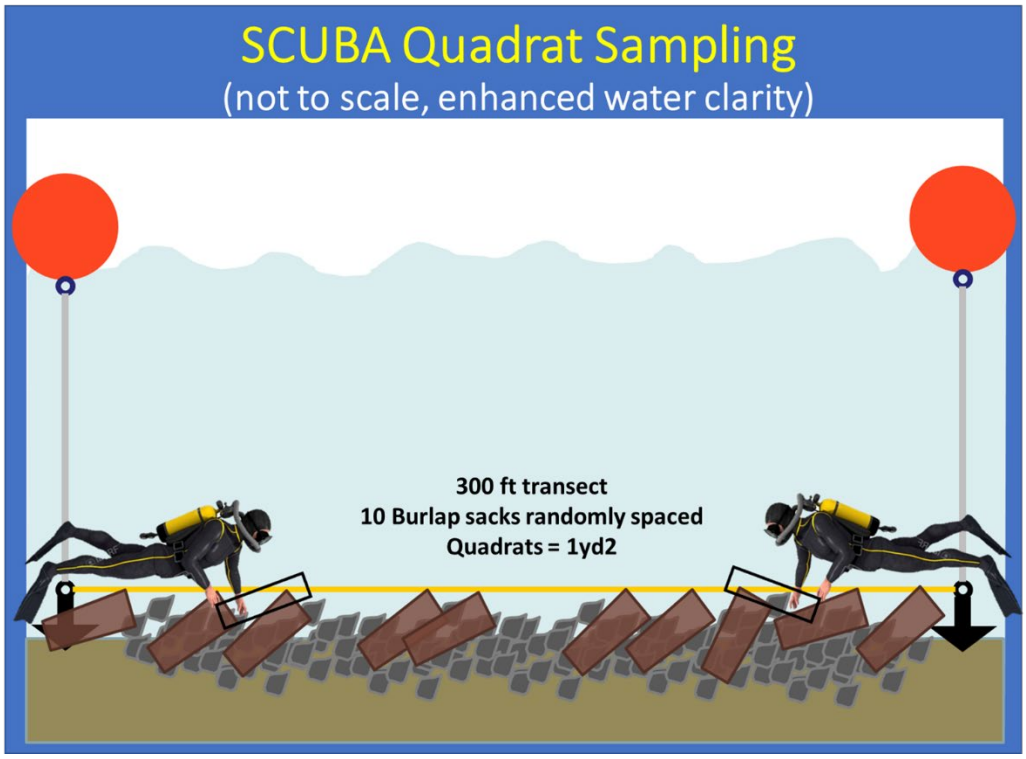

FIGURE 3. SCUBA quadrat sampling.

Hydraulic Patent Tong Surveys

Hydraulic patent tongs function in much the same way as traditional hand powered oyster tongs (Figure 4). Hydraulic patent tongs will be deployed over the side of the survey vessel via winch in a slow and controlled movement to the bottom substrate or inshore reef. After reaching the bottom, they will be activated to close and collect reef material and brought back on board the vessel. The tongs collect the reef material from a 0.25 m^2 area. Samples will be processed similarly to that of quadrat samples. It is anticipated that total sampling effort will be between 150 and 250 samples collected each year.

Hand Dredge

Oyster hand dredge sampling is conducted in conjunction with quadrat/patent tong surveys. The gear provides qualitative data used to assess differences in reef health and oyster density. It is used to spot check reef material on specific reefs and may be followed by quadrat/patent tong surveys if warranted. The hand dredges are a small 11-toothed device made of stainless steel with a 1 in^2 wire mesh bag (20-in. wide at the tooth, ~8 kg; Figure 5) and are towed under tension in a circular pattern for 90 secs. behind a small vessel. The length of the tow line is approximately three times the depth of the water (absolute line length is variable and depends on the height of the vessel gunnel). It is then pulled back on board, and the sample is processed onboard with counts of all live oysters, cultch, boxes (pairs of empty shells joined together by ligaments), and oyster drills (a predatory sea snail that feed on oysters). Approximately 10 to 40 hand dredge samples are anticipated to be collected per 100 acres of inshore oyster reef each year. The average number of dredges per year is expected to be 300.

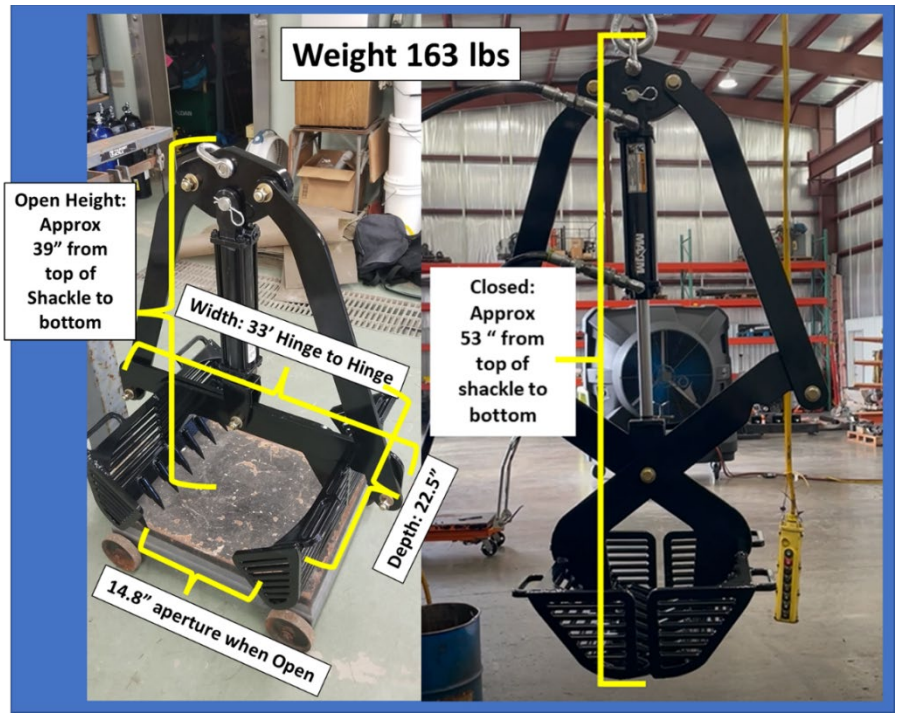

FIGURE 4. Oyster tongs.

FIGURE 5. Oyster hand dredge.

1.3.4 Habitat Mapping with Side Scan Sonar

Side scan sonar data assist with the identification of ecologically sensitive habitats and water bottoms suitable for restoration/enhancement activities. Additionally, side scan sonar is utilized to monitor the existing inshore and nearshore artificial reefs as well as oyster reef habitats. Side scan sonar surveys typically occur in spring, summer, and early fall using a Klein® 3000H digital side scan sonar. The stainless-steel towfish is 122 cm long, 8.9 cm in diameter, and weighs 29 kg. A bow mount assembly is utilized to secure the towfish when scanning in waters less than 15 m deep. At greater depths, the towfish is rigged with a depressor wing and pulled behind the vessel on a multiconductor cable ~10 m above the seabed. The device operates simultaneous dual frequencies, 100 kHz (125 kHz +/- 1% act.) and 500 kHz (445 kHz, +/- act.), and transmits independent pulses for each frequency. The maximum range of the 100 kHz frequency is 600 m, and for the 500 kHz frequency, it is 1500 m. It is anticipated that side scan sonar surveys will occur on ~5 days/year, totaling 25 hours of active side scan sonar usage/year.

1.3.5 Finfish Stocking

GoM native fish fingerlings raised in a DCNR marine fish hatchery are released approximately four times per year. Currently, spotted seatrout (*Cynoscion nebulosus*), Florida pompano (*Trachinotus carolinus*), and southern flounder (*Paralichthys lethostigma*) are spawned and reared in the hatchery. Fingerlings are usually stocked at 1–2" in length. The mean number of fish stocked in Alabama coastal waters during fiscal years 2020–2023 was 42,250 Florida pompano, 139,229 spotted seatrout, and 70,283 southern flounder. A fish stocking tank is mounted to the boat with bottled oxygen aeration onboard. Fish are released through a siphon hose while the vessel idles in waters less than 4 ft deep.

2 DATES, DURATION, AND SPECIFIED GEOGRAPHIC REGION

2.1 Dates and Duration of Project Activities

The DCNR is proposing to continue conducting their FIM survey work during the ITR period. While these surveys are planned for the 5-year period, not every activity may occur each year, and the number of sets/tows/trawls/hours could vary annually and monthly. For the purposes of this ITR application, a description of the types of surveys, project area, season/frequency, gear or equipment used, and effort such as number of tows, is presented in Table 1 for all potential types of activities that may occur during the 5-year period. This precautionary approach allows the DCNR to estimate the potential for interacting with marine mammals during this 5-year period and to calculate potential takes as described in Section 6 of this application. As described in Section 5, the DCNR is requesting Level A takes, due to potential injurious or lethal entanglement of bottlenose dolphins in FIM gear.

2.2 Specified Geographic Region of Activity

The DCNR conducts FIM survey work in Mobile Bay, Alabama, and adjacent waters, including Mississippi Sound, Perdido Bay, Wolf Bay, and Little Lagoon (Figure 1). The project area encompasses marine and estuarine waters of the northern GoM. Water depths are generally less than 17 m.

3 SPECIES AND NUMBER OF MARINE MAMMALS

The inshore and coastal waters of Alabama are typically used by a single species of marine mammal – the common bottlenose dolphin. There are four different stocks that could occur within the project area – estimates of the numbers of bottlenose dolphins in each of the four stocks, estimates of mortality/serious injury (M/SI), and potential biological removal (PBR), are shown in Table 4. The status and distribution of each stock are discussed in Section 4.

4 AFFECTED SPECIES STATUS AND DISTRIBUTION

The common bottlenose dolphin occurs in tropical, subtropical, and temperate waters throughout the world, including the GoM (Wells and Scott 2018). Although it is more commonly found in coastal and shelf waters, it can also occur in deep offshore waters (Jefferson et al. 2015). There are two distinct bottlenose dolphin types: a shallow water type mainly found in coastal waters and a deepwater type mainly found in oceanic waters (Duffield et al. 1983; Walker et al. 1999). The nearshore dolphins usually inhabit shallow waters along the continental shelf and upper slope, in water depths <200 m (Davis et al. 1998, 2002). As well as inhabiting different areas, these ecotypes differ in their diving abilities (Klatsky 2004) and prey types (Mead and Potter 1995). Coastal dolphins in the GoM are selective feeders that forage on demersal soniferous fish (e.g., Gannon et al. 2005; Berens McCabe et al. 2010; Smith et al. 2013). Typical fish prey species include Atlantic Croaker (*Micropogonias undulatus*), Gulf menhaden (*Brevoortia patronus*), spotted seatrout, bay anchovy (*Anchoa mitchilli*), mullet (*Mugil* spp.), butterfish (*Peprilus* spp.), pinfish (*Lagodon rhomboides*), Crevalle jack (*Caranx hippos*), spot (*Leiostomus xanthurus*), among others (Gannon et al. 2005; Smith et al. 2013; Cloyed et al. 2021; DISL and NOAA 2023).

Bottlenose dolphins in the GoM and elsewhere are known to depredate fishing nets (e.g., Chávez-Martínez et al. 2022). Dames et al. (2022) also reported differences in foraging behavior of bottlenose dolphins in Mobile Bay compared with Perdido Bay, Alabama, due to differences in anthropogenic activities (i.e., commercial fishing) between those two areas; bottlenose dolphins appeared to take advantage of or associate with fishing vessels when foraging in Mobile Bay.

Both shallow and deepwater bottlenose dolphins are known to occur in the GoM (Walker et al. 1999); however, only the shallow-water type is expected to occur in the project area. The inshore type inhabits shallow lagoons, bays, and inlets, and the oceanic population occurs in deeper, offshore waters over the continental shelf (Würsig et al. 2000). Stocks currently recognized in the GoM include one oceanic stock, one continental shelf stock, three coastal stocks (Northern, Eastern, and Western), and more than 30 Northern Gulf of Mexico Bay, Sound, and Estuary (BSE) stocks (Hayes et al. 2023), although genetic data indicates that these stocks may require revision (Vollmer and Rosel 2017). Based on the currently recognized stock structure, four stocks could occur in the project area including the Northern Coastal stock and three Northern Gulf of Mexico BSE stocks (Mississippi Sound/Lake Borgne/Bay Boudreau, Mobile Bay/Bonsecour Bay, and Perdido Bay); only the latter three are considered strategic stocks as their stock sizes are either small or currently unknown, such that a small number of M/SI would exceed PBR. Human-caused mortality/SI for these stocks can result from fisheries-related activities, research activities, intentional harm, and pollution (e.g., Deepwater Horizon oil spill) (Carmichael et al. 2022).

TABLE 4. Populations of common bottlenose dolphins expected to occur in the project area in Alabama. Information is from the 2022 NMFS Marine Mammal Stock Assessment Reports (SAR; Hayes et al. 2023), unless otherwise noted.

Stocks	N_{range}[1] 2019–2022	N_{est}	CV N_{est}	N_{min}	PBR	Year of Last Survey in SAR	Minimum Annual HCMSI, 2015–2019	Total Annual M/SI[2] 2016–2020	Total Annual Fisheries M/SI[2] 2016–2020
Northern Gulf of Mexico Bay, Sound, and Estuary Stocks									
Mississippi Sound/Lake Borgne/Bay Boudreau	-	1,265	0.35	947	8.5	2018	-	59	2.0
Mobile Bay/ Bon Secour Bay	518.2 – 1,711.9	122	0.34	UNK	UND / 6.7 [3]	1993 [4]	15.6	16	1.0
Perdido Bay	99.6 – 190.7	0 [5]	-	-	UND / 1.9 [3]	1993 [4]	0.6	0.8	0.6
Gulf of Mexico Coastal Stocks									
Northern Coastal	-	11,543	0.19	9,881	89	2017, 2018	-	28	7.9

- not available; N_{est} = abundance estimate; CV = coefficient of variation; N_{min} = minimum abundance estimate; PBR = potential biological removal; M/SI = Total annual mortality/serious injury; HCMSI = human-caused mortality and serious injury. UNK = unknown; UND = undetermined.

[1] N_{range} = range of seasonal abundance estimate from DISL and NOAA (2024) for Winter 2019 to Summer 2022.

[2] Total annual mortality/serious injury (M/SI) and annual fisheries M/SI are mean annual figures for the period 2016–2020.

[3] Undetermined (Hayes et al. 2023); PBR estimated here based on minimum population size from DISL and NOAA (2024) x ½ R_{max} (maximum productivity rate) x recovery factor.

[4] Baylock and Hoggard (1994).

[5] During earlier surveys by Scott et al. (1989 *in* Hayes et al. 2023), the abundance was also 0.

Significant mixing or interbreeding is unlikely to occur between the various stocks. The Northern Coastal stock is delineated by 84°longitude to the east and the Mississippi River Delta to the west, occurring between the shore, barrier islands, and outer bay boundaries to the 20-m isobath (Hayes et al. 2023). Bottlenose dolphins in the BSE stocks reside in their respective bodies of water year-round (Hayes et al. 2023). For example, Hubard et al. (2004) and Mullin et al. (2017) reported long-term residency in Mississippi Sound. Genetic data also indicate that there are discrete stocks in the bay, sound, and estuary (BSE) waters of the northern GoM (e.g., Duffield and Wells 2002; Sellas et al. 2005; Rosel et al. 2017). Some mixing of stocks occurs via the passes of the northern GoM (e.g., Maze and Würsig 1999; Quintana-Rizzo and Wells 2001; Mackey 2010; Shane 2004). Although residents mostly occur in BSE waters, some seasonal movements through passes into the GoM have been reported (e.g., Hubard et al. 2004; Sinclair 2016).

During 2021–2022 surveys, DISL and NOAA (2023) reported that encounter rates of bottlenose dolphins were higher in Perdido Bay compared with Mobile Bay, although the relative abundance of dolphins was similar in both study areas. Abundance of BSE stocks varies seasonally, with abundance typically being higher during the summer (e.g., Hubard et al. 2004; DISL and NOAA 2023, 2024). To date, 2431 different individuals have been identified in Perdido Bay, Mobile Bay, and coastal waters of Alabama (DISL and NOAA 2024). Seasonal abundance estimates for Perdido Bay ranged from 99.6 to 190.7 individuals for 2019–2022; for Mobile Bay, the seasonal abundance ranged from 518.2to 1711.9 individuals

(DISL and NOAA 2024). These estimates are much higher than those based on 1993 surveys (Hayes et al. 2023).

In Perido Bay, dolphins were most often encountered in Wolf Bay, Bay La Launch, and Arnica Bay, but seasonal differences in dolphin distribution were detected within the bay (DISL and NOAA 2023). A kernel density estimation showed that the highest densities were found in Wolf Bay, Bay La Launch, and Big Lagoon. In Mobile Bay, most sightings occurred between Galliard Island and the mouth of the bay. A kernel density estimation showed the highest densities in the southern part of Mobile Bay around the mouth of the bay and including off Dauphin Island. Densities in Mobile Bay were lower than in Perdido Bay. Dolphins in Perdido Bay were somewhat more resident than those in Mobile Bay (DISL and NOAA 2024). Dolphins in both bays mainly occurred in water depths of ~3 m deep.

Bottlenose dolphins can give birth any time of the year, but in Mississippi Sound, calf sightings are typically highest during the spring and summer (e.g., Miller et al. 2010, 2013). Bottlenose dolphins are thought to use shallow coastal waters as nurseries during the summer (e.g., Scott et al. 1990), which likely explains higher densities in shallow waters during the summer (Miller et al. 2013). During surveys in 2021–2022, neonates were only observed in Perdido Bay and Mobile Bay during summer, but calves were seen during the winter and summer (DISL and NOAA 2023). The maximum productivity rate (R_{max}) for all common bottlenose dolphin stocks in the GoM is 0.04, and the recovery factor ranges from 0.4 for the Perdido Bay stock to 0.45 for the other three stocks that could occur in the project area (Hayes et al. 2023).

5 TYPE OF INCIDENTAL TAKE AUTHORIZATION REQUESTED

The DCNR is petitioning NMFS for regulations pursuant to Section 101(a)(5)(D) of the MMPA, 16 USC Section 1371.101(a)(5), and 50 CFR Section 216, Subpart I, to allow the potential taking of small numbers of marine mammals incidental to the planned FIM activities in the northern GoM. Effects on marine mammals would be anticipated as falling within the MMPA definition of "Level B Harassment" or "Level A Harassment". However, serious injury or lethal takes are unlikely given the monitoring and mitigation measures that are planned (see Section 11). The activities outlined in Section 1 (Table 1) have the potential to take marine mammals incidentally through the use of fishing gear, including gillnets, trawl nets, seine nets, and hook and line gear. Marine mammals can become entangled or captured in nets or can be hooked and entangled during the use of hook and line gear.

The types of incidental taking requested in this application include:

- Level A takes due to non-lethal injury or mortality/serious injury (M/SI). NMFS interprets the regulatory definition of serious injury (i.e., any injury that will likely result in mortality) as any injury that is "more likely than not" to result in mortality, or any injury that presents a greater than 50% chance of death to a marine mammal. A serious injury must contribute to the death or likely death of the animal to be classified as such. Level A takes could also occur if a marine mammal is captured or entangled (i.e., during a trawl survey) and although the animal may be released alive, non-lethal injury is possible. Non-lethal or lethal Level A takes could occur during fishing activities that use gillnets, trawl, or hook and line.

The DCNR is not requesting takes due to:

- Level B harassment due to physical disturbance by vessels and fishing gear. Currently, NMFS does not consider depredation events to result in Level B takes. Level A take associated with auditory injury or permanent threshold shift (PTS). PTS is highly unlikely from the acoustic gear to be used during the surveys (e.g., multibeam and side scan sonar);

- Level B harassment associated with auditory disturbance or temporary threshold shift (TTS) is also discounted given the types of acoustic equipment used during FIM activities (see Section 7 for rationale).

6 TAKE ESTIMATES FOR MARINE MAMMALS

Authorization for incidental takes is requested for FIM activities that have the potential to injure or harass marine mammals, as described in Section 1.2. Marine mammals can suffer injury or mortality due to encounters or interactions with the fishing gear to be used during FIM activities, including gillnets, trawls, and hook and line, which could result in entanglement or capture. To determine the potential for interactions during the DCNR's FIM activities, various factors are considered including past interactions between marine mammals and DCNR activities, past marine mammal interactions with commercial and other research fisheries that use similar gear, and other biological factors such as feeding behavior.

Although collisions with vessels are a concern for marine mammals (e.g., Laist et al. 2001; Redfern et al. 2013), no vessel strikes with cetaceans have been reported during any DCNR FIM activities. Reducing vessel speeds can decrease the chance of ship strikes (e.g., Vanderlaan et al. 2007; Wiley et al. 2016; Currie et al. 2017). Transit speeds during FIM surveys can be up to 25 kts; during FIM activities, the vessel speed is typically 2–2.5 kts. The much slower speeds during FIM activities, along with mitigation measures to watch for marine mammals during gear towing and retrieval, essentially eliminate the risk of ship strikes. Thus, takes of marine mammals due to vessel collisions are not requested and are not discussed further.

The following subsections discuss the potential for interactions that could disturb, injure, or result in mortality of marine mammals with the types of gear used during FIM activities by the DCNR (Section 6.1), past marine mammal encounters with DCNR FIM gear types (Section 6.2), the rational for discounting Level B harassment due to acoustic sources used during FIM activities by the DCNR (see Section 6.3), and the basis and estimate of the requested takes for FIM activities for the period 2024–2028 (Section 6.4).

6.1 Potential Gear Interactions with Marine Mammals During FIM Activities

Anytime gear is placed in the water, there is the potential for an interaction with marine mammals via physical disturbance, entanglement, or capture, which could lead to non-lethal or serious injury or even mortality. The sections below describe the pathway of interaction for various gear types and the potential for such an interaction to occur during FIM activities. To put potential gear interactions during FIM surveys into perspective, we also describe how NMFS has categorized various commercial fisheries (List of Fisheries; NOAA 2023a) in the GoM with respect to the level of incidental mortality and serious injury (M/SI) of marine mammals. This categorization assesses the impact of each fishery on marine mammal stocks based on rate of incidental of M/SI relative to the potential biological removal (PBR) level for marine mammal stocks. The PBR is defined in Section 118 of the MMPA (50 CFR 229.2) as the highest 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. The categories are as follows: Category I – the annual M/SI of a stock is $\geq$50% of the PRB; Category II – the annual M/SI of a stock is 1–50% of the PRB; and Category III – the annual M/SI is <1% of the PBR.

6.1.1 Gillnets

Gillnets have vertical panels of netting and floats at the top and are weighted at the bottom; fish are caught by their gills in these nets. Marine mammals can also be caught in the gillnet itself or entangled in the net or lines. An entangled or captured animal is at risk of drowning unless it can be freed quickly, and lines wrapped around the animal can immobilize or injure it. Marine mammal interactions with gillnets have been widely documented (e.g., Reeves et al. 2013; Lewison et al. 2014). On the List of Fisheries, the GoM gillnet fishery is considered to be Category II, as bottlenose dolphins have been occasionally killed or injured in this fishery (NOAA 2023a,b). However, the DCNR does not use commercial-type drift gillnets during its FIM, and no dolphin mortalities have ever been recorded by DCNR during FIM gillnet sets. Details on the gear, timing, duration, and locations of FIM surveys are provided in Table 1.

6.1.2 Bottom Otter Trawls

Capture or entanglement in DCNR trawl gear may occur whenever marine mammals are swimming near the gear, either intentionally while foraging or unintentionally. Animals can be captured or entangled in nets or tow lines causing injury or risk drowning unless they can be freed quickly. Lines wrapped around the animal or its fins can immobilize or injure it by cutting into or through the blubber, muscles, or bone, and constricting blood flow or severing appendages. The animal may also not be able to feed once captured or entangled (Andersen et al. 2008). An interaction that does not result in the immediate death of the animal by drowning can also cause non-lethal or serious injury later on.

On the List of Fisheries, the GoM shrimp trawl fishery is considered Category II, whereas the GoM butterfish trawl fishery and mixed species trawl fishery are categorized as Category III or having "remote likelihood of or no known interactions" with marine mammals (NOAA 2023a,b). Bottlenose dolphins have been documented to have been injured or killed during both the shrimp trawl fishery and the butterfish trawl fishery (NOAA 2023a,b). Similar to Category III fisheries, the FIM surveys that use trawl gear also appear to have a remote likelihood of interactions, as no takes of marine mammals have ever been recorded during DCNR bottom trawls. Details regarding the gear used, timing, and duration of these activities are provided in Table 1. Fishing at greater depths, slower trawl speeds, and sets with shorter duration, along with the use of nets with smaller mesh would all minimize the risk of capture and entanglement. As it has not been proven that marine mammal exclusion devices eliminate the risk of marine mammal interactions with trawl nets (e.g., Chilvers 2008; Lyle et al. 2016), these devices are not being considered for use by the DCNR.

6.1.3 Beach Seines

Beach seines are deployed in shallow water from shore. The nets hang vertically in the water column with the bottom of the net weighted down and the top buoyed by floats. Individual marine mammals or groups can be caught in the net while feeding or become entangled in lines. On the List of Fisheries, the GoM beach seine fishery is rated as Category III (NOAA 2023a,b). Similarly, as no takes of marine mammals have been reported during DCNR beach seines, there appears to be only a remote likelihood of an interaction with bottlenose dolphins. Details on the gear, timing, duration, and locations of this activity is shown in Table 1. If a dolphin is seen within 100 m of the static sampling location once the crew has arrived on site and is considered at risk of an interaction before setting the gear, the crew must choose a different section of the sampling area or wait at least 10 min to see if the animal moves away. If the animal moves on, the crew will watch for another 10 min, and if there are no other sightings within 100 m the gear can be deployed.

6.1.4 Hook and Line Activities

Hook and line refers to a fishing method that uses short fishing lines with hooks. The gear is similar to that used by recreational fishers using rod and reel gear, bait or lures to attract target species. This type of gear has less potential for marine mammal interaction, but the use of baited hooks in areas where marine mammals occur carries some risk. The hook can injure a flipper or it can be ingested by a marine mammal. Pinnipeds are most likely to be taken during hook and line fishing (e.g., Hofmeyr et al. 2002). However, this type of gear is much less likely to result in marine mammal interaction than most other fishing gear. The List of Fisheries categorizes the GoM longline/hook and line commercial fishery as Category III (NOAA 2023a,b). Similarly, no interactions involving hook and line gear have been reported during its use by the DCNR for fish tissue sampling and hatchery broodstock collection. Details on the gear, timing, duration, and locations of these surveys are provided in Table 1.

6.1.5 All Other Gear Types

The DCNR uses a variety of additional gear types during FIM activities (e.g., water sampling devices, oyster tongs, etc.). However, there is very minimal/no risk of non-lethal injury or M/SI or even physical disturbance of marine mammals due to this equipment. Thus, other gear types are not considered further.

6.2 Past Marine Mammal Interactions During DCNR FIM Activities

From 2018–2021, three entanglements (takes) of marine mammals were recorded on the Southeast Region Protected Species Incidental Take (PSIT) form and reported to NMFS during DCNR FIM activities, all involving common bottlenose dolphins and gillnets (Table 5). One individual became entangled on 5 November 2019 in Perdido Bay (Area 4E), and another individual became entangled in Area 4E of Perdido Bay on 10 March 2020; the third dolphin became entangled on 15 July 2021 in lower Mobile Bay (Area 2E); refer to Figure 2 for locations. The three individuals that became entangled in gillnets were successfully released alive. The entanglements were reported by the DCNR, although it is not known whether the animals were seriously injured during the interactions (this was considered unlikely). Details regarding the entanglements are provided in Table 5; the type of gillnets that the dolphins were entangled in are still used regularly by the DCNR during FIM activities. No entanglements of marine mammals due to interactions with FIM gear were recorded in 2022 or 2023. No other entanglements, injuries, or mortalities have been recorded for any other DCNR FIM activities. Prior to 2019, the DCNR had no history of marine mammal entanglements.

TABLE 5. Summary of Incidental Takes of Bottlenose Dolphins during 2019–2021 DCNR FIM Gillnet Sets^.

Year	2019	2020	2021
Date	2019-11-05	2020-03-10	2021-07-15
Time of Initial Set	13:27	13:38	11:27
Entanglement Location	6 in. mesh	5 in. mesh	6 in. mesh
Average depth**	3.18 ft / 0.97 m	3.18 ft / 0.97m	2.75 ft / 0.84 m
Temperature, Degrees C*	18.5	18.4	29.3
Salinity, ppt*	17.73	19.65	5.8
Dissolved Oxygen mg/L*	8.87	7.34	6.42
Entanglement location	Wrapped	Tail/Fluke	Wrapped
Location in the net	Top and Bottom	Floatline	Top and Bottom
Behavior upon release	Swam away	Swam away vigorously	Swam away vigorously
GPS Location, Latitude	30.29865	30.29286	30.24361
GPS Location, Longitude	-87.50477	-87.54599	-87.85139
Fish in net	Black Drum (4.5-5.5 in. mesh)	no catch	Ladyfish (4.5-6 in. mesh)

* All physical parameters are recorded at the surface.
**Depth maximum (following Standard Procedures) is 8 ft / 2.44 m.
^Gillnets are continuously repaired of holes to maintain proper effort estimates for monitoring estimates.

Other gear interactions that did not involve entanglement (e.g., dolphins touching the net or depredating fish from the net) were not considered to be takes by the DCNR and are not currently considered to be takes by NMFS; thus, they are not used in the analysis. Entanglement and gear interaction rates are shown for gillnets in Table 6 and otter trawls in Table 7; there were no gear interactions during beach seines (Table 8). The DCNR started keeping rigorous records of all interactions between bottlenose dolphins and FIM survey gear in 2021. In 2021, one dolphin was recorded to have touched the gillnet in Mississippi Sound. Another 17 observations (but no interactions) of dolphins within 25 ft of the gillnet were recorded during 2021–2022, including 9 observations in Mississippi Sound, 3 observations in Perdido Bay, 2 observations in Upper Mobile Bay, and 3 observations in Lower Mobile Bay (Table 6). During otter trawls, 2 interactions with the net occurred in Perdido Bay in 2021, and one interaction with the net was recorded in 2022 (Table 7). In 2021, observations of dolphins within 25 ft of the otter trawl (without direct net interactions) were made 5 times in Perdido Bay, 3 times in Mississippi Sound, 1 time in Upper Mobile Bay, 1 time in Lower Mobile Bay, and 1 time in Mobile Pass outside of the bay. In 2022, observations within 25 ft of otter trawls occurred 5 times in Mississippi Sound, 2 times in Perdido Bay, 3 times in Lower Mobile Bay, and 2 times in Upper Mobile Bay.

6.3 Basis for Estimating Potential "Take"

Level A take estimates are based on a consideration of the number of bottlenose dolphins that could become entangled during FIM surveys based on past dolphin entanglements with DCNR activities, and past dolphin takes in commercial and other fisheries. Entanglements and other interactions with gillnets during 2018–2022 FIM surveys are shown in Table 6. There have been no entanglements in trawl gear (Table 7) or beach seines (Table 8).

TABLE 6. Total gillnet effort, number of bottlenose dolphin observations, entanglements, and interactions with gillnets, and interaction rates for FIM gillnet activities during 2018–2022. Total interactions include all entanglements and other interactions with the net.

Year	Total Effort (1-hr sets)	Entangle-ments	Entangle-ments/ Set	Gear Interaction (# of sets)**	Interactions/ Set*	Observations of Dolphins Within 25 Feet (# of sets)*	Dolphins Observed (# of sets)*	No Marine Mammals Observed (# of sets)*
2018	241	0	0	0	0	-	-	-
2019	240	1	0.0042	0	0	-	-	-
2020	236	1	0.0042	0	0	-	-	-
2021	239	1	0.0042	1	0.0042	5	14	217
2022	243	0	0	0	0	12	20	219
Total	**1,199**	**3**	**0.0025**	**1**	**0.0008**	**17**	**34**	**436**

*Prior to 2021 FIM surveys, observations of marine mammal proximity to deployed gear were not documented, with the exception of some notes added to the comment section of field data sheets.

TABLE 7. Total trawl effort, number of bottlenose dolphin observations, entanglements, and interactions with trawls, and interaction rates for FIM trawl activities during 2018–2022. Total interactions include all entanglements and other interactions with the net.

Year	Total Effort (10-min tows)	Entangle-ments	Entangle-ments/ Tow	Gear Interaction (# of tows)**	Interactions/ Tow**	Observations of Dolphins Within 25 Feet (# of tows)**	Dolphins Observed (# of tows)**	No Marine Mammals Observed (# of tows)**
2018	286	0	0	0	0	-	-	-
2019	288	0	0	0	0	-	-	-
2020	286	0	0	0	0	-	-	-
2021	288	0	0	2	0.0069	11	15	259
2022	286	0	0	1	0.0035	12	15	249
Total	**1,434***	**0**	**0**	**3**	**0.0002**	**23**	**30**	**508**

*Numbers do not add up to total because data was mis-entered for a small number of samples each year.
**Prior to 2021 FIM surveys, observations of marine mammal proximity to deployed gear were not documented, with the exception of some notes added to the comment section of field data sheets.

TABLE 8. Total seine effort, number of bottlenose dolphin observations, entanglements, and interactions with seines, and interaction rates for FIM seine activities during 2018–2022.

Year	Total Effort (60-ft tow)	Entangle-ments	Entangle-ments/ Tow	Gear Interaction (# of sets)*	Interactions/ Tow*	Observations of Dolphins Within 25 Feet (# of sets)*	Dolphins Observed (# of sets)*	No Marine Mammals Observed (# of sets)*
2018	38	0	0	0	0	0	0	0
2019	97	0	0	0	0	0	0	0
2020	118	0	0	0	0	0	0	0
2021	118	0	0	0	0	0	1	115
2022	120	0	0	0	0	0	0	105
Total	**236**	**0**	**0**	**0**	**0**	**0**	**1**	**220**

*Prior to 2021 FIM surveys, observations of marine mammal proximity to deployed gear were not documented, with the exception of some notes added to the comment section of field data sheets.

6.3.1 Gillnets

The DCNR has recorded three entanglements during its FIM activities that use gillnets; one bottlenose dolphin became entangled in the gillnet (and was released alive) annually from 2019 to 2021 (Table 6). Annual gillnet effort during that time period averaged 238 hours per year (or 238 1-hr sets). Based on Table 6, the rate of entanglement for the 2018–2022 period was 0.0025 bottlenose dolphins/hr. During fishery-independent gillnet sampling, 240 1-hr sets are expected to occur each year, and another 20 sets during fish tissue sampling could occur during a 5-year period (see Table 3), for a total of 1220 hrs of gillnet effort over the 5-year period. Thus, the potential number of Level A takes would be 3 bottlenose dolphins (Table 9).

6.3.2 Otter Trawls

As described in Section 6.2, no entanglements of bottlenose dolphins have been documented during FIM activities that involved trawl gear (Table 7). Although none of the interactions with trawl gear for 2018–2022 were deemed to result in incidental takes by the DCNR (bottlenose dolphins only took fish from the net), based on historical takes of common bottlenose dolphins by research activities conducted by NMFS's Southeast Fisheries Science Center in the GoM (SEFSC 2016), the potential takes estimated by the Northwest Fisheries Science Center for their research activities (NWFSC 2022), and gear interactions during DCNR activities during 2018–2022, it is estimated that there could be up to 1 Level A take during the 5-yr ITR (Table 9). Of note here is that the NMFS offshore trawls use a larger trawl net size and have longer tow times.

6.3.3 Beach Seines

As described in Section 6.2, no entanglements or interactions with bottlenose dolphins have been documented during FIM activities that involve seine nets (Table 8). Similarly, there have been no marine mammal takes during Northwest Fisheries Science Center (NWFSC) or SEFSC past fisheries activities involving seine nets (SEFSC 2016; NWFSC 2022). Level A takes during beach seines are deemed highly unlikely and are not being requested. Thus, the DCNR is not requesting any Level A takes for this activity (Table 9).

6.3.4 Hook and Line Gear

The DCNR has no history of marine mammal takes with hook and line gear. NWFSC (2022) noted that a take of a marine mammal in hook and line gear is a relatively rare occurrence. Furthermore, monitoring and mitigation measures described in Section 11 reduce the potential for takes in hook and line gear. However, as a precautionary approach, DCNR is requesting one Level A take for the 5-year ITR period (Table 9) in case a bottlenose dolphin becomes entangled in fishing line, ingests a hook, or otherwise interacts with this gear.

6.4 Summary of Requested Take

The requested annual takes for each year of the ITR are shown in Table 10 below. The annual take is the maximum number of takes that is expected to occur in a given year.

TABLE 9. Level A takes during FIM activities for the 5-year period and annual takes as percentages of stock abundance.

FIM Activity	Requested Level A Takes[1]	Annual Level A Takes as Percentage of Abundance of Each Stock[2]			
		Mississippi Sound	***Mobile Bay***	***Perdido Bay***	***Northern Coastal***
Gillnets	3	0.06	0.12	0.60	0.01
Otter Trawls	1	0.02	0.04	0.20	0.002
Beach Seines	0	0	0	0	0
Hook and Line	1	0.02	0.04	0.20	0.002
Total Requested	***5***	***0.11***	***0.19***	***1.00***	***0.01***

[1]Takes over 5-year period.

[2]Annual takes are total estimated takes for the 5-year ITR period divided by 5. Percentage (%) based on minimum abundance estimate for each of four stocks; assumes all estimated takes affect only a single stock (Perdido Bay; Mississippi Sound = Mississippi Sound/Lake Borgne/Bay Boudreau stock; Mobile Bay = Mobile Bay/Bon Secour Bay stock).

Table 10. Level A takes during FIM activities. Annual takes are total takes for the 5-year ITR period divided by 5 years.

Year of ITR	Level A Takes
1	1
2	1
3	1
4	1
5	1
Total Requested	**5**

7 ANTICIPATED IMPACT OF THE ACTIVITY

Although the MMPA does not have a clear definition of "take by harassment", based on NRC (2005) and Southall et al. (2007), simple exposure to sound, or brief reactions that do not disrupt behavioral patterns in a potentially biologically significant manner, are not typically considered to constitute harassment or "taking". Thus, only Level A non-lethal injury or M/SI takes, as well as other interactions with FIM gear (e.g., taking fish from net) are considered as takes in this assessment. Bottlenose dolphins that come close to the activities (e.g., within 25 feet; see Tables 5-7) but do not interact with the fishing gear used during FIM surveys, are not considered to be disturbed. Similarly, acoustic sources proposed for use during FIM activities are unlikely to result in Level A or Level B takes (see Section 7.2).

7.1 Impact from FIM Surveys Using Fishing Gear

As noted earlier in Section 6, DCNR FIM activities have the potential to cause non-injurious and M/SI Level A takes of marine mammals through entanglements and captures in nets/gear or other injuries. The total Level A takes (5) for the 5-year period means that one Level A take per year would be expected. However, the annual requested Level A takes are low relative to the minimum population sizes of the four stocks of bottlenose dolphins that occur in the project area (Table 9). In addition, the calculated percentages

are based on all takes occurring for one stock rather than across all four stocks. However, it is unlikely that all takes would be from one stock; the three previous entanglements during DCNR FIM surveys were reported for at least two different locations — Perdido Bay (2 entanglements in area 4E) and Mobile Bay (1 entanglement in area 2E) (see Figure 1 for locations). One annual Level A take would not exceed the PBR for any of the stocks. In addition, estimated annual takes do not exceed 1.3% of any population and would be lower if estimated takes would be assigned to the four different stocks in the project area.

7.2 Impact from Acoustic Equipment (Multibeam Echosounder and Side Scan Sonar)

The impacts of anthropogenic sound on marine mammals have been summarized by numerous authors and include one or more of the following: tolerance, masking of natural sounds, behavioral disturbance, and at least in theory, temporary or permanent hearing impairment or non-auditory physical or physiological effects (e.g., Richardson et al. 1995; Nowacek et al. 2007; Southall et al. 2007, 2019, 2021; Erbe 2012; Weilgart 2017; Erbe et al. 2022). Responses to sound, if any, depend on the received sound level, species, state of maturity, experience, current activity, reproductive state, time of day, and many other factors (Richardson et al. 1995; Wartzok et al. 2004; Southall et al. 2007; Weilgart 2007; Ellison et al. 2012, 2018). Temporary threshold shift (TTS) or temporary hearing impairment is typically not considered an injury as hearing sensitivity recovers over time, whereas the loss of hearing sensitivity associated with permanent threshold shift (PTS) is not recoverable (Southall et al. 2007).

Although the frequencies (100–500 kHz) used by the multibeam echosounder and side scan sonar during FIM activities include those used by mid-frequency cetaceans (150 Hz to 160 kHz) including the bottlenose dolphin, the multibeam echosounder is typically operated at a frequency of 400 kHz, and the side scan sonar can be used at a frequency of 500 kHz (see Table 1). Sound sources with transmission frequencies higher than 180 kHz are considered inaudible by marine mammals and therefore do not result in incidental take. In addition to typically operating at frequencies inaudible to marine mammals, Ruppel et al. (2022) found that multibeam echosounders and side scan sonars are unlikely to result in incidental take of marine mammals as these sound sources have low source and received levels, narrow beams, downward directed transmission, and/or have low exposure (e.g., short pulse lengths, intermittency of pulses). Sound sources that are unlikely to result in incidental take of marine mammals such as multibeam echosounders and side scan sonars are considered *de minimis* by NMFS (2019).

Considering the monitoring and mitigation measures to be employed during FIM activities using the multibeam echosounder and side scan sonar (see Section 11), the potential effects of these sound sources on marine mammals are considered *de minimus*, and no Level A or Level B takes due to acoustic disturbance are requested.

7.3 Conclusions

Based on the above information, DCNR FIM activities: 1) would have a negligible impact on the affected species or stocks of marine mammals, in particular given the monitoring and mitigation measures that are proposed (Section 11); and 2) would not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence or commercial uses.

8 ANTICIPATED IMPACTS ON SUBSISTENCE USES

There is no subsistence use of marine mammals in the GoM.

9 ANTICIPATED IMPACTS ON HABITAT

Impacts on habitat due to DCNR FIM activities could occur through changes to the benthic environment from bottom trawling or changes in prey availability to marine mammals from sampling activities.

9.1 Impacts to Physical Habitat

The DCNR conducts bottom otter trawling, which could result in changes to the seafloor. However, relatively small areas are expected to be impacted by bottom trawling. Physical damage to the seafloor habitat could include furrowing or smoothing of the seafloor, as well as the displacement of rocks or cultch, although rocky areas and oyster reefs are generally avoided during trawling. Bottom trawling does not overlap with historic distributions of submerged aquatic vegetation, so there is no impact to seagrass areas, but there could be minor localized impacts to infauna and epifauna. Damage can increase with repeated bottom contact in the same area, and recovery of physical and biological effects varies widely (e.g., Morgan and Chuenpagdee 2003; Stevenson et al. 2004); in sensitive habitat, recovery can take years (Morgan and Chuenpagdee 2003). Although rocks and cultch could be permanently displaced, physical damage to the seafloor would likely recover relatively quickly (within 18 months) due to water currents and natural sedimentation (Stevenson et al. 2004). Biological damage would likely recover within the same timeframe as physical disturbance of the seafloor as the impact area is expected to be relatively small; however, repeated disturbance of one area can prolong recovery time (Stevenson et al. 2004). Because FIM surveys are not conducted in the exact same locations throughout the year, they would not cause repeated disturbances at any given site. DCNR activities are not expected to affect water quality over the long-term, although water turbidity may increase temporarily. The potential for DCNR FIM activities to impact the quality of physical habitat sufficiently to affect the survival of or availability of prey for marine mammals such as bottlenose dolphins is considered negligible.

9.2 Changes in Food Availability Due to Removal of Prey and Discards

Commercial and recreational fisheries in the GoM target many of the same fish species as common bottlenose dolphins such as mullet, pinfish, Gulf menhaden, Crevalle jack, and spot (e.g., Berens McCabe et al. 2010; Smith et al. 2013). For fisheries activities by the NWFSC, NMFS (2018) reported that the potential impacts of prey removals on marine mammals is minimal, as the amount of prey species taken is very small relative to their overall regional biomass. Likewise, the prey removals during DCNR FIM surveys are small compared to the total productivity of the coastal ecosystem and compared to removals by commercial and recreational fisheries. For example, in 2021 the total biomass removed by FIM beach seines was 11 kg, and the total biomass removed by FIM trawling was 128 kg. By comparison, commercial fisheries landed 13,936 t (metric tons) of fish and shellfish in Alabama that same year (see NOAA 2023c). However, the commercial landings can be misleading because they only represent seafood landed in Alabama, and those landings may have been captured in federal waters, state waters, or the waters of other states. Similarly, fish caught commercially in Alabama waters could be brought to port in other states.

In addition to commercial landings, there is substantial harvest by recreational fishers in Alabama's coastal waters each year. Table 11 includes the fish species known to be present in the diets of bottlenose dolphins (e.g., Smith et al. 2013; Cloyed et al. 2021; DISL and NOAA 2023), the number of fish caught in DCNR gillnet surveys each year, and the estimated numbers harvested by recreational fishers in Alabama. Both the commercial and recreational harvest of potential dolphin prey species in the waters of Alabama are orders of magnitude higher than the amounts removed by DCNR sampling efforts.

In addition to the small biomass taken by FIM activities, research surveys using beach seines, and otter trawling, tend to target smaller sizes of fish than are typically taken by bottlenose dolphins. Additionally, FIM catches are distributed over a wide area because the surveys are designed to cover a large area. Thus, prey removals by these activities occur across all of Alabama inshore waters and are unlikely to affect the concentrations and availability of prey for common bottlenose dolphins. Therefore, the removal of prey biomass during DCNR FIM activities is unlikely to change prey availability and is not expected to affect prey sources for common bottlenose dolphins.

10 ANTICIPATED EFFECTS OF HABITAT IMPACTS ON MARINE MAMMALS

As stated in Section 9, the proposed activities are not expected to result in impacts to marine mammal habitat nor to the food resources on which they depend. Thus, the proposed activities are not expected to have any habitat-related effects that could cause significant or long-term consequences for individual marine mammals or their populations.

11 MITIGATION MEASURES

Mitigation measures, along with monitoring procedures, for surveys proposed over the 5-year period are shown in Table 12. The DCNR considers the proposed monitoring and mitigation measures necessary to avoid adverse interactions with common bottlenose dolphins while allowing the DCNR to continue fulfilling its fisheries-independent monitoring program obligations. In addition to the monitoring and mitigation measures, the DCNR has implemented a number of protocols for handling, data collection, and incidental take reporting. The DCNR has based the proposed measures on guidelines given in the NMFS safe handling, release, and identification workshops[1], as well as those used by NMFS' NWFSC fisheries research (NWFSC 2022). The measures and protocols should result in increased chances of post-release survival and improve DCNR FIM crew knowledge about protected species such as common bottlenose dolphins that interact with gear used during fisheries research and factors that contribute to interactions.

[1] https://www.fisheries.noaa.gov/resource/outreach-materials/atlantic-highly-migratory-species-safe-handling-release-and

TABLE 11. A comparison of the annual catch in DCNR gillnet surveys and the annual recreational harvest in Alabama, in numbers of fish, of five species known to be prey for common bottlenose dolphins.

Species	Year	DCNR Gillnet Catch	Recreational Harvest[1]
Atlantic Croaker *Micropogonias undulatus*	2018	567	1,770,571
	2019	426	765,166
	2020	403	726,752
	2021	588	616,098
	2022	512	939,282
Gulf Menhaden *Brevoortia patronus*	2018	4162	1,076,964
	2019	4962	1,279,779
	2020	2847	1,080,957
	2021	1452	52,079
	2022	2802	452,299
Spotted Seatrout *Cynoscion nebulosus*	2018	295	838,686
	2019	257	285,221
	2020	258	267,050
	2021	477	350,845
	2022	226	322,257
Striped Mullet *Mugil cephalus*	2018	430	1,165,201
	2019	487	464,153
	2020	328	676,101
	2021	678	572,872
	2022	292	1,695,343
White Mullet *Mugil curema*	2018	207	–
	2019	234	91,099
	2020	499	23,102
	2021	379	64,545
	2022	402	17,851

– not available

[1] Recreational harvest estimates were obtained from https://www.fisheries.noaa.gov/data-tools/recreational-fisheries-statistics-queries.

12 MITIGATION MEASURES TO PROTECT SUBSISTENCE USE

Not Applicable as there is no subsistence use in the area.

13 MONITORING AND REPORTING

13.1 Monitoring

Marine mammal monitoring and mitigation measures are described in Table 12. Visual monitoring for marine mammals is a standard part of FIM surveys, particularly when using gear (e.g., gillnets or otter trawls) that could or is known to interact with marine mammals. The entire DCNR FIM crew will observe for marine mammals while underway or transiting to avoid striking marine mammals. The vessel crew typically consists of 2–3 people, including the captain and scientists. Thus, the observations are not conducted by dedicated staff, but rather personnel that also have other duties associated with navigation and vessel operations. Visual monitoring for marine mammals also takes place 10 min. prior to deploying gear and continues until gear is retrieved and on board. The crew only records marine mammal sightings (including species and behavior) if animals are seen 10 min. prior to gear deployment and while the gear is in the water, not while the vessel is transiting. If common bottlenose dolphins (or other marine mammals) are sighted within 100 m of FIM planned sampling activity, the sampling crew will either move to another sampling site, delay sampling until the animal(s) have moved from the area or cancel the planned sampling activities.

13.2 Reporting

All "take" incidents involving protected species will be reported to the appropriate DNCR supervisor and appropriate federal agency immediately after the "take" occurs. The following numbers are associated with the appropriate contacts and must be used when reporting a "take':

- Alabama Marine Mammal Stranding Network: 877-WHALE-HELP (942-5343)
- Sea turtles: 866-732-8878
- Gulf sturgeon: 727-209-5962
- Sawfish: 844-4SAWFISH

In addition to making the initial phone call when a take occurs, the DCNR staff must complete the PSIT form. Staff must give completed paperwork to their immediate supervisor and/or supervisor on duty; the supervisor is required to submit the paperwork to the appropriate federal agency after an internal review ideally within 24 hours of the take.

The DCNR has developed Standard Operating Procedures (SOP) that describe protocols that are in place if a take should occur. If a take of a protected species occurs, the DCNR staff will assess the situation to 1) prevent mortality of the animal if the animal is still alive, and 2) minimize stress to the animal by working efficiently and quickly to remove any gear and return the animal to the water once it regains its strength. If possible and without endangering the health of the animal, photographs and/or video of the animal will be acquired before administering assistance, during assistance, and after release of the animal. Photographs/videos are helpful to confirm the species, document the extent of capture, and determine the general health of the animal after release. If the animal is released alive, the staff will visibly monitor the area for 10 min. after the release for signs of distress by the released animal.

Field staff and sampling program supervisors will be familiar with reporting procedures and information requested on the PSIT form. A waterproof container containing the SOP, reporting forms, agency contact information, and tools for assisting individuals with the release of captured animals that are also approved by the federal agency with jurisdiction of the captured animal must be maintained on each vessel used for sampling where practical and safe. Only trained staff members will be permitted to handle the animals.

TABLE 12. Proposed (and Current) Monitoring and Mitigation Measures*.

Type of Activity	**Monitoring and Mitigation Measure**
General Measures Applicable to All Activities	● Coordination and Communication: In advance of each survey, ensure clear understanding of the monitoring and mitigation measures and their implementation; program managers will conduct briefings at the beginning of each activity with the vessel's crew to ensure outlined procedures are followed. ● Vessel speed: If captain or crew see protected species that may cross the vessel path, the captain will alter course or reduce speed or the crew will immediately notify the captain to alter course or reduce speed, if possible. Vessel speed will be limited to no more than 10 kts in depths less than 3 ft. ● Protected Species Training: A protected species training program will take place for all field crew every 2-3 years with a review of training procedures on a yearly basis. Training will include monitoring and sighting protocols, species identification, mitigation measures to avoid take, procedures for handling and documenting protected species interactions, and reporting requirements. ● The program manager will conduct an annual review of written protocols for avoiding interactions with protected species.
Trawling and Gillnets	● The crew will watch from the helm by scanning 360 degrees (if possible) around the vessel, for protected species during all daytime operations. ● During initial monitoring, the crew will monitor for 10 min. prior to deploying any gear. The crew must confirm that no protected species are seen within 100 m of the vessel or appear to be approaching the vessel, before gear is deployed. ● Monitoring will occur within 100 m of the station and will be continuous by the crew until the net has been retrieved. During monitoring, the crew will scan the surrounding waters with the naked eye. ● If protected species are seen within 100 m of the vessel once on site and are considered at risk of an interaction before setting the gear, the vessel must transit to a different section of the sampling area or wait at least an additional 10 min. to allow animal(s) to leave the area in order to redeploy gear. ● There will be continuous visual observations around the vessel and gear while deployed. If protected species are seen before gear retrieval, the crew will determine the best action to minimize interactions with animals. Observations of entanglement of large specimens in the gillnet will be immediately investigated to determine if they are protected species and proper procedures will be conducted for removal from the gear whether a protected species ID is confirmed or not. ● If sampling extends into dusk or nighttime hours, observations will be made with the naked eye and any available vessel lighting. ● When emptying the trawl, the cod end will be opened as close as possible to the deck in order to avoid damage to protected species (from height above the deck) that may be caught in the gear but are not visible before emptying the cod end; gear will be emptied as quickly as possible to ensure no protected species are entangled.
Beach Seine	● The crew will monitor the area for protected species prior to set and during the activity. ● If protected species are observed at the site prior to seine deployment, samplers must wait for at least 10 min. after the last sighting within 100 m of the sampling location before gear is deployed. ● The gear will be removed from the water if protected species are interacting with it. ● If protected species are observed within 10 m of the seine during its deployment, one sampler will remain stationary while the other sampler gathers the seine net out of the water while walking towards the stationary sampler. Then both samplers will walk to the shore with the seine out of the water.
Hook and Line or Rod and Reel	● Visual monitoring will occur for at least 10 min. prior to gear use. ● If protected species are seen within 100 m of the vessel or collection site and are considered at risk of an interaction before setting the gear, crew must transit to a different collection site or wait at least another 10 min. to see if the animals move away. Gear can be deployed if there are no other sightings after 10 min. ● If gear is retrieved due to the presence of protected species, setting gear can resume only if no protected species have been observed within 100 m for at least 10 min.

	● If protected species are detected in the area when gear has been deployed and are at risk of entanglement, gear retrieval will be postponed until the crew on watch determines that it is safe to retrieve the gear. ● Chumming is not allowed; uneaten bait will be removed from hooks during gear retrieval and retained on the vessel until all gear is removed from the area.
Field Activities with a Low Probability of Protected Species Interaction and Take	● Other field activities are listed in Table 1 of the application and include: ● finfish stocking ● habitat mapping with multi-beam sonar ● habitat mapping with side-scan sonar ● hydrologic sampling ● oyster monitoring dive quadrats ● oyster monitoring hand dredge ● oyster monitoring patent tongs ● continuous water quality sonde monitoring ● During the 10 min. monitoring period before deploying gear, the crew must confirm that no marine mammals or other protected species have been seen within 100 m of the vessel or appear to be approaching the vessel, before gear is deployed. ● If protected species are seen within 100 m of the vessel once on site and are considered at risk of an interaction before setting the gear, the vessel must transit to a different section of the sampling area or wait at least another 10 min. to see if the animals move away. If animals do move on, the crew will watch for another 10 min., and if there are no other sightings, the gear can be deployed. ● There will be continuous visual observations while gear is deployed. If protected species are seen before gear retrieval, the crew will determine the best action to minimize interactions with animals.
Handling Procedures for Incidentally Captured Individuals	● The field staff will maintain all NOAA required safe handling and release equipment on the vessel and will ensure that all equipment is available and in good working order prior to field activities. ● Handling Procedures: 1. The DCNR will implement NMFS established protocols to reduce injuries to protected species while gathering the most information feasible by following a stepwise order. 2. Ensure health and safety of crew. 3. Depending on how and where an animal is hooked or entangled, take action to prevent further injury to the animal. 4. Take action to increase the animal's chance of survival. 5. Record detailed information and photos during the interaction, response of the crew, and observations of the animal's behavior throughout the incident. ● Captured live or injured protected species 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. ● Data collection is helpful to estimate survival and injury rates for caught animals, but collection should not cause undue delay in releasing the animal. ● The data to be collected, if time allows, includes species identification, sex identification if genital region is visible, estimated length, disposition at release (e.g., live, dead, hooked, entangled, amount of gear remaining on the animal, etc.), and photographs. ● The crew will collect as much data as possible from hooked or entangled animals, considering the disposition of the animal; if it is in imminent danger of drowning, it will be released as quickly as possible. ● The program manager will submit a completed Protected Species Incidental Take form to the appropriate NOAA representative immediately following all incidental takes of protected species.

*This table is based on measures in NWSFC (2022), and NMFS safe handling, release, and identification workshops.

14 SUGGESTED MEANS OF COORDINATION

The DCNR will implement an adaptive management approach to evaluating takes of marine mammals that may occur during FIM surveys. In consultation with the NMFS Office of Protected Resources, if actual takes during FIM activities exceed those requested in Section 6.3 of this application, the DCNR may request changes to the mitigation measures or implement additional measures to reduce the number of takes.

15 LITERATURE CITED

Andersen, M.S., K.A. Forney, T.V. Cole, T. Eagle, R. Angliss, K. Long, L. Barre, L. Van Atta, D. Borggaard, and T. Rowles. 2008. Differentiating serious and non-serious injury of marine mammals: Report of the serious injury technical workshop. NOAA Tech. Memo. NMFS-OPR-39. 94 p.

Berens McCabe, E.J., D.P. Gannon, N.B. Barros, and R.S. Wells. 2010. Prey selection by resident common bottlenose dolphins (*Tursiops truncatus*) in Sarasota Bay, Florida. **Mar. Biol.** 157:931-942.

Blaylock, R.A. and W. Hoggard. 1994. Preliminary estimates of bottlenose dolphin abundance in southern U.S. Atlantic and Gulf of Mexico continental shelf waters. NOAA Tech. Memo. NMFS-SEFSC-356. 10 p.

Carmichael, R.H., M.R. Hodanbosi, M.L. Russell, and N.L. Wingers. 2022. Human influence on bottlenose dolphin (*Tursiops truncatus*) strandings in the northern Gulf of Mexico. **Front. Environ. Sci.** 10:951329.

Chávez-Martínez, K., E. Morteo, I. Hernández-Candelario, S.Z. Herzka, and C.A. Delfín-Alfonso. 2022. Opportunistic gillnet depredation by common bottlenose dolphins in the southwestern Gulf of Mexico: Testing the relationship with ecological, trophic, and nutritional characteristics of their prey. **Front. Mar. Sci.** 9:870012.

Chilvers, B.L. 2008. New Zealand sea lions *Phocarctos hookeri* and squid trawl fisheries: bycatch problems and management options. **Eng. Species Res.** 5(2-3):193-204.

Cloyed, C.S., B.C. Balmer, L.H. Schwacke, R.S. Wells, E.J. Berens McCabe, A.A. Barleycorn, J.B. Allen, T.K. Rowles, C.R. Smith, R. Takeshita, and F.I. Townsend. 2021. Interaction between dietary and habitat niche breadth influences cetacean vulnerability to environmental disturbance. **Ecosphere** 12(9):e03759.

Currie, J.J., S.H. Stack, and G.D. Kaufman. 2017. Modelling whale-vessel encounters: the role of speed in mitigating collisions with humpback whales (*Megaptera novaeangliae*). **J. Cetacean Res. Manage.** 17(1):57-63.

Dames, K. 2022. Impacts of high anthropogenic activity on the foraging behaviors and habitat utilization of individual bottlenose dolphins (*Tursiops truncatus*) in active and protected waters within mobile estuary in Mobile, Alabama, M.Sc. Thesis, Tuskegee University, Alabama.

Davis, R.W., G.S. Fargion, N. May, T.D. Leming, M. Baumgartner, W.E. Evans, L.J. Hansen, and K. Mullin. 1998. Physical habitat of cetaceans along the continental slope in the north-central and western Gulf of Mexico. **Mar. Mamm. Sci.** 14(3):490-507.

Davis, R.W., J.G. Ortega-Ortiz, C.A. Ribic, W.E. Evans, D.C. Biggs, P.H. Ressler, R.B. Cady, R.R Lebend, K.D. Mullin, and B. Würsig. 2002. Cetacean habitat in the northern oceanic Gulf of Mexico. **Deep-Sea Res.** I 49(1):21-142.

DISL and NOAA (Dauphin Island Sea Lab and National Oceanic and Atmospheric Association). 2023. Assessment of Alabama Estuarine Bottlenose Dolphin Population and Health. Annual Report 2022. Available at https://pub-data.diver.orr.noaa.gov/restoration/ANNUAL%20REPORT%202022.pdf

DISL and NOAA. 2024. Assessment of Alabama Estuarine Bottlenose Dolphin Population and Health. Annual Report 2023. Available at https://pub-data.diver.orr.noaa.gov/restoration/ALDP-ANNUALREPORT2023-12202023.pdf

Duffield, D.A. and R.S. Wells. 2002. The molecular profile of a resident community of bottlenose dolphins, *Tursiops truncatus*. p. 3-11 *In:* C.J. Pfeiffer (ed.) Cell and molecular biology of marine mammals. Krieger Publishing, Melbourne, FL.

Duffield, D.A., S.H. Ridgway, and L.H. Cornell. 1983. Hematology distinguishes coastal and offshore forms of dolphins (*Tursiops*). **Can. J. Zool**. 61(4):930-933.

Ellison, W.T., B.L. Southall, C.W. Clark, and A.S. Frankel. 2012. A new context-based approach to assess marine mammal behavioral responses to anthropogenic sounds. **Conserv. Biol.** 26(1):21-28.

Ellison, W.T., B.L. Southall, A.S. Frankel, K. Vigness-Raposa, and C.W. Clark. 2018. An acoustic scene perspective on spatial, temporal, and spectral aspects of marine mammal behavioral responses to noise. **Aquatic Mamm.** 44(3):239-243.

Erbe, C. 2012. The effects of underwater noise on marine mammals. p. 17-22 *In:* A.N. Popper and A. Hawkins (eds.) The effects of noise on aquatic life. Springer, New York, NY. 695 p.

Erbe, C., M.L. Dent, W.L. Gannon, R.D. McCauley, H. Römer, B.L. Southall, A.L. Stansbury, A.S. Stoeger, and J.A. Thomas. R. Schoeman, D. Peel and J.N. Smith. 2022. The effects of noise on animals. p. 459-506 *In:* C. Erbe and J. A. Thomas (eds.) Exploring Animal Behavior Through Sound: Volume 1. Springer Nature Switzerland AG.

Gannon, D.P., N.B. Barros, D.P. Nowacek, A.J. Read, D.M. Waples, and R.W. Wells. 2005. Prey detection by bottlenose dolphins, *Tursiops truncatus*: an experimental test of the passive listening hypothesis. **Animal Behav.** 69(3):709-720.

Hayes, S.A, E. Josephson, K. Maze-Foley, P.E. Rosel, J. McCordic, and J. Wallace (eds.) 2022. U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments 2022. NOAA Tech. Memo. NMFS-NE-304.

Hofmeyr, G., M. M. De, M. Beste, S. Kirkman, P. Pistorius, and A. Makhado. 2002. Entanglement of pinnipeds at Marion Island, Southern Ocean: 1991-2001. **Australian Mamm. 24**(1):141-146

Hubard, C.W., K. Maze-Foley, K.D. Mullin, and W.W. Schroeder. 2004. Seasonal abundance and site fidelity of bottlenose dolphins (*Tursiops truncatus*) in Mississippi Sound. **Aquat. Mamm.** 30(2):299-310.

Jefferson, T.A., M.A. Webber, and R.L. Pitman. 2015. Marine mammals of the world: a comprehensive guide to their identification, 2nd ed. Academic Press, London, U.K. 608 p.

Klatsky, L.J. 2004. Movement and dive behavior of bottlenose dolphins (*Tursiops truncatus*) near the Bermuda Pedestal. MSc thesis, San Diego State University.

Laist, D.W., A.R. Knowlton, J.G. Mead, A.S. Collet, and M. Podesta. 2011. Collisions between ships and whales. **Mar. Mamm. Sci.** 17(1):35-75.

Lewison, R.L., L.B. Crowder, B.P. Wallace, J.E. Moore, T. Cox, R. Zydelis, S. McDonald, A. DiMatteo, D.C. Dunn, C.Y. Kot, and R. Bjorkland. 2014. Global patterns of marine mammal, seabird, and sea turtle bycatch reveal taxa-specific and cumulative megafauna hotspots. **Proc. Nat. Acad. Sci.** 111(14):5271-5276.

Lyle, J.M., S.T. Willcox, and K. Hartmann. 2016. Underwater observations of seal–fishery interactions and the effectiveness of an exclusion device in reducing bycatch in a midwater trawl fishery. **Can. J. Fish. Aquat. Sci.** 73(3):436-444.

Mackey, A.D. 2010. Site fidelity and association patterns of bottlenose dolphins (*Tursiops truncatus*) in the Mississippi Sound. M.A. Thesis. The University of Southern Mississippi, Hattiesburg. 144 p.

Maze, K.S. and B. Würsig. 1999. Bottlenose dolphins of San Luis Pass, Texas: Occurrence patterns, site fidelity, and habitat use. **Aquat. Mamm.** 25(2):91-103.

Mead, J.G. and C.W. Potter. 1995. Recognizing two populations of the bottlenose dolphins (*Tursiops truncatus*) off the Atlantic coast of North America: morphological and ecological considerations. **IBI Reports** 5:31-44.

Miller L.J., A.D. Mackey, T. Hoffland, M. Solangi, and S.A. Kuczaj. 2010b. Potential effects of a major hurricane on Atlantic bottlenose dolphin (*Tursiops truncatus*) reproduction in the Mississippi Sound. **Mar. Mamm. Sci.** 26:707-715.

Miller, L.J., A.D. Mackey, M. Solangi, and S.A. Kuczaj II. 2013. Population abundance and habitat utilization of bottlenose dolphins in the Mississippi Sound. **Aquatic Conserv. Mar. Freshw. Ecosyst.** 23:145-151.

Morgan, L.E. and R. Chuenpagdee. 2003. Shifting gears: assessing collateral impacts of fishing methods in US waters. **Frontiers Ecol. Environ.** 1(10):517-524

Mullin, K.D., T. McDonald, R.S. Wells, B.C. Balmer, T. Speakman, C. Sinclair, E.S. Zolman, F. Hornsby, S.M. McBride, K.A. Wilkinson, and L.H. Schwacke. 2017. Density, abundance, survival, and ranging patterns of common bottlenose dolphins (*Tursiops truncatus*) in Mississippi Sound following the *Deepwater Horizon* oil spill. **PLoS ONE** 12(10):e0186265.

NRC (National Research Council). 2005. Marine mammal populations and ocean noise/Determining when noise causes biologically significant effects. U.S. Nat. Res. Counc., Ocean Studies Board, Committee on characterizing biologically significant marine mammal behavior (Wartzok, D.W., J. Altmann, W. Au, K. Ralls, A. Starfield, and P.L. Tyack). Nat. Acad. Press, Washington, DC. 126 p.

NMFS (National Marine Fisheries Service). 2018. Final Programmatic Environmental Assessment for Fisheries Research Conducted and Funded by the Northwest Fisheries Science Center. Anchorage, AK, National Marine Fisheries Service and URS Group. 412 p.

NMFS. 2019. Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to Office of Naval Research Arctic Research Activities. **Fed. Reg.** 84(185, 24 September):37240-37262.

NOAA. 2023a. List of Fisheries for 2024; Proposed rule, request for comment. **Fed. Reg.** 88(176, 13 September): 62748-62769.

NOAA. 2023b. List of Fisheries for 2023; Final rule. **Fed. Reg.** 88(54, 21 March):16899-16919.

NOAA. 2023c. Commercial landings. Available at https://www.fisheries.noaa.gov/foss/f?p=215:200:1357320544596:Mail:NO:::.

Nowacek, D.P., L.H. Thorne, D.W. Johnston, and P.L. Tyack. 2007. Responses of cetaceans to anthropogenic noise. **Mamm. Rev.** 37(2):81-115.

NWFSC (Northwest Fisheries Science Center). 2022. Petition for promulgation of regulations and request for letter of authorization pursuant to Section 101 (a) (5) (A) of the Marine Mammal Protection Act for the taking of marine mammals incidental to fisheries and ecosystem research conducted and funded by the Northwest Fisheries Science Center. Submitted by Northwest Fisheries Science Center. Prepared by ECO49 Consulting, LLC.

Quintana-Rizzo, E. and R.S. Wells. 2001. Resighting and association patterns of bottlenose dolphins (*Tursiops truncatus*) in the Cedar Keys, Florida: Insights into social organization. **Can. J. Zool.** 79(3):447-456.

Redfern, J.V., M.F. McKenna, T.J. Moore, J. Calambokidis, M.L. Deangelis, E.A. Becker, J. Barlow, K.A. Forney, P.C. Fiedler, and S.J. Chivers. 2013. Assessing the risk of ships striking large whales in marine spatial planning. **Conserv. Biol.** 27(2):292-302.

Reeves, R.R., K. McClellan, and T.B. Werner. 2013. Marine mammal bycatch in gillnet and other entangling net fisheries, 1990 to 2011. **Endang. Species Res.** 20(1):71-97.

Richardson, W.J., C.R. Greene, Jr., C.I. Malme, and D.H. Thomson. 1995. Marine mammals and noise. Academic Press, San Diego. 576 p.

Rosel, P.E., L.A. Wilcox, C. Sinclair, T.R. Speakman, M.C. Tumlin, J.A. Litz, and E.S. Zolman. 2017. Genetic assignment to stock of stranded common bottlenose dolphins in southeastern Louisiana after the Deepwater Horizon oil spill. **Endang. Species Res.** 33:221-234.

Ruppel, C.D., T.C. Weber, E.R. Staaterman, S.J. Labak, and P.E. Hart. 2022. Categorizing active marine acoustic sources based on their potential to affect marine animals. **J. Mar. Sci. Eng.** 10:1278.

Scott, G.P., D.M. Burn, L.J. Hansen, and R.E. Owen. 1989. Estimates of bottlenose dolphin abundance in the Gulf of Mexico from regional aerial surveys. CRD 88/89-07. Available from: NMFS, Southeast Fisheries Science Center, 75 Virginia Beach Dr., Miami, FL 33149.

Scott, M.D., R.S. Wells, and A.B. Irvine. 1990. A longterm study of bottlenose dolphins on the west coast of Florida. p. 235-244 *In:* S. Leatherwood and R.R. Reeves (eds.) The Bottlenose Dolphin, Academic Press: San Diego, CA.

SEFSC (Southeast Fisheries Science Center). 2016. Request for rulemaking and letters of authorization under Section 101 (a) (5) (A) of the Marine Mammal Protection Act for the take of marine mammals incidental to fisheries research activities conducted by NOAA Fisheries Southeast Fisheries Science Center within the Atlantic Ocean, Gulf of Mexico and Puerto Rico/Virgin Islands Ecosystems. Submitted by Southeast Fisheries Science Center.

Sellas, A.B., R.S. Wells, and P.E. Rosel. 2005. Mitochondrial and nuclear DNA analyses reveal fine scale geographic structure in bottlenose dolphins (*Tursiops truncatus*) in the Gulf of Mexico. **Conserv. Genet.** 6(5):715-728.

Shane, S.H. 2004. Residence patterns, group characteristics, and association patterns of bottlenose dolphins near Sanibel Island, Florida. **G. Mex. Sci.** 22(1):1-12.

Sinclair, C. 2016. Comparison of group size, abundance estimates and movement patterns of common bottlenose dolphins (*Tursiops truncatus*) in Mississippi Sound, Mississippi. M.Sc. Thesis, Louisiana State University, Baton Rouge. 68 p

Smith, C.E., B.J. Hurley, C.N. Toms, A.D. Mackey, M. Solangi, and S.A. Kuczaj II. 2013. Hurricane impacts on the foraging patterns of bottlenose dolphins *Tursiops truncatus* in Mississippi Sound. **Mar. Ecol. Prog. Ser.** 487:231-244.

Southall, B.L., A.E. Bowles, W.T. Ellison, J.J. Finneran, R.L. Gentry, C.R. Greene Jr., D. Kastak, D.R. Ketten, J.H. Miller, P.E. Nachtigall, W.J. Richardson, J.A. Thomas, and P.L. Tyack. 2007. Marine mammal noise exposure criteria: initial scientific recommendations. **Aquat. Mamm.** 33(4):411-522.

Southall, B.L., J.J. Finneran, C. Reichmuth, P.E. Nachtigall, D.R. Ketten, A.E. Bowles, W.T. Ellison, D.P. Nowacek, and P.L. Tyack. 2019. Marine mammal noise exposure criteria: updated scientific recommendations for residual hearing effects. **Aquatic Mamm.** 45(2):125-232.

Southall, B.L., D.P. Nowacek, A.E. Bowles, V. Senigaglia, L. Bejder, and P.L. Tyack. 2021. Marine mammal noise exposure criteria: assessing the severity of marine mammal behavioral responses to human noise. **Aquatic Mamm.** 47(5):421-464.

Stevenson, D., L. Chiarella, D. Stephan, R. J. Reid, K. Wilhem, J. McCarthy, and M. Pentony. 2004. Characterization of the fishing practices and marine benthic ecosystems of the Northeast U.S. Shelf, and an evaluation of the potential effects of fishing on essential fish habitat. NOAA Technical Memorandum NMFS-NE-181, National Fisheries Service. 179 p.

Vanderlaan, A.S. and C.T. Taggart. 2007. Vessel collisions with whales: the probability of lethal injury based on vessel speed. **Mar. Mamm. Sci.** 23(1):144-156.

Vollmer, N.L. and P.E. Rosel. 2017. Fine-scale population structure of common bottlenose dolphins (*Tursiops truncatus*) in offshore and coastal waters of the US Gulf of Mexico. **Mar. Biol**. 164:1-15.

Walker, J.L., C.W. Potter, and S.A. Macko. 1999. The diets of modern and historic bottlenose dolphin populations reflected through stable isotopes. **Mar. Mamm. Sci.** 15(2):335-350

Wartzok, D., A.N. Popper, J. Gordon, and J. Merrill. 2004. Factors affecting the responses of marine mammals to acoustic disturbance. **Mar. Technol. Soc. J.** 37(4):6-15.

Weilgart, L. 2017. Din of the deep: noise in the ocean and its impacts on cetaceans. p. 111-124 *In:* A. Butterworth (ed.) Marine mammal welfare human induced change in the marine environment and its impacts on marine mammal welfare. Springer Nature, Germany.

Wells, R.S. and M.D. Scott. 2018. Bottlenose dolphin, *Tursiops truncates*, common bottlenose dolphin. p. 118-123 *In*: B. Würsig, J.G.M. Thewissen, and K.M. Kovacs (eds.) Encyclopedia of Marine Mammals, 3rd ed. Academic Press/Elsevier, San Diego, CA. 1157 p.

Wiley, D.N., C.A. Mayo, E.M. Maloney, and M.J. Moore. 2016. Vessel strike mitigation lessons from direct observations involving two collisions between noncommercial vessels and North Atlantic right whales (*Eubaleana glacialis*). **Mar. Mamm. Sci.** 32(4):1501-1509.

Würsig, B., T.A. Jefferson, and D.J. Schmidly. 2000. The marine mammals of the Gulf of Mexico. Texas A&M University Press, College Station, TX. 232 p.