

2013-2018

Southeast Fisheries Science Center Science Plan



NOAA Southeast Fisheries Science Center Science Plan

Executive Summary

The National Marine Fisheries Service (NOAA Fisheries) provides stewardship of living marine resources for the benefit of the nation through their science-based conservation and management and promotion of the health of their environment. In the southeastern United States, that science is produced by NOAA Fisheries, Southeast Fisheries Science Center (SEFSC). Scientific data, information, and advice produced by the SEFSC represent a foundation of knowledge upon which living marine resource managers in the southeastern United States depend. SEFSC science is used for making informed decisions for maintaining healthy marine ecosystems and productive and sustainable fisheries, restoring depleted populations and damaged habitats, and recovering populations of protected, threatened, and endangered species. The region is large and unique, comprising three large marine ecosystems under federal management jurisdiction measuring nearly eight million square miles in size. The federal region borders Mexico, Cuba, and jurisdictions of other Caribbean countries. This necessitates cooperative international research and management, making strategic transboundary engagement paramount.

SEFSC's Science Plan addresses research activities, infrastructure and support services envisioned for the next 3-5 years with the following research themes.

- 1. Monitor and assess fisheries and marine ecosystems, including populations of exploited and protected species, their habitats, and the associated human communities that rely on these resources.*
- 2. Understand and forecast effects of natural and anthropogenic processes and threats (including climate change) on living marine resources and habitats.*
- 3. Describe and assess the role of habitat in supporting healthy marine ecosystems and populations of exploited and protected species.*

An Implementation Process accompanies the Science Plan to serve as a framework for resource allocation, decision-making, and communication to accomplish core activities and high priority research. The Science Plan and the Implementation Process work together as guiding strategic documents for the SEFSC.

Background and Purpose

Living marine resources are managed for public benefit (Figure 1). In this regard, NOAA's Southeast Fisheries Science Center (SEFSC) monitors and conducts scientific investigations in support of the management of living marine resource in the southeastern United States. It is incumbent on the SEFSC to maximize the potential value of its research by wisely defining, assessing, and directing future scientific efforts within its research mission. The following strategic science plan identifies the portfolio of SEFSC science activities, consisting of three major themes with 13 subcategories or foci (Table 1). It also identifies within the portfolio particular areas of core research that are of significant strategic importance and consequently should receive priority under any future funding scenario.



Figure 1. Recreational marine fisheries in the southeast region are the largest in the United States.

Table 1. SEFSC research themes and related foci.
Theme 1: Monitor and assess fisheries and marine ecosystems, including populations of exploited and protected species, their habitats, and the associated human communities that rely on marine resources
Monitor exploited fishery stocks, protected species, and other living marine resources
Provide science advice and products necessary to achieve the management objectives of NOAA Fisheries, fishery management councils, state commissions and international organizations
Improve and expand biological, social, and economic data collection in support of living marine resource assessments
Develop and promote more efficient, less destructive, and less wasteful fishing gear
Conduct integrated ecosystem assessments to enhance or replace existing single-stock assessments
Theme 2: Understand and forecast effects of climate change and other factors on marine ecosystems
Monitor change and conduct research to better understand the effects of environmental factors, including climatic change, on marine ecosystems and on people that depend on ecosystem goods and services.
Conduct research to better understand ecological interactions within and among species
Conduct research to better understand the direct impacts of changing temperature, ocean acidification, and sea level rise on marine populations
Conduct research to forecast indirect effects of climate and other change on fish, invertebrate, and protected species
Theme 3: Describe and assess the role of habitats in supporting healthy marine ecosystems and populations of fish, invertebrates, and protected species
Assess and evaluate the importance of different habitat types for managed populations of fishery and protected species.
Evaluate and forecast fishery impacts on marine ecosystems and develop mitigation strategies and tools for habitat restoration
Develop capabilities and evaluate impacts of non-fishing human activities on marine habitats and ecosystems.
Provide information and analyses in support of coastal and marine spatial planning

National Priorities for Ocean Research

NOAA Fisheries is responsible for the stewardship of living marine resources for the benefit of the nation through their science-based conservation and management and promotion of the health of their environment. NOAA Fisheries plays a supportive and advisory role in the management of living marine resources in coastal areas under state and local jurisdictions, provides scientific and policy leadership in the international arena, and implements international conservation and management measures per treaty and convention obligations.

Because a myriad of natural and anthropogenic factors affect living marine resources and marine ecosystems, the agency collects, maintains, and analyzes scientific information to inform policymakers and managers about the conditions and factors that influence marine ecosystems. Understanding and predicting the health and productivity of marine ecosystems is critical to the mission of stewardship for providing employment, food, and economic security for the public wellbeing.

NOAA maintains five strategic research priorities, the first three of which are addressed by the SEFSC:

- 1. Enhancing NOAA's climate services in support of the nation's need for sound, scientifically-backed policies and programs to respond to climate change*
- 2. Supporting comprehensive marine spatial planning, where NOAA can help the nation reconcile competing demands on ocean and coastal resources*
- 3. Ensuring the sustainability of marine fisheries, where NOAA can simultaneously strengthen ocean ecosystems and local economies*
- 4. Strengthening Arctic science and stewardship, where NOAA can help to improve our understanding of changing climate and environmental condition and better inform policy options and management responses to the unique challenges in the Arctic region*
- 5. Sustaining satellite-based earth observations.*

"We have a stewardship responsibility to maintain healthy, resilient, and sustainable oceans, coasts, and Great Lakes resources for the benefit of this and future generations. Yet, the oceans, coasts, and Great Lakes are subject to substantial pressures and face significant environmental challenges. Challenges include water pollution and degraded coastal water quality caused by industrial and commercial activities both onshore and offshore, habitat loss, fishing impacts, invasive species, disease, rising sea levels, and ocean acidification. Oceans both influence and are affected by climate change. They not only affect climate processes but they are also under stress from the impacts of climate change. Renewable energy, shipping, and aquaculture are also expected to place growing demands on ocean and Great Lakes resources."

President Barack Obama

Role of the Southeast Fisheries Science Center

The SEFSC partners with many organizations to manage living marine resources throughout the U.S. Gulf of Mexico, U.S. South Atlantic, U.S. Caribbean Sea, and Western Atlantic Ocean. Inshore and coastal habitats fall under the jurisdictions of eight southeastern states, Puerto Rico, and U.S. Virgin Islands. Offshore habitats on and above the continental shelf, extending out to 200 nm are federally managed. Habitats farther offshore are managed under the jurisdiction of the International Committee for the Conservation of Atlantic Tunas (ICCAT) (Figure 2). The objective of science-based management in all jurisdictions is to achieve healthy marine ecosystems with sustainable and productive populations that provide long-term economic and social benefits involving fishing, recreation, tourism, and other activities. Management also strives to rebuild overexploited populations, restore damaged habitats, and forecast the effects of ecosystem-level changes on biota.



Figure 2. Marine ecosystems addressed by SEFSC research are within geographic areas defined by multiple management jurisdictions. Inshore and coastal habitats are under the jurisdiction of eight southeastern states, Puerto Rico, and U.S. Virgin Islands. The area from the outer boundary of state jurisdictions, extending out to 200 nm offshore is managed by NOAA Fisheries. Conservation of tunas and tuna-like species in the Atlantic Ocean and adjacent seas is carried out through ICCAT.

The Southeast U.S. region is characterized by:

- Large marine recreational fisheries
- Three large marine ecosystems
- The only shallow-water coral reefs in the continental United States
- Rich and complex marine biological diversity
- Significant commercial fisheries in weight and value
- Spawning areas for highly migratory fish species
- Tropical and subtropical habitats with hundreds of stocks of commercial and recreational value
- Shared responsibility for management of transboundary stocks
- Over half of the nation’s oil and natural gas production and refining capacity
- Significant growth in coastal population

The SEFSC conducts research and monitors natural resources to better understand and predict resource condition, and promote wise conservation practices. Primary legislative authorities and mandates that direct SEFSC in this mission, and example partner entities that collaborate with the SEFSC in this effort are listed in [Table 2](#). Although not listed in the table, the SEFSC coordinates and collaborates with dozens of additional federal, state, and local agencies, academic institutions, cooperative institutes, industry, and international and non-governmental organizations.

Table 2. Legislation and primary entities that provide for living marine resource management in the southeastern region.
Legislation:
Atlantic Tunas Convention Act of 1975 (ATCA)
Coastal Zone Management Act of 1972 (CZMA)
Convention on International Trade in Endangered Species (CITES)
Coral Reef Conservation Act of 2000
Endangered Species Act of 1973 (ESA)
Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006 (MSRA)
Marine Mammal Protection Act of 1972 (MMPA)
National Environmental Policy Act of 1970 (NEPA)
National Marine Sanctuaries Act of 1972 (NMSA)
Entities and Partners:
Atlantic States Marine Fisheries Commission (ASMFC)
Gulf States Marine Fisheries Commission (GSMFC)
South Atlantic Fishery Management Council (SAFMC)
Caribbean Fishery Management Council (CFMC)
Gulf of Mexico Fishery Management Council (GMFMC)
Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC)
International Commission for the Conservation of Atlantic Tunas (ICCAT)
International Council for the Exploration of the Sea (ICES)
International Whaling Commission (IWC)
IUCN Marine Turtle Specialist Group (IUCN MTSG)

Research Themes

RESEARCH THEME 1: Monitor and assess fisheries and marine ecosystems, including populations of exploited and protected species, their habitats, and the associated human communities that rely on marine resources

The SEFSC collects and analyzes scientific data on the condition, trends, and causes of change for living resources in three large marine ecosystems and for highly migratory species in the Western North Atlantic. This effort includes over 400 managed species. The first four Research Foci within this theme directly support these responsibilities and are considered 'core' activities that the SEFSC is mandated to continue under the most restrictive budget scenario. The fifth focus is a mandate that might be supported, depending on funding availability and priorities.

Research Foci for Research Theme 1

➤ MONITOR EXPLOITED FISHERY STOCKS, PROTECTED SPECIES, AND OTHER LIVING MARINE RESOURCES

SEFSC stock assessments and other scientific products mandated by the Magnuson-Stevens Reauthorization Act (MSRA) provide critical information for regional fishery management councils to achieve optimum yield for exploited species and prevent overfishing by determining minimum stock size and establishing annual catch limits (ACLs). Assessments of population status also support consultations and listings of protected, endangered, and threatened species under the Marine Mammal Protection Act (MMPA) and Endangered Species Act (ESA). The need for more accurate and precise assessments and growing conflicts among users has substantially increased the importance of having strong science to inform management decisions.

To achieve these goals the SEFSC conducts a wide variety of research and monitoring needed to support stock assessments of exploited and protected species. Data are collected on fishing effort, total landings, and bycatch, as well as economic and social information to evaluate impacts on people and coastal communities that depend on healthy populations of living marine resources. Field surveys and laboratory studies are conducted to determine population abundance, age composition, maturity, fecundity, spatial stock structure, feeding preferences, growth rates, spawning behavior, habitat usage, and natural and fishing mortality. Marine mammal and sea turtles stranding response programs collect data to determine causes of mortality and to help assess the condition of healthy animals. A suite of activities are needed to support resource management. The SEFSC surveys, collects, analyzes, maintains, and archives data for economically and ecologically important fishery and protected species, and predicts and evaluates ecological and human outcomes of management actions. The accompanying infrastructure, including adequate staffing for these activities, must be sustained.

➤ PROVIDE SCIENCE ADVICE AND PRODUCTS NECESSARY TO ACHIEVE THE MANAGEMENT OBJECTIVES OF NOAA FISHERIES, FISHERY MANAGEMENT COUNCILS, STATE COMMISSIONS AND INTERNATIONAL ORGANIZATIONS

The SEFSC is unique in providing scientific information for three fishery management councils, two state fisheries commissions, and for highly migratory species in the high seas of the Western Atlantic Ocean.

This information is also shared with numerous other federal, state, local partners including industry, non-governmental organizations and the public. Obligations include quota monitoring and analyses required by legal and regulatory processes, basic biological information necessary to evaluate the implication of management actions on marine ecosystems, fishery stocks and protected resources, and information on social and economic impacts on people. Scientific support includes maintaining fishery observer programs and the collection, maintenance, and analysis of commercial and recreational data on landings, bycatch, and effort; predicting ecological and socioeconomic effects of management proposals; and participation in international, national, and regional working groups. Analytical tools include retrospective and prospective management strategy evaluations, socioeconomic surveys, and model-based evaluations.

➤ IMPROVE AND EXPANDED BIOLOGICAL, SOCIAL, AND ECONOMIC DATA COLLECTIONS IN SUPPORT OF LIVING MARINE RESOURCE ASSESSMENTS

Better management of living marine organisms under SEFSC jurisdiction requires basic life-history information, scientific surveys, fishery indices, and landing histories. In the southeast, and particularly in the Caribbean, data availability is limited, despite the fact that fishing communities are highly dependent on marine resources for income and sustenance. The rich biological diversity in the region is also a challenge for data collection and for understanding and predicting fishery impacts. A deeper understanding of the socio-economic impacts of management is also required.

In addition, stock assessments need to be elevated to higher standards in order to achieve goals of ecosystem based management that will adequately incorporate environmental changes and ecosystem considerations, while optimizing sustainable landings. Scientific uncertainty must be incorporated into stock assessment models to better forecast the biologically allowable level of fishing for exploited species and increase the ability to provide population estimates, evaluate stock structure, and assess abundance trends for protected species. Because of limited resources, less than half of the protected species stocks for which the SEFSC is responsible have been assessed. Hence a major focal area for the SEFSC is to expand data collections to reduce scientific uncertainty and improve the accuracy and precision of stock assessments through the following actions:

- 1) Enhance information content in stock assessments
 - a. Use more efficient and spatially comprehensive surveys
 - b. Fill in gaps in key life-history information such as reproduction, age and growth, and stock structure
 - c. Use advanced technology to improve survey data collection
 - d. Increase precision of data from commercial and recreational fisheries
 - e. Improve commercial fishery observer coverage
 - f. Collaborate with partners to improve catch and bycatch information used in assessments
- 2) Improve stock assessment models to fully incorporate scientific uncertainty and biological and environmental realities

- a. Incorporate habitat data into spatially and temporally explicit models for fished and protected species
 - b. Collect better information on age-specific population growth and mortality to improve assessment models
 - c. Improve methods to provide annual catch limits (ACL) for stocks with limited data
 - d. Train new quantitative scientists capable of developing new modeling approaches
- 3) Improve social and economic science
- a. Design improved social and economic data collection programs
 - b. Develop models to evaluate the economic performance of fishery policies
 - c. Evaluate cultural impacts of fishery policies on fishers and fishing communities
 - d. Provide research results and policy advice to fishery management councils
 - e. Supply social science support for other NOAA Fisheries programs
 - f. Help train next generation of fishery economists and sociologists

➤ DEVELOP AND PROMOTE MORE EFFICIENT, LESS DESTRUCTIVE, AND LESS WASTEFUL FISHING GEAR

NOAA Fisheries has obligations to monitor and reduce bycatch of fishes, marine mammals, sea turtles, seabirds, and other organisms per MSRA, ESA, and MMPA. Reducing bycatch has become a central national and global concern of commercial and recreational fishing industries, resource managers, conservation organizations, scientists, and the public. Reducing bycatch is essential for maintaining healthy marine ecosystems and productive fisheries. The SEFSC is experienced with developing more selective fishing gear such as turtle excluder devices (TEDs) and bycatch reduction devices (BRDs). Requirements for use of TEDs have been in place in the Gulf of Mexico shrimp trawl fishery for several decades and are being evaluated for skimmer trawl and longline fisheries in the southeast. These gear modifications have played an important role in the recovery of fish and sea turtle populations while maintaining viable commercial fisheries. SEFSC researchers also collaborate with fishers to develop and evaluate new fishing methods and gear to resolve bycatch problems in trawl, longline, trap, and other static gear fisheries. Once implemented in a fishery, industry outreach efforts by SEFSC gear specialists are used to ensure effective use, troubleshoot operational issues, and train law enforcement personnel on how to inspect regulated fishing gear.

➤ CONDUCT INTEGRATED ECOSYSTEM ASSESSMENTS TO INCORPORATE OR REPLACE EXISTING SINGLE-STOCK ASSESSMENTS

Develop integrated monitoring and analyses of Large Marine Ecosystems (LMEs) that incorporate multiple ecosystem components (living organisms, mammals, sea turtles, oceanography, climate, and human dimensions). LMEs are large areas of ocean, approximately 200,000 km² or greater, adjacent to the continents in coastal waters where primary productivity is generally higher than in the open ocean. Unlike other geographical ocean boundaries, LMEs are defined by ecological rather than political or economic criteria.

NOAA is moving from single-species management to an Ecosystem-Based Approach to Fishery Management (EBFM) to better predict ocean and coastal resource changes and manage human

activities. EBFM requires developing an understanding of how atmospheric and oceanic processes interact with habitat and fisheries to influence marine populations and ecosystem productivity. Forecasting these impacts requires an understanding of the factors controlling primary production, predator-prey interactions, climate, human behavior, and the interactions between factors. Monitoring these impacts requires developing new and improved ecosystem indicators of fishing, habitat loss, and climate impacts on living marine resources.

Achieving effective EBFM requires the ecosystem-level data gathering and synthesis known as Integrated Ecosystem Assessment (IEA) for each of the Large Marine Ecosystems (LMEs). An IEA is the synthesis and analysis of all available relevant information on physical, chemical, ecological, and human processes in relation to specified ecosystem management objectives. IEAs provide an efficient means of summarizing the status of ecosystem components, screening and prioritizing potential risks, and evaluating alternative management strategies against a backdrop of environmental (e.g., temporal and spatial) variability. IEAs also provide a means of evaluating tradeoffs in management objectives among potentially competing ocean-use sectors. Although all three LMEs in the southeast lack fully developed IEAs, the SEFSC has begun to build a formal Gulf of Mexico IEA. That effort spans NOAA line offices, several universities, as well as international agencies via the Gulf of Mexico Large Marine Ecosystem project. As part of the IEA development, an Ecosystem Status Report (ESR) for the Gulf of Mexico is being initiated.

RESEARCH THEME 2: *Understand and forecast effects of climate change other factors on marine ecosystems*

All marine ecosystems in the southeastern United States are potentially vulnerable to climate change and environmental variability. Important predicted physical effects include increased water temperature, ocean acidity, sea level, and frequency and intensity of tropical storms and hurricanes. These factors could interact and impact marine ecosystems in complex and unpredictable ways with direct and indirect economic and social consequences. Biological responses may involve spatial changes in habitat distribution and quality; shifts in species composition, population abundance, distribution, connectivity and recovery; changes in organism physiology; and changes in ecosystem resiliency and fishery productivity. The SEFSC currently has extensive monitoring programs designed to detect and measure changes in populations of exploited and protected species, habitat, and fisheries, but seeks to improve its ecosystem monitoring and assessment capabilities to better understand, predict, and respond to climate change in the region. An improved scientific understanding of climate is necessary to inform decision makers so they can develop appropriate management strategies. The first step is to measure significant changes in fisheries, protected species, and ecosystem processes. The next steps include determining the causes and mechanisms of change, evaluating important interactions between different factors, and distinguishing between manageable and unmanageable factors necessary to elucidate and facilitate responsive strategies.

Research Foci for Research Theme 2

- MONITOR CHANGE AND CONDUCT RESEARCH TO BETTER UNDERSTAND THE EFFECTS OF ENVIRONMENTAL FACTORS, INCLUDING CLIMATIC CHANGE, ON MARINE ECOSYSTEMS AND ON PEOPLE THAT DEPEND ON ECOSYSTEM GOODS AND SERVICES

The SEFSC will develop the scientific basis for evaluating the vulnerability, condition, and sustainability of marine resources and their human systems under changing climate conditions. SEFSC laboratories will conduct collaborative interdisciplinary and shared climate research using laboratory, field, and modelling approaches to predict regional effects of climate and environmental variability on marine ecosystems and people in southeastern United States.

Tropical and subtropical coastlines in the southeast region are subjected to frequent and often violent tropical storms and hurricanes which may become more intense and perhaps more frequent due to climate change. Sea level rise creates risks to human communities and to the critical nursery grounds, nesting beaches, and other habitats that support living marine resources and human activities in the region. Predicted temperature changes may affect spawning cycles, growth, and mortality. Sea turtle sex, for example, is determined by nest temperature. Warm temperatures have caused massive mortalities of reef-building corals in the southeast region and shifts in distribution of important commercial species of fish. SEFSC research on marine ecosystem changes in the Gulf of Mexico, the western Atlantic Ocean, and the Caribbean Sea will inform management bodies (Table 2) to help mitigate detrimental ecological, social, and economic impacts. SEFSC research will focus on strategic agency needs and leverage its resources through collaborations with federal, state, and local agencies, academic institutions, industry, private, and non-governmental organizations.

- CONDUCT RESEARCH TO BETTER UNDERSTAND ECOLOGICAL INTERACTIONS WITHIN AND AMONG SPECIES

Climate change may affect people by changing fishery productivity through variations in recruitment strength and prey availability, ecosystem resilience to disturbance, and recovery potential of exploited and protected species. This research seeks to better measure, understand, and predict major spatial and seasonal patterns in marine ecosystem structure (e.g., population age and size structure, distribution, and abundance), and function (e.g., processes that influence populations, such as primary production, competition, feeding relationships, disease, parasitism, and life history features involving reproduction, dispersal, and growth).

SEFSC research will use an ecosystem-based approach to conduct modeling studies and targeted field and laboratory research on key ecological and biological interactions that most likely influence ecosystem dynamics and processes ultimately important to people. These include primary productivity, predator-prey interactions, inter- and intra-specific competition, parasitism, and pathogens which can influence the survival, growth, and reproductive success of living marine organisms. SEFSC resources will be leveraged through partnerships and collaborations with other regional research institutions.

➤ CONDUCT RESEARCH TO BETTER UNDERSTAND THE DIRECT IMPACTS OF CHANGING TEMPERATURE, OCEAN ACIDIFICATION, AND SEA LEVEL RISE ON MARINE POPULATIONS

Understand the effect of ocean acidification on fisheries, habitat, and ecologically important, exploited and protected living marine organisms.

Increased ocean acidification is a major concern for fishery and protected species. Tropical coral reefs are particularly susceptible to effects of ocean acidification due to the importance of calcification processes in ecosystem structure and function. Ocean acidification alters the complex chemical carbonate balance, causing stress in calcifying organisms by increasing the bioenergetic costs of calcification. Ocean acidification will likely impact the ability of marine calcifiers, including corals and other ecologically important species to make shells and skeletons from calcium carbonate. Altered availability of various forms of inorganic carbon may also have important impacts on marine plants such as seagrasses and macroalgae, as well as cyanobacteria and phytoplankton. There is also mounting evidence that ocean acidification may further impair early life history bottlenecks (e.g., fertilization, settlement, larval development) for urchins, mollusks, corals, and fishes. Such profound population and functional changes in the ecosystem could affect fish, invertebrates, sea turtles, marine mammals, and seabirds through habitat alteration and potential decreased prey abundance. SEFSC will conduct diagnostic monitoring to track such changes and participate and partner in research efforts to further investigate the potential population and functional impacts of ocean acidification on marine ecosystems. Species-specific study results need to be incorporated into population and ecosystem models to forecast population responses and ecosystem level impacts.

➤ CONDUCT RESEARCH TO FORECAST INDIRECT EFFECTS OF CLIMATE AND OTHER CHANGE ON FISH, INVERTEBRATE, AND PROTECTED SPECIES

Use forecasts of population changes in response to climate change (ocean warming, ocean acidification) on exploited, ecologically important, and protected species to predict social and economic effects on coastal commercial fishing communities, and recreational fishing and tourism in the southeast region.

Marine ecosystems in the southeastern U.S. support a robust tourism economy with more recreational fishing and diving participation than anywhere else in the country. The economy of coastal communities also depends a great deal on commercial fishing to provide employment and supply the nation and tourist destinations with high quality, locally-caught seafood. While the SEFSC seeks to understand direct environmental effects on exploited marine populations, it is also critical to predict more subtle and indirect changes of economic and social importance that may occur in response to climate change. It will be important to determine if climate change will create long-term shifts in habitat and population abundance and distribution. Some goals of this effort are to provide scientific information that helps sustain healthy commercial and recreational fishing economies and an ongoing subsistence lifestyle along the Gulf and southeast U.S. coasts. Potential changing interactions between fisheries and populations require evaluating tradeoffs between conflicting activities. For example, industrial fishing on forage and bait fishes may have indirect effects on game fish of economic and social importance that need to be considered in an ecosystem management context.

RESEARCH THEME 3: Describe and assess the role of habitats in supporting healthy marine ecosystems and populations of fish, invertebrates, and protected species

The SEFSC conducts research to understand the role habitat plays in the health and sustainability marine ecosystems and populations of fish, invertebrates, and protected species

Research Foci for Research Theme 3

- ASSESS AND EVALUATE THE IMPORTANCE OF DIFFERENT HABITAT TYPES FOR MANAGED POPULATIONS OF FISHERY AND PROTECTED SPECIES

The SEFSC conducts spatially explicit, fishery-independent habitat surveys, assessments, and research to evaluate regulatory effectiveness and determine impacts of fishery and other human activities on essential habitats essential for sustaining of living marine resources. The SEFSC collaborates with other governmental agencies and non-governmental organizations to leverage its resources and achieve its goals.

Under the MSRA, NOAA Fisheries minimizes damaging effects of fishing and non-fishing activities by designating Essential Fish Habitat (EFH), defined as "...those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." EFH includes living organisms and nonliving structures on the bottom, surface, and in the water column in coastal, continental shelf, and oceanic environments. Examples of EFH include coastal estuaries, coral reefs, and ocean frontal zones.

Under the ESA, the federal government designates critical habitat for all listed species. Under the MMPA, effort is focused on protecting and conserving critical habitat for marine mammals. Critical habitat is defined as areas within the geographical area occupied by listed species if these areas contain physical or biological features essential to conservation. Critical habitat may require special management considerations or protection. Also, if the agency determines that specific areas outside the geographical area occupied by the species are essential for conservation; those areas as well may require special management.

Surveys of ocean and coastal benthic habitats are essential to SEFSC's responsibilities under many acts. The SEFSC also conducts coastal habitat assessments for ESA stock assessments, oil spill response, damage assessment, and restoration activities.

- EVALUATE AND FORECAST FISHERY IMPACTS ON MARINE ECOSYSTEMS AND DEVELOP MITIGATION STRATEGIES AND TOOLS FOR HABITAT RESTORATION

SEFSC scientists evaluate fishing impacts on ecosystem health, defined as the sustained ability for self-renewal, and transmit scientific advice to managers to promote and sustain ecosystem health. Science activities include studies to reduce bycatch and habitat damage from fishing, and developing mitigation strategies and tools to restore damaged habitats.

Assessment of historical, present, and future states of marine ecosystems and the impacts of people and climate on ecosystem condition are crucial for providing scientific information required to implement ecosystem-based fishery management. EBFM is used to evaluate fishery impacts on fishery target species, habitat, and non-target species with ecological, economic, and social significance. Management actions range from providing protection to restore endangered species populations to preventing new fisheries from starting on key food web components such as forage fish. SEFSC research evaluates the effectiveness of fishery regulations and possible alternative mitigation approaches for policymakers and managers to consider. For example, SEFSC coral reef research has been used to design and locate Marine Protected Areas (MPAs) that accomplish multiple objectives, such as protecting critical habitat, supporting reef fisheries, enhancing tourism and educational opportunities, and promoting public understanding and appreciation of coral reef ecosystems. SEFSC coral reef research has also elucidated relationships between population connectivity and physical oceanography. Continued research also seeks to balance potentially conflicting objectives to ensure sustainable fisheries, marine ecosystem persistence, and the well-being of people who depend on these ecosystem services.

➤ DEVELOP CAPABILITIES AND EVALUATE IMPACTS OF NON-FISHING HUMAN ACTIVITIES ON MARINE HABITATS AND ECOSYSTEMS

This focus will evaluate a range of human activities on living marine resources, including habitat impacts of coastal development, runoff, and pollution on the sustained productivity and health of living marine resources. Rapidly growing human populations in the southeastern United States with multiple values and diverse activities increase the potential for impacts from non-fishery related activities on exploited, protected, and other living marine organisms, particularly for coral reefs and estuarine-dependent species. Managers continue to need information about how these activities potentially impact habitats for fishery and protected species and how to mitigate those impacts.

SEFSC research, for example, plays a key role in adaptive management involving Everglades Restoration through the Comprehensive Everglades Restoration Program (CERP). SEFSC scientists monitor and assess habitat changes involved with planned changes to the southern Florida hydrology. Also, partnerships with the Florida Fish and Wildlife Commission, the Florida Keys National Marine Sanctuary, and the National Park Service continue to provide ecosystem level monitoring of coral reefs.

Examples of growing concerns in the Southeast include the monitoring and evaluation of direct effects of anthropogenic noise on marine mammals and fish, and the direct and indirect effects of oil spills on living marine resources. The overlap between managed species and non-fishing human activities involving oil or gas exploration and development, defense activities, dredging, contaminants, and coastal infrastructure has increased. The SEFSC plays an important role in conducting habitat and organism sampling after oil spills to help quantify the levels of exposure to oil and consequent toxic effects for damage assessment and seafood safety concerns. SEFSC stranding networks also assess individual health and exposure of protected marine mammals and sea turtles to pollutants. In

2010, for example, the Deep Water Horizon incident presented an unprecedented challenge for SEFSC scientists to had to determine direct and indirect ecosystem impacts and help plan for recovery monitoring and restoration actions (Figure 3). SEFSC data are also used for analyses in NEPA compliance documents, biological opinions, ESA consultations with the U.S. Fish and Wildlife Service, and with state, territorial, and commonwealth governments and their agencies. Expansion of human activities that impact habitat is expected to increase for the foreseeable future. It will be important to understand the short and long-term effects of anthropogenic activities so that they can be evaluated in the context of NOAA's stewardship responsibilities. Providing accurate SEFSC scientific advice requires that activity-specific and cumulative effects are understood and analyzed accurately.



Figure 3. The Deep Water Horizon incident in April 2010 was a new and unexpected challenge for the SEFSC. Evaluation and restoration research will be an important aspect of future SEFSC work.

➤ PROVIDE INFORMATION AND ANALYSES IN SUPPORT OF COASTAL AND MARINE SPATIAL PLANNING

Coastal and marine spatial planning (CMSP) is a comprehensive, ecosystem-based management approach through which incompatible human activities are allocated in space and time to sustain critical ecological, economic, and cultural services. CMSP addresses cumulative effects to ensure the protection, integrity, maintenance, resilience, and restoration of ocean and coastal ecosystems, while promoting sustainable uses of coastal waters and ecosystems.

This ecosystem focus necessitates the understanding of linkages between habitat and traditional marine resource uses for fisheries, transportation, recreation, education, research, ecotourism, and defense, as well as for changing societal needs for ocean energy projects, coastal development, and increased oil and gas exploration and extraction. Achieving this understanding is especially challenging in the southeastern U.S. because of its rapidly growing coastal human population, its dependency on healthy marine resources, and the diversity of habitats and living marine organisms distributed across three large marine ecosystems in the Gulf of Mexico, U.S. Caribbean, and the southeastern U.S. Atlantic. Activities focus on spatially-explicit monitoring of resources and their responses to various human activities, including their type, intensity, duration, spatial and temporal distribution, and impact on habitat. Knowledge of ecosystem characteristics and human use are required along with the development of decision-support tools to inform decision makers of important linkages and potential impacts. Many of SEFSC's existing and planned research activities will provide the tools necessary to support coastal and marine spatial planning. The SEFSC's continued integration of biological, social and economic studies will be essential to ensure that the development and implementation of coastal and marine spatial plans in the Gulf of Mexico, U.S. Caribbean, and the southeastern U.S. Atlantic will be adequately informed by best available scientific information.

Research infrastructure and support

SEFSC research activities require the active development and improvement of SEFSC infrastructure and support capabilities. This section briefly describes the tools, facilities, and support staff needed to enable high-priority research.

➤ INFRASTRUCTURE: THE SEFSC MAINTAINS THE INFRASTRUCTURE FOR CRITICAL DATA MANAGEMENT FUNCTIONS, LABORATORY FACILITIES, FIELD SAMPLING, AND ADMINISTRATIVE ACTIVITIES

Data management responsibilities of the SEFSC are complex and require constant supported to ensure that the data are high quality, accessible, and released in a manner consistent with applicable laws and policies. The SEFSC has over 40 years of data resulting from the study of environmental conditions in the Gulf of Mexico and the South Atlantic. The SEFSC needs the capacity to store, provide access, and archive these data. The SEFSC is an active member in NOAA Fisheries enterprise data management and is working to develop metadata records in the NOAA Fisheries metadata repository. NOAA Fisheries data and information policy and data documentation procedural directives ensure that data are efficiently made available to the public.

Scientific laboratories, offices, libraries, and support infrastructure such as sea-water systems are required to conduct research. The SEFSC maintains facilities in Galveston, TX; Lafayette, LA; Pascagoula and Stennis, MS; Panama City and Miami, FL; and Beaufort, NC.

The SEFSC owns and operates a fleet of small boats necessary for nearshore research activities. The SEFSC also relies on NOAA and chartered commercial vessels and on aircraft to complete mission critical field work. The SEFSC is committed to maintaining and expanding the functionality and available operational days of these NOAA ships and aircraft by continuing to work with NOAA's Office of Marine and Aviation Operations and by working with the commercial community to retain access to and use of chartered ships and aircraft.

➤ SUPPORT STAFF: SEFSC RESEARCH REQUIRES DEDICATED AND KNOWLEDGEABLE TECHNICAL AND SUPPORT STAFF TO DESIGN, PREPARE, STAGE, AND MAINTAIN CRITICAL EQUIPMENT, INSTRUMENTS, AND FACILITIES AND ADMINISTER BUDGETS, PROCUREMENTS, AND CONTRACTS

The SEFSC must continue to commit staff, time, and budgetary resources for operations and administrative functions. Continued information technology support is critical to ensure computer systems are secure and functional and to develop and maintain necessary databases and applications for research and administrative functions. Laboratory, field, and office safety is a priority and an essential part of successful performance of SEFSC research. Staff with expertise and resources to maintain facilities and ensure workplace safety and environmental compliance is critical to maintain these functions.

SEFSC staff provides publication, web, graphics, outreach, and education services to promote and support effective communications of scientific research activities and findings to a broad audience.

Implementation Strategy

Accompanying the Science Plan will be an Implementation Process, outlining the processes for resource allocation decision-making and communication to accomplish core activities and high priority research. While this is envisioned as a separate document, the Implementation Process and Science Plan will work together as guiding documents for the SEFSC.

Appendices

1. Table of fish and shellfish species and species groups managed by NOAA Fisheries within the U.S. Exclusive Economic Zone off the Southeastern U.S., Puerto Rico, and the U.S. Virgin Island
2. Table of dolphin and whale species managed by NOAA Fisheries within the U.S. Exclusive Economic Zone off the Southeastern U.S. (Northern Gulf of Mexico – NGOM and Western North Atlantic – WNA) and Puerto Rico and the U.S. Virgin Islands (PR&USVI)
3. Table of sea turtle species managed by NOAA Fisheries within the U.S. Exclusive Economic Zone off the Southeastern U.S., Puerto Rico, and the U.S. Virgin Islands
4. Table of other protected species managed by NOAA Fisheries within the U.S. Exclusive Economic Zone off the Southeastern U.S., Puerto Rico, and the U.S. Virgin Islands

Appendix 1: Table of fish and shellfish species and species groups managed by NOAA Fisheries within the U.S. Exclusive Economic Zone of the southeastern United States, Puerto Rico, and U.S. Virgin Islands.

FMP	Stock
Atlantic Coast Red Drum	Red Drum
Coral, Coral Reefs, and Live / Hard Bottom Habitats of the South Atlantic Region	Black Corals
Coral, Coral Reefs, and Live / Hard Bottom Habitats of the South Atlantic Region	Fire Corals
Coral, Coral Reefs, and Live / Hard Bottom Habitats of the South Atlantic Region	Hydrocorals
Coral, Coral Reefs, and Live / Hard Bottom Habitats of the South Atlantic Region	Octocorals
Coral, Coral Reefs, and Live / Hard Bottom Habitats of the South Atlantic Region	Stony Corals
Dolphin Wahoo and Coastal Migratory Pelagics of the Gulf of Mexico and South Atlantic	Wahoo
Pelagic Sargassum Habitat of the SA Region	Sargassum
Shrimp Fishery of the South Atlantic Region	Brown rock shrimp - Southern Atlantic Coast
Shrimp Fishery of the South Atlantic Region	Brown shrimp - Southern Atlantic Coast
Shrimp Fishery of the South Atlantic Region	Pink shrimp - Southern Atlantic Coast
Shrimp Fishery of the South Atlantic Region	White shrimp - Southern Atlantic Coast
Snapper-Grouper Fishery of the South Atlantic Region	Black grouper - Southern Atlantic Coast
Snapper-Grouper Fishery of the South Atlantic Region	Black sea bass - Southern Atlantic Coast
Snapper-Grouper Fishery of the South Atlantic Region	Gag - Southern Atlantic Coast
Snapper-Grouper Fishery of the South Atlantic Region	Gray triggerfish - Southern Atlantic Coast
Snapper-Grouper Fishery of the South Atlantic Region	Greater amberjack - Southern Atlantic Coast
Snapper-Grouper Fishery of the South Atlantic Region	Hogfish - Southern Atlantic Coast
Snapper-Grouper Fishery of the South Atlantic Region	Red grouper - Southern Atlantic Coast
Snapper-Grouper Fishery of the South Atlantic Region	Red porgy - Southern Atlantic Coast
Snapper-Grouper Fishery of the South Atlantic Region	Red snapper - Southern Atlantic Coast
Snapper-Grouper Fishery of the South Atlantic Region	Scamp - Southern Atlantic Coast
Snapper-Grouper Fishery of the South Atlantic Region	Snowy grouper - Southern Atlantic Coast
Snapper-Grouper Fishery of the South Atlantic Region	Speckled hind - Southern Atlantic Coast
Snapper-Grouper Fishery of the South Atlantic Region	Tilefish - Southern Atlantic Coast
Snapper-Grouper Fishery of the South Atlantic Region	Vermillion snapper - Southern Atlantic Coast
Snapper-Grouper Fishery of the South Atlantic Region	Warsaw grouper - Southern Atlantic Coast
Snapper-Grouper Fishery of the South Atlantic Region	White grunt - Southern Atlantic Coast
Snapper-Grouper Fishery of the South Atlantic Region	Wreckfish - Southern Atlantic Coast
South Atlantic Golden Crab	Golden Crab
South Atlantic Golden Crab	Jonah Crab
South Atlantic Golden Crab	Red Crab
South Atlantic Snapper-Grouper	Almaco Jack
South Atlantic Snapper-Grouper	Atlantic Spadefish
South Atlantic Snapper-Grouper	Banded Rudderfish
South Atlantic Snapper-Grouper	Bank Sea Bass
South Atlantic Snapper-Grouper	Bar Jack
South Atlantic Snapper-Grouper	Black Margate
South Atlantic Snapper-Grouper	Black Snapper

FMP	Stock
South Atlantic Snapper-Grouper	Blackfin Snapper
South Atlantic Snapper-Grouper	Blue Runner
South Atlantic Snapper-Grouper	Blueline Tilefish
South Atlantic Snapper-Grouper	Bluestriped Grunt
South Atlantic Snapper-Grouper	Coney
South Atlantic Snapper-Grouper	Cottonwick
South Atlantic Snapper-Grouper	Crevalle Jack
South Atlantic Snapper-Grouper	Cubera Snapper
South Atlantic Snapper-Grouper	Dog Snapper
South Atlantic Snapper-Grouper	French Grunt
South Atlantic Snapper-Grouper	Grass Porgy
South Atlantic Snapper-Grouper	Gray (Mangrove) Snapper
South Atlantic Snapper-Grouper	Graysby
South Atlantic Snapper-Grouper	Jolthead Porgy
South Atlantic Snapper-Grouper	Knobbed Porgy
South Atlantic Snapper-Grouper	Lane Snapper
South Atlantic Snapper-Grouper	Lesser Amberjack
South Atlantic Snapper-Grouper	Longspine Porgy
South Atlantic Snapper-Grouper	Mahogany Snapper
South Atlantic Snapper-Grouper	Margate
South Atlantic Snapper-Grouper	Misty Grouper
South Atlantic Snapper-Grouper	Mutton Snapper
South Atlantic Snapper-Grouper	Nassau Grouper
South Atlantic Snapper-Grouper	Ocean Triggerfish
South Atlantic Snapper-Grouper	Porkfish
South Atlantic Snapper-Grouper	Puddingwife
South Atlantic Snapper-Grouper	Queen Snapper
South Atlantic Snapper-Grouper	Queen Triggerfish
South Atlantic Snapper-Grouper	Red Hind
South Atlantic Snapper-Grouper	Rock Hind
South Atlantic Snapper-Grouper	Rock Sea Bass
South Atlantic Snapper-Grouper	Sailors Choice
South Atlantic Snapper-Grouper	Sand Tilefish
South Atlantic Snapper-Grouper	Saucereye Porgy
South Atlantic Snapper-Grouper	Schoolmaster
South Atlantic Snapper-Grouper	Scup
South Atlantic Snapper-Grouper	Sheepshead
South Atlantic Snapper-Grouper	Silk Snapper
South Atlantic Snapper-Grouper	Smallmouth Grunt
South Atlantic Snapper-Grouper	Spanish Grunt
South Atlantic Snapper-Grouper	Tiger Grouper
South Atlantic Snapper-Grouper	Tomtate
South Atlantic Snapper-Grouper	Whitebone Porgy
South Atlantic Snapper-Grouper	Yellow Jack
South Atlantic Snapper-Grouper	Yellowedge Grouper
South Atlantic Snapper-Grouper	Yellowfin Grouper

FMP	Stock
South Atlantic Snapper-Grouper	Yellowmouth Grouper
Coastal Migratory Pelagics of the Gulf of Mexico and South Atlantic	Cero Mackerel
Dolphin and Wahoo Fishery of the Atlantic / Coastal Migratory Pelagic Resources of the Gulf of Mexico and South Atlantic	Dolphinfish - Southern Atlantic Coast / Gulf of Mexico
Gulf of Mexico / South Atlantic Spiny Lobster	Slipper Lobster
Snapper-Grouper Fishery of the South Atlantic Region / Reef Fish Resources of the Gulf of Mexico	Goliath grouper - Southern Atlantic Coast / Gulf of Mexico
Snapper-Grouper Fishery of the South Atlantic Region / Reef Fish Resources of the Gulf of Mexico	Yellowtail snapper - Southern Atlantic Coast / Gulf of Mexico
Reef Fish Resources of the Gulf of Mexico	Black grouper - Gulf of Mexico
Reef Fish Resources of the Gulf of Mexico	Red grouper - Gulf of Mexico
Reef Fish Resources of the Gulf of Mexico	Vermilion snapper - Gulf of Mexico
Shrimp Fishery of the Gulf of Mexico	Brown shrimp - Gulf of Mexico
Shrimp Fishery of the Gulf of Mexico	White shrimp - Gulf of Mexico
Consolidated Atlantic Highly Migratory Species	Atlantic Small Coastal Shark Complex
Consolidated Atlantic Highly Migratory Species	Atlantic sharpnose shark - Atlantic
Consolidated Atlantic Highly Migratory Species	Blacktip shark - Gulf of Mexico
Consolidated Atlantic Highly Migratory Species	Blue shark - Atlantic
Consolidated Atlantic Highly Migratory Species	Bonnethead - Atlantic
Consolidated Atlantic Highly Migratory Species	Finetooth shark - Atlantic
Consolidated Atlantic Highly Migratory Species	Swordfish - North Atlantic
Consolidated Atlantic Highly Migratory Species	Yellowfin tuna - Western Atlantic
Shrimp Fishery of the Gulf of Mexico	Pink shrimp - Gulf of Mexico
Consolidated Atlantic Highly Migratory Species	Bigeye tuna - Atlantic
Consolidated Atlantic Highly Migratory Species	Shortfin mako - Atlantic
Shallow Water Reef Fish Fishery of Puerto Rico and the U.S. Virgin Islands	Caribbean Grouper Unit 2
Shallow Water Reef Fish Fishery of Puerto Rico and the U.S. Virgin Islands	Caribbean Snapper Unit 1
Consolidated Atlantic Highly Migratory Species	Porbeagle - Atlantic
Consolidated Atlantic Highly Migratory Species	Sailfish - Western Atlantic
Red Drum Fishery of the Gulf of Mexico	Red drum - Gulf of Mexico
Reef Fish Resources of the Gulf of Mexico	Nassau grouper - Gulf of Mexico
Shrimp Fishery of the Gulf of Mexico	Royal red shrimp - Gulf of Mexico
Stone Crab Fishery of the Gulf of Mexico	Stone crabs (Menippe spp.) - Gulf of Mexico
Queen Conch Resources of Puerto Rico and the United States Virgin Islands	Queen conch - Caribbean
Shallow Water Reef Fish Fishery of Puerto Rico and the U.S. Virgin Islands	Caribbean Grouper Unit 1
Shallow Water Reef Fish Fishery of Puerto Rico and the U.S. Virgin Islands	Caribbean Grouper Unit 4
Reef Fish Resources of the Gulf of Mexico	Gag - Gulf of Mexico
Reef Fish Resources of the Gulf of Mexico	Gray triggerfish - Gulf of Mexico
Reef Fish Resources of the Gulf of Mexico	Greater amberjack - Gulf of Mexico
Reef Fish Resources of the Gulf of Mexico	Red snapper - Gulf of Mexico
Consolidated Atlantic Highly Migratory Species	Albacore - North Atlantic

FMP	Stock
Consolidated Atlantic Highly Migratory Species	Blacknose shark - Atlantic
Consolidated Atlantic Highly Migratory Species	Blue marlin - Atlantic
Consolidated Atlantic Highly Migratory Species	Bluefin tuna - Western Atlantic
Consolidated Atlantic Highly Migratory Species	Dusky shark - Atlantic
Consolidated Atlantic Highly Migratory Species	Sandbar shark - Atlantic
Consolidated Atlantic Highly Migratory Species	White marlin - Atlantic
Shallow Water Reef Fish Fishery of Puerto Rico and the U.S. Virgin Islands	Caribbean Snapper Unit 3
Shallow Water Reef Fish Fishery of Puerto Rico and the U.S. Virgin Islands	Caribbean Snapper Unit 4
Spiny Lobster Fishery of Puerto Rico and the U.S. Virgin Islands	Caribbean spiny lobster - Caribbean
Reef Fish Resources of the Gulf of Mexico	Hogfish - Gulf of Mexico
Reef Fish Resources of the Gulf of Mexico	Snowy grouper - Gulf of Mexico
Reef Fish Resources of the Gulf of Mexico	Yellowedge grouper - Gulf of Mexico
Consolidated Atlantic Highly Migratory Species	Atlantic Large Coastal Shark Complex
Consolidated Atlantic Highly Migratory Species	Blacktip shark - South Atlantic
Shallow Water Reef Fish Fishery of Puerto Rico and the U.S. Virgin Islands	Silk snapper
Shallow Water Reef Fish Fishery of Puerto Rico and the U.S. Virgin Islands	Redtail parrotfish
Shallow Water Reef Fish Fishery of Puerto Rico and the U.S. Virgin Islands	Queen snapper

Appendix 2: Dolphin and whale species and species groups managed by NOAA Fisheries within the U.S. Exclusive Economic Zone of the southeastern United States (Northern Gulf of Mexico - NGOM and Western North Atlantic - WNA) and Puerto Rico and U.S. Virgin Islands (PRVI).

Strategic stocks are those listed as threatened or endangered under the ESA, or depleted under the MMPA, or those stocks with a level of human-related serious injury and mortality that is greater than the PBR level for that stock. The Marine Mammal Stock Assessment Improvement Plan (SAIP) Tier generally describes the level of information included in the stock assessment for that stock. Assessments ranked as being in Tier 1 have minimal or no information on abundance, stock structure, distribution, or anthropogenic impacts. Often, PBR levels cannot be calculated for stocks in Tier 1 because of lack of information. Assessments ranked as being in Tier 2 include estimates of abundance (although they may be imprecise), some information on stock structure from a directed study, and a minimum estimate of anthropogenic impacts. The tier system for marine mammals is described in Merrick et al 2004 http://www.nmfs.noaa.gov/pr/pdfs/sars/improvement_plan.pdf.

<i>Common Name</i>	<i>Region</i>	<i>Stock</i>	<i>ESA Status</i>	<i>MMPA Status</i>	<i>SAIP Tier</i>
Bryde's whale	NGOM	Oceanic			1
Sperm whale	NGOM	Oceanic	E	Strategic	2
Dwarf sperm whale	NGOM	Oceanic			1
Pygmy sperm whale	NGOM	Oceanic			1
Cuvier's beaked whale	NGOM	Oceanic			1
Blainville's beaked whale	NGOM	Oceanic			1
Gervais' beaked whale	NGOM	Oceanic			1
Bottlenose dolphin	NGOM	Laguna Madre		Strategic	1
Bottlenose dolphin	NGOM	Nueces Bay, Corpus Christi Bay, Compano Bay, Aransas Bay, San Antonio Bay		Strategic	1
Bottlenose dolphin	NGOM	Redfish Bay, Espirtu Santo Bay		Strategic	1
Bottlenose dolphin	NGOM	Matgorda Bay, Tres Palacios Bay, Lavaca Bay		Strategic	1
Bottlenose dolphin	NGOM	West Bay		Strategic	1
Bottlenose dolphin	NGOM	Galveston Bay, East Bay, Trinity Bay		Strategic	1
Bottlenose dolphin	NGOM	Sabine Lake		Strategic	1
Bottlenose dolphin	NGOM	Calcasieu Lake, Vermillion Bay, West Cote Blanche Bay		Strategic	1
Bottlenose dolphin	NGOM	Atchafalaya Bay		Strategic	1
Bottlenose dolphin	NGOM	Terrebonne Bay, Timbalier Bay		Strategic	1
Bottlenose dolphin	NGOM	Barataria Bay		Strategic	1
Bottlenose dolphin	NGOM	Mississippi River Delta		Strategic	1
Bottlenose dolphin	NGOM	Mississippi Sound, Bay Boudreau		Strategic	1
Bottlenose dolphin	NGOM	Mobile Bay, Bonsecour Bay		Strategic	1
Bottlenose dolphin	NGOM	Perdido Bay		Strategic	1
Bottlenose dolphin	NGOM	Pensacola Bay, East Bay		Strategic	1

<i>Common Name</i>	<i>Region</i>	<i>Stock</i>	<i>ESA Status</i>	<i>MMPA Status</i>	<i>SAIP Tier</i>
Bottlenose dolphin	NGOM	Choctawhatchee Bay		Strategic	1
Bottlenose dolphin	NGOM	St. Andrews Bay		Strategic	1
Bottlenose dolphin	NGOM	St. Joseph Bay		Strategic	1
Bottlenose dolphin	NGOM	St. Vincent Sound, Apalachicola Bay, St. Georges Sound		Strategic	1
Bottlenose dolphin	NGOM	Apalachee Bay		Strategic	1
Bottlenose dolphin	NGOM	Waccasassa Bay, Withlacoochee Bay, Crystal Bay		Strategic	1
Bottlenose dolphin	NGOM	St. Joseph Sound, Clearwater Harbor		Strategic	1
Bottlenose dolphin	NGOM	Tampa Bay		Strategic	1
Bottlenose dolphin	NGOM	Sarasota Bay, Little Sarasota Bay		Strategic	1
Bottlenose dolphin	NGOM	Lemon Bay		Strategic	1
Bottlenose dolphin	NGOM	Pine Island Sound, Charlotte Harbor, Gasparilla Sound		Strategic	1
Bottlenose dolphin	NGOM	Caloosahatchee River		Strategic	1
Bottlenose dolphin	NGOM	Estero Bay		Strategic	1
Bottlenose dolphin	NGOM	Chokoloskee Bay, Ten Thousand Islands, Gullivan Bay		Strategic	1
Bottlenose dolphin	NGOM	Whitewater Bay		Strategic	1
Bottlenose dolphin	NGOM	Florida Keys (Bahia Honda to Key West)		Strategic	1
Bottlenose dolphin	NGOM	Western Coastal		Strategic	1
Bottlenose dolphin	NGOM	Northern Coastal			1
Bottlenose dolphin	NGOM	Eastern Coastal			1
Bottlenose dolphin	NGOM	Continental Shelf			1
Bottlenose dolphin	NGOM	Oceanic			1
Atlantic spotted dolphin	NGOM	Continental Shelf & Oceanic			1
Pantropical spotted dolphin	NGOM	Oceanic			1
Striped dolphin	NGOM	Oceanic			1
Spinner dolphin	NGOM	Oceanic			1
Clymene dolphin	NGOM	Oceanic			1
Rough-toothed dolphin	NGOM	Outer Continental Shelf & Oceanic			1
Fraser's dolphin	NGOM	Oceanic			1
Killer whale	NGOM	Oceanic			1
False killer whale	NGOM	Oceanic			1
Pygmy killer whale	NGOM	Oceanic			1
Melon-headed whale	NGOM	Oceanic			1
Risso's dolphin	NGOM	Oceanic			1
Short-finned pilot whale	NGOM	Oceanic			1
Sperm whale	PRVI	PRVI		Strategic	1
Cuvier's beaked whale	PRVI	PRVI			1
Bottlenose dolphin	PRVI	PRVI			1

<i>Common Name</i>	<i>Region</i>	<i>Stock</i>	<i>ESA Status</i>	<i>MMPA Status</i>	<i>SAIP Tier</i>
Atlantic spotted dolphin	PRVI	PRVI			1
Spinner dolphin	PRVI	PRVI			1
Short-finned pilot whale	PRVI	PRVI			1
North Atlantic right whale	WNA*	Western North Atlantic	E	Strategic	1
Humpback whale	WNA*	Gulf of Maine	E	Strategic	2
Fin whale	WNA*	Western North Atlantic	E	Strategic	1
Sei whale	WNA*	Nova Scotia	E	Strategic	1
Blue Whale	WNA*	Western North Atlantic	E	Strategic	1
Sperm whale	WNA*	Western North Atlantic	E	Strategic	1
Dwarf sperm whale	WNA	Western North Atlantic			1
Pygmy sperm whale	WNA	Western North Atlantic		Strategic	1
Cuvier's beaked whale	WNA*	Western North Atlantic			1
Blainville's beaked whale	WNA*	Western North Atlantic			1
Gervais' beaked whale	WNA*	Western North Atlantic			1
Bottlenose dolphin	WNA	Offshore			1
Bottlenose dolphin	WNA	Northern Coastal Migratory		Depleted	1
Bottlenose dolphin	WNA	Southern Coastal Migratory		Depleted	1
Bottlenose dolphin	WNA	Coastal		Strategic	1
Bottlenose dolphin	WNA	Coastal		Strategic	1
Bottlenose dolphin	WNA	Coastal		Strategic	1
Bottlenose dolphin	WNA	Northern North Carolina Estuarine System		Strategic	1
Bottlenose dolphin	WNA	Southern North Carolina Estuarine System		Strategic	1
Bottlenose dolphin	WNA	Charleston Estuarine System		Strategic	1
Bottlenose dolphin	WNA	Northern Georgia/Southern South Carolina Estuarine System		Strategic	1
Bottlenose dolphin	WNA	Southern Georgia Estuarine System		Strategic	1
Bottlenose dolphin	WNA	Jacksonville Estuarine System		Strategic	1
Bottlenose dolphin	WNA	Indian River Lagoon Estuarine System		Strategic	1
Bottlenose dolphin	WNA	Biscayne Bay		Strategic	1
Bottlenose dolphin	WNA	Florida Bay			1
Atlantic spotted dolphin	WNA	Western North Atlantic			1
Pantropical spotted dolphin	WNA	Western North Atlantic			1
Striped dolphin	WNA*	Western North Atlantic			1
Spinner dolphin	WNA	Western North Atlantic			1
Clymene dolphin	WNA	Western North Atlantic			1
Rough-toothed dolphin	WNA	Western North Atlantic			1
Fraser's dolphin	WNA	Western North Atlantic			1
Pygmy killer whale	WNA	Western North Atlantic			1
Melon-headed whale	WNA	Western North Atlantic			1

Appendix 3: Sea turtle species managed by NOAA Fisheries within the U.S. Exclusive Economic Zone of the southeastern U.S., Puerto Rico, and U.S. Virgin Islands.

<i>Common Name</i>	<i>DPS/RMU</i>	<i>ESA Stock</i>	<i>ESA Status</i>	<i>SAIP Tier</i>
Loggerhead	Atlantic, NW	9 stocks worldwide	T	1
Green	Atlantic, NW Atlantic, S. Caribbean	3 stocks worldwide	T (FL is E) T	1
Leatherback	Atlantic, NW	1 stock worldwide	E	1
Hawksbill	Atlantic, W. Caribbean, USA	1 stock worldwide	E	1
Kemp's ridley	Atlantic, NW	1 stock worldwide	E	1
Olive ridley	Atlantic, W	2 stocks worldwide	T	1

Appendix 4: Other protected species found within the U.S. Exclusive Economic Zone of the southeastern United States, Puerto Rico, and U.S. Virgin Islands.

<i>Common Name</i>	<i>ESA Status</i>
Smalltooth sawfish	E
Largetooth sawfish	E
Gulf sturgeon	T
Shortnose sturgeon	E
Johnson's seagrass	T
Staghorn coral	T
Elkhorn coral	T