FINAL

Endangered Species Act Biological Assessment for the U.S. Atlantic Coast

by

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August 1, 1995

Contract No. DAAL03-91-C-0034
TCN Number: 95-030
Scientific Services Program

EXECUTIVE SUMMARY

The United States Coast Guard (USCG) provides maritime humanitarian, law enforcement, and safety services to the people of the United States. These services are performed in the estuarine, coastal, and offshore waters of the United States and have the potential for interacting with endangered and threatened species of whales and sea turtles that are under the stewardship of the National Marine Fisheries Service (NMFS). Because some its operations could adversely affect protected species of whales and sea turtles, the USCG, in accordance with Section 7 of the Endangered Species Act has prepared this Biological Assessment to evaluate potential effects of USCG activities on protected species and their critical habitats along the Atlantic coast of the United States, including Puerto Rico and the U.S. Virgin Islands. The threatened or endangered species considered in this Biological Assessment include:

- The Northern Right Whale *(Eubalaena glacialis)*
- The Humpback Whale *(Megaptera novaeangliae)*
- The Fin Whale *(Balaenoptera physalis)*
- The Sei Whale *(Balaenoptera borealis)*
- The Blue Whale *(Balaenoptera musculus)*
- The Sperm Whale *(Physeter macrocephalus)*
- The Loggerhead Sea Turtle *(Caretta caretta)*
- The Kemp's Ridley Sea Turtle *(Lepidochelys kempi)*
- The Leatherback Sea Turtle *(Dermochelys coriacea)*
- The Green Sea Turtle *(Chelonia mydas)*
- The Hawksbill Sea Turtle *(Eretmochelys imbricata)*

High-Use Habitats

One or more of these species occurs in estuarine, coastal, or continental shelf waters, at least on a seasonal basis, over the entire length of the U.S. Atlantic coast from the Maine/Canada border to Key West, FL, Puerto Rico, and the U.S. Virgin Islands. As part of an integrated strategy to protect and restore populations of these endangered/threatened species, Critical Habitats and National Marine Sanctuaries have been designated along the Atlantic coast in areas where one or more of these species may congregate in large numbers on a seasonal basis. Critical Habitats for right whales are Cape Cod Bay, MA, Great South Channel, MA, and coastal waters of Georgia and northern Florida. A Critical Habitat for nesting leatherback and hawksbill sea turtles is located at Sandy Point, St. Croix, U.S. Virgin Islands. Several National Marine Sanctuaries have been designated along the U.S. Atlantic coast in part because they are considered important habitats for endangered/threatened species. These include Stellwagen Bank National Marine Sanctuary, MA (humpback and fin whales) and the Archie Carr National Marine Sanctuary, FL (nesting loggerhead, green, leatherback, and hawksbill sea turtles). Several other areas along the U.S. east coast are important high-use areas for some species and life stages of endangered/threatened species. High-use habitats, in addition to those designated as Critical Habitats and National Marine Sanctuaries include all of the Gulf of Maine (especially Jeffreys Ledge), Long Island Sound and the waters south of Long Island, the offshore waters, mouths, and lower reaches of Delaware and Chesapeake Bays, waters adjacent to Cape Hatteras, isolated sandy beaches along the coasts of South Carolina and Georgia, the beaches and coastal waters of south Florida from Cape Canaveral to Key Biscayne, small islands off Puerto Rico, and the U.S. Virgin Islands.

The Environment

The physical, chemical, and biological characteristics of the marine environment along the U.S. Atlantic coast determine the distribution of endangered species of whales and sea turtles. The U.S. Atlantic coast can be divided into three regions; the North Atlantic (Gulf of Maine and Georges Bank), Middle Atlantic (Nantucket Shoals to Cape Hatteras), and the South Atlantic (Cape Hatteras to Key West).

The Gulf of Maine is a 90,700 km^2 embayment of the western North Atlantic, with an average depth of 150 m. It is bordered on the north and northeast by Canada and on the west and southwest by New England. In the east and southeast, the Gulf of Maine is bordered by Georges Bank and the Great South Channel. Georges Bank is a shallow sandy bank east of Cape Cod; it is approximately 150 km wide and 280 km long with water depths less than 40 m at its crest. Stellwagen Bank is another shallow sandy bank lying in the center of the Gulf of Maine, just north of the northern tip of Cape Cod and west of Georges Bank. It is about 37 km long (40-m contour) with a minimum depth of about 18 m at its crest. Cape Cod Bay is a small bay about 40 km in diameter in the southern Gulf of Maine, bordered by Cape Cod and the Massachusetts coast. Water depth increases from south to north, with a maximum depth of about 60 m at the confluence of Cape Cod and Massachusetts Bays. The Great South Channel is a large funnel-shaped depression separating Cape Cod and Nantucket Shoals from Georges Bank. Its average depth is about 175 m.

The general water circulation of the Gulf of Maine, including Cape Cod Bay, is a counterclockwise gyre, with semidiurnal tidal flows superimposed. The mean net circulation on Georges Bank is a clockwise gyre that is open, at least in the winter, to the southwest. The overall circulation of the western North Atlantic is strong; although seasonal water column stratification does occur, the waters are generally well-mixed and nutrient-rich.

The nutrient-rich waters of the Gulf of Maine support rich and diverse phytoplankton communities that typically experience a large bloom in the early spring and lesser blooms in the late summer and fall. The high primary production supports dense populations of zooplankton, particularly copepods, upon which right whales and the populations of schooling fish (sand lance, herring, and mackerel) preferred as food by humpback and fin whales depend for food. The abundant zooplankton also are an important food source for benthic crustaceans and molluscs and planktonic jellyfish upon which loggerhead, ridley, and leatherback sea turtles depend for food during their occasional summer visits to the Gulf of Maine.

The Middle Atlantic Bight is a vast, wide continental shelf region, bisected by several submarine canyons, the most prominent of which are the Hudson and Baltimore Canyons. It is bordered to the east by the Gulf Stream and to the west by the mid-Atlantic states and several endangered species seasonal habitats, including Long Island Sound, Delaware Bay, and Chesapeake Bay. The net surface water flow in the bight is to the southwest from

Georges Bank along the coast south to Cape Hatteras. Intrusions of warm, Gulf Stream waters in the form of filaments, meanders, and warm core rings may alter circulation locally. Delaware Bay is a shallow estuary with an area of about 1,600 km^2 and an average depth of about 10 m. Water circulation is good and there is a gradual increasing salinity gradient from the head to the mouth of the estuary. Chesapeake Bay is the largest estuary in the U.S. with a length of 320 km and a width varying from 6 to 48 km. The average water depth is 9 m, but the central channel is deeper than 100 m in some places. The circulation is that of a typical salt-wedge estuary with a net outward flow of low-salinity water at the surface, especially in the western bay, and a net inflow of high-salinity water along the bottom, particularly in the eastern bay. The waters of the bay generally are well mixed, but salinity and temperature stratification in the summer may lead to hypoxic bottom water in the deeper basins.

Vertical stratification during the summer in the Middle Atlantic Bight and adjacent bays may result in nutrient depletion and reduced primary production during summer months. However, vertical mixing and upwelling in the fall and winter replenishes nutrients in the surface euphotic zone. Highest primary productivity occurs in the early spring with a secondary peak in the late fall and early winter. Zooplankton biomass increases from an annual low in winter to an annual high in autumn. Zooplankton production is highest in coastal waters around Long Island and in the southern part and adjacent offshore waters of Delaware and Chesapeake Bays. This production supports high production of benthic crustaceans and molluscs upon which juvenile loggerhead and ridley sea turtles forage during the summer months. Small numbers of green sea turtles may feed on seagrass (mostly *Zostera marina*) beds in Long Island Sound and southern Chesapeake Bay during the summer.

The South Atlantic Bight is characterized by a narrow, sloping continental shelf bordered to the east by the warm waters of the Gulf Stream and to the west by the south Atlantic states. The continental shelf broadens from south to north. It is only about 5 km wide off Palm Beach, FL, about 50 km wide off Cape Canaveral, FL., more than 120 km wide off Georgia and South Carolina, and narrows again off Cape Hatteras. Surface water flows on the inner shelf are controlled by tidal flows and winds, with a general southward flow. Farther offshore, the Gulf Stream and its meanders control local circulation. Waters of the middle shelf are stratified in the summer, but well mixed in the winter. Salinity increases with distance offshore. Upwelling of nutrient-rich water occurs seasonally along the continental shelf break, north of the major shoals, and in the Charleston Trough. Primary production decreases seaward but does not vary much seasonally. Zooplankton abundance is greatest in the summer and lowest in the winter. Seagrass beds, composed mainly of three species of marine vascular plants, are common in sheltered nearshore habitats along the south Atlantic coast, particularly south of Cape Canaveral. They are important foraging areas for green turtles. Coastal lagoons also support diverse populations of crustaceans and molluscs, relied upon by loggerhead and ridley turtles for food. Hawksbills, which are rare in the south Atlantic, feed in reef and hard bottom areas on the abundant sponges. Rich foraging habitat for green, loggerhead, and hawksbill sea turtles occurs around Puerto Rico and in the U.S. Virgin Islands.

The Endangered Species

The right, humpback, and fin whales are all listed as endangered in the western North Atlantic Ocean. They are observed frequently in nearshore waters along the U.S. Atlantic coast at different times of year. The blue, sei, and sperm whales, also listed as endangered in the western North Atlantic, are restricted primarily to more northerly waters and to offshore slope and deep ocean waters and are rarely encountered inshore along the coast of the United States. All six species of endangered whales make large-scale seasonal migrations to the north in the spring to foraging areas and to the south in the fall and wintering and reproduction areas.

Fewer than 350 right whales survive in the western North Atlantic population. Right whales, some with newborn or yearling calves, arrive in the Great South Channel and Cape Cod Bay in late February and remain until about May to feed in the rich patches of zooplankton there. They then move north to Canadian waters for the remaining months of summer and early fall. Some right whales pass through Cape Cod Bay and the Great South Channel on their way south in the late fall to wintering grounds. A small fraction of the right whale population consisting of pregnant or lactating females and some juveniles, winter in nearshore waters off Georgia and northern Florida. Most calving takes place in this area. The winter distribution of the remainder of the North Atlantic population of right whales in not known. During spring and fall migrations between summer feeding areas and winter habitats, some right whales move through the Middle and South Atlantic Bights inshore of the Gulf Stream.

The western North Atlantic population of humpback whales numbers about 5,500 animals, of which perhaps as many as 800 individuals visit New England waters once or more during the summer to feed. Of the estimated 7,200 fin whales in the western North Atlantic population, as many as 5,000 visit coastal waters of the U.S. between the Canadian border and Cape Hatteras and as many as 3,000 may visit the Gulf of Maine during the summer. Humpback and fin whales visit coastal waters of the Gulf of Maine, mainly the Great South Channel, Stellwagen Bank, and Jeffreys Ledge, to feed on small schooling fish and euphausiids during spring and summer each year. Some individuals make frequent foraging migrations between these areas and the southern Bay of Fundy and the banks off Nova Scotia, Canada during the summer.

In the fall, all the humpbacks and most of the fin whales migrate south from New England and Canadian waters. The winter distribution of fin whales is poorly understood. Some congregate in the Middle Atlantic Bight, particularly in continental shelf waters east of New Jersey and the Delmarva Peninsula. Most of the humpbacks migrate southward through the Middle Atlantic Bight in offshore waters to wintering grounds in the Caribbean. Most of the humpback whales, including the reproductively active adults, winter on Silver and Navidad Banks off the north coast of the Dominican Republic, Virgin Bank off the Leeward Islands, Mona Passage off Puerto Rico, and Samana Bay, Dominican Republic. Humpback calving occurs in these protected southern waters. Some juvenile humpbacks may spend the winter off Virginia, especially off the mouth of Chesapeake Bay, and along the North Carolina coast north of Cape Hatteras. The mouth of Delaware Bay may also be important winter habitat for some juveniles. Fin and humpback whales migrate northward in the spring in coastal and offshore waters, some passing near Bermuda.

Sei and blue whales occur primarily in boreal and subarctic waters north of the U.S. border. They may visit nearshore waters of the Gulf of Maine on rare occasions during the summer in pursuit of their preferred zooplankton food. There have been only a few sightings of these whales in the vicinity of Stellwagen Bank in recent years. Sperm whales are restricted primarily to deep offshore waters on the continental slope, where they may dive to great depths in pursuit of their cephalopod food. In spring and summer, they occasionally are sighted in deep water of the Middle Atlantic Bight and off southern Georges Bank. In the winter, they may congregate in large numbers in deep water east and northeast of Cape Hatteras.

The loggerhead sea turtle, with an estimated population of nearly 400,000 individuals in the western North Atlantic, is the most abundant sea turtle in coastal waters of the eastern U.S. It is listed as threatened throughout its range. Green turtles, with the exception of breeding populations in Florida and on the Pacific coast of Mexico which are listed as endangered, also are listed as threatened. The other sea turtles encountered in U.S. Atlantic coastal waters, the Kemp's ridley, leatherback, and hawksbill turtles, are all listed as endangered in the western North Atlantic.

Loggerheads nest on sandy beaches from Key Biscayne, FL northward to North Carolina south of Cape Hatteras. Peak nesting occurs south of Cape Canaveral. Green turtles, and to a lesser extent, leatherback turtles also nest on south Florida beaches. Most nesting of leatherback and hawksbill turtles in U.S. Atlantic waters is in the U.S. Virgin Islands, including the recently-designated sea turtle critical habitat at Sandy Point, St. Croix, and Puerto Rico. Nearly the entire population of Kemp's ridley turtles nests along a single, 15-km beach at Rancho Nuevo, Mexico.

All five species of sea turtles spend the first one or more years after hatching in the offshore pelagic environment associated with rafts of sargassum weed or in convergence zones. Their distribution during this juvenile, pelagic period is poorly understood. As sub-adults, they move into nearshore waters to feed and grow. During the summer, sub-adult loggerhead, ridley, and to a lesser extent green turtles migrate northward along the U.S. Atlantic coast to feed in nearshore waters as far north as the southern Gulf of Maine. Important feeding areas for these species include Long Island Sound and the southern parts of Delaware and Chesapeake Bays. In the fall, they migrate southward and tend to congregate in large numbers in coastal waters, inlets, and lagoons of south Florida. During northward migrations in spring and southward migrations in fall, these turtles may be abundant in coastal waters off Cape Hatteras. Subadult turtles also may be abundant during the winter in nearshore waters of North Carolina south of Cape Hatteras.

Leatherbacks are highly pelagic and come into coastal waters, primarily during the summer to feed on jellyfish. They are temperate animals, preferring more northern waters for foraging than the other species. They are encountered frequently during the summer in the Gulf of Maine and southward around Long Island and off Chesapeake Bay. In the winter, they sometimes congregate in large numbers off Cape Canaveral. Hawksbills are a tropical species, restricted to the warmer Caribbean Sea. They occur sporadically in south Florida and in greater numbers around Puerto Rico and the U.S. Virgin Islands. They tend to congregate over coral and other hard bottom reef areas less than about 40 m deep where they feed on benthic animals, particularly sponges.

The major interactions between whales and human activities that may lead to injury or death of the whales include entanglement in fishing gear and marine debris, collisions with vessels, marine pollution, habitat change, and general harassment. Twenty-seven percent of documented right whale mortalities along the Atlantic coast between 1973 and 1993 were due all or in part to collisions with vessels.

Sea turtles experience similar unfavorable interactions with human activities. More than 17% of turtles stranded along the U.S. Atlantic coast since 1988 showed evidence of collision with a vessel or the propeller of a vessel. However, the major documented source of mortality of sea turtles, particularly loggerheads, ridleys, and greens, is entanglement in fishing gear, particularly shrimp nets. This source of mortality alone may account for 50,000 deaths each year in U.S. waters. Sea turtles are vulnerable to human disturbance during nesting, through nesting habitat alteration or destruction, vehicular traffic on nesting beaches, and artificial lighting of nesting beaches which disorients emerging females and seaward migrating hatchlings. In addition, adult sea turtles and their eggs are still heavily exploited in some areas for food or turtle products, particularly tortoise-shell.

USCG Activities
As one of America's five Armed Forces, the United States Coast Guard (USCG) is a versatile military service tasked with the following missions:

- Enforce all applicable Federal laws in U.S. waters;
- Engage in maritime air surveillance or interdiction to enforce or assist in the enforcement of the laws of the United States;
- Administer laws and promulgate and enforce regulations for the promotion of safety of life and property in U.S. waters;
- Develop, establish, maintain, and operate aids to navigation, icebreaking facilities, and rescue facilities for the promotion of safety in U.S. waters;
- Engage in oceanographic research in U.S. waters;
- Maintain a state of readiness to function as a specialized service in the Navy in time of war, including the fulfillment of Maritime Defense Zone command responsibilities; and
- Establish and maintain a coordinated environmental program and a comprehensive ports and waterways system, including all aspects of marine transportation.

Some USCG activities in these mission areas could result in interaction with and harm to endangered species of whales and sea turtles along the U.S. Atlantic coast. Other coast guard activities directly or indirectly contribute to the protection and restoration of these endangered or threatened species.

The most likely source of interaction between routine USCG activities and endangered/threatened whales and turtles that could lead to injury or death of the protected species is collisions. The emergent nature of many search and rescue and law enforcement activities means that USCG vessels must travel at high speed, sometimes through areas that may be inhabited by endangered species. Other activities in coastal waters such as installation and maintenance of aids to navigation are less likely to result in ship strikes. Law enforcement, environmental protection, navigation control, and traffic control operations of the USCG may contribute to protection and restoration of endangered/threatened whales and turtles. The two recorded USCG collisions with young whales took place during normal transit evolutions of the CGC Pt. Francis and the CGC Chase. The strike by the CGC Pt. Francis took place in an area which subsequently was designated a critical habitat area for northern right whale calving. Both whales appeared to have suffered fatal injuries and the larger USCG vessel was damaged to the extent that it could no longer proceed under its own power.

Proposed Actions

The USCG currently carries out several activities to minimize the risk of a collision with an endangered whale or sea turtle during various required USCG activities in coastal and marine waters of the U.S. Atlantic Ocean. Typically, a lookout is posted on the vessel who identifies and aids in avoiding objects in or on the water, including whales and turtles. However, whales and turtles are difficult to spot below the water surface. The USCG currently is working with the regional NMFS offices to determine the best means to train USCG personnel in sighting methods.

During non-emergency transits of critical habitats and known high-use areas of endangered whales and turtles, USCG vessels are directed to use caution and be alert for marine mammals and turtles. If a whale is sighted, the USCG vessel is instructed to give it a wide berth and notify mariners in the area of its presence. USCG vessels in the vicinity of sea turtle nesting beaches are instructed to use extreme caution to avoid females in the waters off the nesting beaches during the nesting season. Marine events, such as regattas and parades, are regulated and monitored to ensure that they do not cause disturbance or harm to endangered species. The USCG, in its role in enforcing the Marine Mammal Protection Act and the Endangered Species Act interdicts vessels operating in a manner that may lead to harm to endangered species or their habitat, and educates mariners on proper boat handling procedures in areas frequented by endangered species.

Routine USCG activities that do not directly result in injury to endangered species may nevertheless lead to disturbance or harassment of the animals. To avoid harassment, USCG aircraft are instructed to maintain an altitude of 3,000 ft or more over areas of critical habitat or high use for endangered species. During search and rescue and some other operations, this may not be possible; so aircraft are instructed to resume a safe altitude as soon as possible. The USCG has been working closely with USFWS and NMFS to ensure that permits issued for marine events that include beachside activities will not adversely affect nesting habitat for sea turtles.

Routine USCG activities may also represent acoustic harassment to endangered whales or turtles or may disperse preferred foods of endangered species. These effects are expected to be minimal, localized, and of little lasting harm to the endangered species. Routine USCG activities do not result in pollution of the marine environment. In fact, many USCG activities, such as oil spill response, result in the minimization or mitigation of adverse effects of pollution events.

Five alternatives to current USCG activities that might affect endangered species were evaluated. These were to:

1. Continue activities, including new mitigating measures (preferred alternative);
2. Reduce vessel speed (increase aircraft altitude) only when endangered species are expected to be in the area;
3. Decrease vessel speed (increase aircraft altitude) during all patrols, at all times, in all areas where endangered whales and sea turtles may be located;
4. Avoid all high use areas, critical habitats, and marine sanctuaries during all USCG patrols;
5. Cease patrolling waters of the U.S. Atlantic coast.

The first alternative in the preferred one. It involves continuing USCG mission activities along the U.S. Atlantic coast, including performance of mitigating measures already in place or proposed in this Biological Assessment for protection and restoration of populations of threatened or endangered species of whales and sea turtles.

The second alternative would be difficult to implement because the timing of visits of endangered/threatened whales and turtles to critical habitats and high use areas is incompletely understood and variable from year to year. Any decrease in vessel speed (or increase in aircraft altitude) in certain emergency operations in critical habitats and high use areas during periods of most likely occupancy by the protected species would entail substantial risk to human life or property.

The third alternative is not practical for the nearly 4,000 emergency operations performed along the U.S. Atlantic coast each year by the USCG. Any decrease in speed may result in loss of life or property.

The fourth alternative is not feasible because of the wide distribution in U.S. Atlantic coastal waters of endangered species of whales and sea turtles. Many USCG missions within critical habitat and high use areas may be important for protection and enhancement of endangered and threatened species. In addition, prohibition of search and rescue missions and other emergency missions in critical habitats may result in substantial risks to human life and property. Overall, the cost of this alternative to the protection and enhancement of endangered species far outweighs the gain realized by avoiding high-use and critical habitats.

The fifth alternative is not possible, because the USCG is the primary law enforcement and maritime search and rescue agency for U.S. waters. USCG operations in waters inhabited by endangered whales and sea turtles are mandated by congress and contribute to the protection of human life and property and of the endangered species themselves.

Cooperative Efforts

The USCG currently undertakes or will propose to undertake several cooperative efforts with other federal agencies, particularly NMFS, to enhance the recovery of endangered species of whales and sea turtles. These cooperative efforts include;

- Contributed $80,000 to the Southeast Atlantic Early Warning Surveys in 1993/94 and 1994/95;
- Provide platforms of opportunity for disentanglement efforts of regional stranding teams;
- Notify regional stranding coordinators when an entangled turtle or whale is located:
- Maintain active membership in the Southeastern Atlantic Right Whale Recovery Team;
- Publish and broadcast seasonal notice to mariners advising caution in critical habitats;
- Implement ESA plans for USCG District 1 and finish and implement ESA plans for Districts 5 and 7;
- Continue Navtex postings in the southeast Atlantic and investigate expanding to other areas;
- Continue to revise area contingency plans as needed;
- Continue the USCG whale sighting program;
- Investigate the feasibility of holding a workshop with state and federal agencies to coordinate ESA activities;
- Propose that a USCG officer attend turtle workshops and stranding network meetings;
- Develop and present endangered species awareness training to newly assigned USCG personnel;
- Collaborate with the regional NMFS offices to determine the best means of training USCG personnel to improve endangered species sighting methods;
- Ensure that all OPCON have appropriate stranding contact procedures and phone numbers;
- Support inclusion of critical habitat and marine sanctuary boundaries on NOAA nautical charts;
- Incorporate whale and turtle conservation information in the USCG Free Partners marine pollution prevention education efforts;
- Establish liaison with USFWS and NMFS to ensure notification of USCG activities that may affect endangered species;
- Cooperate with regional stranding network coordinators during mass stranding events;
- Notify NMFS and regional stranding network coordinators when an illegal take is detected;
- Investigate using alternative lighting options at USCG stations adjacent to sea turtle nesting beaches to prevent turtle disorientation;
- Develop an easy to use field guide for use by USCG personnel to identify endangered species of whales and sea turtles; and
- Incorporate whale and turtle conservation information in the USCG Auxiliary's safe boating courses and provide this information to the public during courtesy vessel examinations.

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INTRODUCTION

As the "world's premier maritime service," the United States Coast Guard (hereafter: USCG) provides maritime humanitarian, law enforcement, and safety services. These services are performed through the following operations: aids-to-navigation, ice breaking, search and rescue, law enforcement, and marine safety and pollution response. These operations are conducted in the estuarine and marine waters of the United States and have the potential for interacting with endangered or threatened (hereafter: listed) species that are under the stewardship of the National Marine Fisheries Service (NMFS). Cooperation and coordination between the USCG and NMFS is required (50 CFR Part 402) to ensure that the following listed species are not jeopardized or their habitat destroyed or adversely modified by USCG operations:

- Northern Right Whale *(Eubalaena glacialis)*,
- Blue Whale *(Balaenoptera musculus)*,
- Fin Whale *(Balaenoptera physalus)*,
- Sei Whale *(Balaenoptera borealis)*,
- Humpback Whale *(Megaptera novaeangliae)*,
- Sperm Whale *(Physeter macrocephalus)*,
- Hawksbill Sea Turtle *(Eretmochelys imbricata)*,
- Leatherback Sea Turtle *(Dermochelys coriacea)*,
- Green Sea Turtle *(Chelonia mydas)*,
- Loggerhead Turtle *(Caretta caretta)*, and
- Atlantic Ridley Sea Turtle *(Lepidochelys kempi)*.

To ensure protection of critically endangered species (i.e., northern right whale) in the western North Atlantic, critical habitats (e.g., Cape Cod Bay, Great South Channel, coastal waters of Georgia and north Florida) and National Marine Sanctuaries (e.g., Stellwagen Bank) have been established. Marine activities (e.g., fishing, transport) that occur within these areas are monitored or restricted to minimize or eliminate the potential for disturbance or injury to endangered species.

USCG activities are based at 143 stations along the east coast of the United States. Some of the operations that originate from these bases are concentrated in the critical habitats and the National Marine Sanctuaries for whales and turtles. Because some USCG operations could adversely affect listed species, the USCG, in accordance with Section 7 of the Endangered Species Act, contacted NMFS on July 5, 1994, to request confirmation of a list of endangered and threatened species that may be impacted by the operation of USCG vessels off the U.S. North Atlantic coast. This was the first step in initiating a formal consultation with NMFS regarding the impact of USCG operations on listed species and their critical habitats. Subsequent to developing the list of potentially affected species, a draft Biological Assessment (BA) was prepared to evaluate the potential effects of the USCG operations on listed species and critical habitats. The draft BA was submitted to NMFS on December 30, 1994. The draft BA was revised based on NMFS comments and is presented herein to fully address the requirements of 50 CFR 402.14. These requirements are addressed in the following chapters of the BA:

Chapter 1 - Introduction and statement of the problem
Chapter 2 - Description of specific areas in which these operations take place,
Chapter 3 - Description of the eleven listed species and critical habitats that may be affected by USCG operations,
Chapter 4 - Description of USCG operations that may affect listed species,
Chapter 5 - Recommendations and alternatives to USCG operations to mitigate or eliminate impacts.
Chapter 6 - Discussion of joint USCG/NMFS activities that could be conducted to further cooperation between USCG and NMFS for the protection of listed species and critical habitats.

The goal of this BA is to demonstrate the USCG commitment to protecting listed species by suggesting mitigating measures and alternatives to current operations that can be implemented to minimize or eliminate impacts to listed species and critical habitats, which include Cape Cod Bay, Great South Channel, coastal waters of Georgia and northeast Florida, and Sandy Point National Wildlife Refuge, St. Croix, U.S. Virgin Islands. In addition to these critical habitats, the BA will focus on areas where there is overlap between USCG activities and cetacean and turtle high-use habitats, such as Delaware Bay, Chesapeake Bay, Stellwagen Bank, and the Archie Carr National Wildlife Refuge, Florida. To fulfill its goal, the BA draws upon the scientific literature pertaining to the listed species of concern and critical habitats, as well as scientific data concerning the link between environmental conditions, USCG operations, and biological effects.

INTRODUCTION

This chapter of the BA provides a description of the physical (e.g., sea floor relief, mixing regimes), chemical (e.g. sea surface temperature), and biological (e.g., prey) characteristics of coastal waters of the North, Middle, and South Atlantic (Note: the South Atlantic in this chapter refers to the area from Cape Hatteras to the tip of Florida). Environmental variables such as sea floor relief (Evans 1975, Hui 1979), fronts and mixing regimes (Volkov and Moroz 1977), sea surface temperature (Au and Perryman 1985), and sea surface salinity (Thomson *et al.* 1986) may be related to the distribution of cetaceans and sea turtles. This chapter is not intended to provide a comprehensive physical, chemical, and biological characterization of the western North Atlantic Ocean, which would require several volumes. Rather, it is intended to provide the reader with a brief overview of the ocean environment, with specific details for areas of high USCG activity. Sufficient background is given to provide an understanding of the assessment of potential linkages between USCG operations and listed species that are the focus of this BA.

PHYSICAL OCEANOGRAPHY

This description of the physical features of the North, Middle, and South Atlantic Ocean provides a basis for understanding the oceanographic processes (Figure 2-1) that make areas desirable as habitat for listed species and their prey (e.g., zooplankton, fish, benthic invertebrates, and seagrass). Listed species usually have been grouped into on-continental shelf and off-continental shelf populations (Hain *et al.* 1985). Humpback, right, and fin whales are considered on-shelf species; sperm, blue, and sei whales are considered shelf-edge species.

North Atlantic

The North Atlantic is comprised of two major areas, the Gulf of Maine and Georges Bank. The circulation patterns of these two areas dominate the physical oceanographic processes of the North Atlantic.

Gulf of Maine

The Gulf of Maine is a rectangular basin in the continental shelf that has an average depth of 150 m and covers an area of 90,700 km^2 (Uchupi and Austin 1987) (Figure 2-2). It is bounded landward by Nova Scotia to the north and east and New Brunswick, Maine, New Hampshire, and Massachusetts to the west (NOAA, 1995; MMS 1991). The Gulf is open to the south at the surface, but at depths greater than 50 m, Georges Bank, a topographical feature, forms a boundary which makes the Gulf semi-enclosed (NEFSC 1995). The interior of the Gulf is characterized by four large and deep basins (>200 m deep) - Georges Basin near the mouth of the Northeast Channel; Jordan Basin to the northeast; and Wilkinson Basin in the southwestern region. Jeffreys Ledge, located near Cape Ann, is one of the two broad ridges (Stellwagen Bank is the other) that dominate the seafloor between Cape Ann and Cape Cod (NOAA 1993b). It also separates Jordan and Wilkinson Basins (NEFSC 1995).

The two primary sources of water in the Gulf are Scotian Shelf water and water from the continental slope (NEFSC 1995). The cold low-salinity Scotian Shelf water and warm high-salinity Slope water enter the Gulf through the Northeast Channel between Georges Bank and Browns Bank. Scotian Shelf water also enters the Gulf through passages formed between Cape Sable and Browns Bank (NEFSC 1995). The circulation pattern of these two types of water, as they mix in this semi-enclosed sea, is in a counterclockwise direction (EG&G 1982), and is strongest in the spring (NEFSC 1995). The shelf-slope front, which begins on the Scotian Shelf and continues south, separates the colder homogenous shelf water from stratified, warmer, more saline slope water (MMS 1991). Gulf of Maine water also contains a mixture of fresh water from local Maine rivers, such as the Androscoggin, Penobscot, Merrimack, and Kennebec (NEFSC 1995). Currents near the coast move in a general counterclockwise direction, except south of the Penobscot Bay region, where a portion of the coastal flow is offshore towards Jeffreys Ledge (NEFSC 1995).

The sediment type of the Gulf ranges from silty clay or clay sediments in the deep basins, to sandy sediments in shallower areas between the basins and in near coastal regions. Jeffrey's Ledge contains the highest content of gravel in this general area (NOAA 1993b).

Georges Bank

Georges Bank is a large shallow submarine bank that is 150-km wide and 280-km long (Figure 2-2). Georges Bank rises more than 100 m above the Gulf of Maine floor and has an average depth of less than 40 m at the crest. Georges Bank is distinguishable on navigation charts by the 100 m isobath. Georges Bank is connected to the Gulf of Maine by the Northeast Channel (70 m deep), which also separates the Bank from the Scotian Shelf. The Great South Channel (140 m deep), at the extreme southwesterly boundary of Georges Bank, separates the Bank from Nantucket Shoals. The Great South Channel also connects the Gulf of Maine and the Atlantic Ocean. The Scotian Shelf provides low-salinity cold water to the southern flank of Georges Bank in the late winter and spring. The combination of shallow bottom topography and semidiurnal tides results in a vertically well-mixed water column within the 60 m isobath throughout the year. Tidal currents are responsible for much of the sediment transport that is not associated with storm events. Recirculation of water on the bank is strongest in the spring and summer and exhibits a clockwise flow. During the winter, recirculation is minimal and much of the circulation escapes southwestward into the New York Bight. The well-mixed environment is a key contributor to the productivity abundance, and diversity of marine populations on the bank. In addition, the shelf/slope water front, which is a feature of the continental shelf of North America, has been known for decades to concentrate fish. (Backus and Bourne 1987)

Great South Channel, Cape Cod Bay, Stellwagen Bank

Two critical habitats for the right whale (Great South Channel and Cape Cod Bay) and one National Marine Sanctuary (Stellwagen Bank, an important foraging area for humpback and fin whales) have been established in the Gulf of Maine area. All three of these areas are off the coast of Massachusetts. The physical features of these areas provide an environment in which listed species, especially right, humpback, and fin whales, concentrate.

Great South Channel—The Great South Channel is one of the most used cetacean habitats off the northeastern United States (NOAA 1993a). The Great South Channel is a large funnel-shaped feature (DOC 1994) located in the southern extreme of the Gulf of Maine, between Georges Bank and Cape Cod, Massachusetts (NOAA 1993a) (Figures 2-2, 2-3). Cape Cod and Nantucket Shoals border the Great South Channel to the west and Georges Bank borders it to the east. It is deeper to the north and shallower to the south (DOC 1994). The channel narrows to the south and rises to the continental shelf edge. To the north, the channel opens into Murray and Wilkinson Basins. The average depth is about 175 m. Silty sand is the predominant sediment type, with finer sediments occurring at the deeper depths.

Cape Cod Bay—Cape Cod Bay is a large embayment that is bordered on three sides by Massachusetts; specifically Cape Cod on the south and east and the coast of Massachusetts (south of Plymouth) to the west. To the north, the Bay opens into Massachusetts Bay and the Gulf of Maine (DOC 1994). The average depth is 25 m, with maximum depths occurring in the northern section bordering Massachusetts Bay (NOAA 1993a). Cape Cod Bay water flows in a general counterclockwise direction, flowing in from the Gulf of Maine into the western portion of the Bay, then to the eastern portion of the Bay, and returning to the Gulf of Maine through a channel between the north end of Cape Cod and the southeast end of Stellwagen Bank (National Marine Sanctuary) (DOC 1994).

Stellwagen Bank—Stellwagen Bank is a submarine bank that lies just north of Cape Cod (NOAA 1993b) (Figure 2-4). Stellwagen Bank, which is located in the southwestern Gulf of Maine, is 37.2 km long. It is isolated from the deeper water of the North Atlantic, except for the Northwest Channel, by a series of shallow banks at its southern border. Current flow over the Bank is in a counterclockwise direction. Internal waves, which are periodic phenomena, are formed over Stellwagen Bank and move into Massachusetts Bay.

The sediments of the three areas are comprised of mostly sand and gravel (EPA 1993).

Middle Atlantic

The Middle Atlantic or Middle Atlantic Bight includes the area of the continental shelf between the Great South Channel and Cape Hatteras (NEFSC 1995). The Baltimore Canyon Trough, which is an elongated depression, structurally dominates the Middle Atlantic region. The Baltimore Canyon Trough is geologically similar to the Georges Bank Basin (MMS 1991). The continental shelf in the Middle Atlantic region gently slopes offshore and is relatively shallow (< 60 m) (NEFSC 1995). The Middle Atlantic surface water is characterized by shelf, slope, and Gulf Stream water masses (MMS 1986). Shelf waters are subject to tidal effects (MMS 1986). Slope water circulates in an elongated gyre (Williams and Godshall 1977). The events of the Gulf Stream, which flows to the northeast, include periodic meanders, filaments, and warm- and cold-core rings that significantly affect the physical oceanographic processes of the continental shelf and slope (MMS 1991). The Gulf Stream boundary oscillates between on shore and offshore as a result of a meander. Freshwater from the mouth of the Hudson-Raritan, Delaware, and Chesapeake Bays enters the Middle Atlantic Bight. The net flow of surface water in the Middle Atlantic moves from

Georges Bank southwest towards Cape Hatteras. The shelf-slope front, which originated on Georges Bank, ends in the southern portion of the Middle Atlantic areas.

Delaware Bay, Chesapeake Bay

The Middle Atlantic area is strongly influenced by the Chesapeake and Delaware Bays. These Bays were formed by melting glaciers at the end of the Pleistocene era (Thurman 1985).

Delaware Bay—Delaware Bay is in the lowest of three zones of the Delaware Estuary (Figure 2-5). The Delaware Estuary was formed after seaward flooding of the river valley during the last glaciation (Biggs 1978). The Bay has an area of approximately 1600 km^2 (80-95% of the estuary surface area) and extends from Artificial Island to the Bay mouth (Gastrich 1992). The mean depth is 9.7 m; however, 80% of the Bay is less than 9 m deep (Versar 1991). The western portion of the bay has depths of 46 m (Versar 1991). Delaware Bay is well-mixed; stratification is not a long-term feature (Biggs 1978). However, short-term vertical stratification, which is most common during summer, results from freshwater input from the Delaware and Schuylkill Rivers (Versar 1991) The bottom sediments are sandy (Biggs and Church 1984). Current flow is northwest to southeast.

Chesapeake Bay—Chesapeake Bay is the largest estuary in the contiguous United States (EPA 1989) (Figure 2-6). Chesapeake Bay was formed from drowned stream beds resulting from the rise in sea level at the close of the Pleistocene era. The Bay is 320 km long and varies in width from 6 to 48 km. The Bay encompasses 5720 km^2 with an average depth of 9 m. A few deep troughs, believed to be the remains of the ancient Susquehana River valley, run the length of the Bay. As compared to the well-mixed Delaware Bay, the Chesapeake Bay is characterized by two-layer flow or stratification characteristic of a salt-wedge estuary. Freshwater from more than 50 tributaries flows seaward at the surface and saltier denser Atlantic Ocean water flows inward at depth. During summer, the combined thermal and salinity stratification and nitrification of deeper waters results in hypoxia in deeper waters of the Bay. In the upper Bay, the stratification is greatest in the spring when freshwater input is the highest. However, sometimes the two layers are mixed by strong tides. In the lower Bay, the water column is fully mixed due to the locations of major rivers (which provide freshwater input) on the western edge and the Coriolis force. The two layer circulation in the Bay is disrupted by wind and barometric pressure.

South Atlantic

The South Atlantic Bight, which extends from Cape Hatteras in the north to Cape Canaveral in the south, is a key area for right whales (Figure 2-7). However, the most important nesting/foraging habitat for sea turtles in the entire United States is Cape Canaveral to Key Biscayne (Figure 2-8). The South Atlantic Bight is dominated by a northerly flowing Gulf Stream and shallow continental shelf. The southern boundary of the Gulf Stream is marked by the westward flowing Antilles Current and the northeast flowing Florida Current. The Antilles current flows westward along the north edge of the Bahamas Bank to Cape Canaveral. The Florida Current flows northeast along the southeast coast of Florida and the

Florida Keys coming within a few kilometers of the shore. The Gulf Stream links southeast Florida with the South Atlantic Bight. The continental shelf in the south and northern portion of the South Atlantic Bight is very narrow; the shelf break is only 5 km off the shore of W. Palm Beach and 50 km offshore of Cape Canaveral. In the central portion of the South Atlantic Bight (Jacksonville, Florida, to Cape Romain), the continental shelf is very broad, extending 120 km off the coast of Georgia and South Carolina. Three hydrographic or depth zones characterize the South Atlantic Bight: inner-, mid-, and outer-shelf. The inner shelf is dominated by tidal currents, freshwater input from rivers, and short-term winds that cause upwelling and downwelling (Menzel 1993). Input from several large rivers has a significant influence on the near-coast environment. In the mid-shelf, current variability is great due to the influences of wind, tide, or the Gulf Stream. Stratification in the mid-shelf occurs in the spring and summer. In fall and winter, waters are well mixed. The Gulf Stream is the primary influence on hydrography of the outer-shelf. Wind has much less influence in this area than in the inner- and mid-shelf zones. Associated with the Gulf Stream in this zone are "sporadic northward propagating meanders, frontal anti-cyclonic filaments, and cyclonic frontal eddies" that exist for a short time. Sediments are comprised of fine sands and muds. The seafloor in the South Atlantic Bight is a gently sloping plain. Coarser sands predominate the sediments on the continental shelf (Menzel 1993).

CHEMICAL ENVIRONMENT

Water quality affects the distribution (directly and indirectly) of listed species in the Atlantic ocean. Water quality is controlled by oceanic circulation (MMS 1991), such as the influx of warm slope water and low-salinity freshwater. Circulation in the North Atlantic is influenced by the Gulf of Maine and Georges Bank gyres. In the Middle-Atlantic, the slope-sea gyre has the strongest influence on circulation. The Gulf Stream controls circulation in the South Atlantic. Oceanic circulation is directly related to sea surface temperature, salinity, and dissolved oxygen, as well as the distribution of nutrients (e.g., nutrient upwellings), chemical contaminants, and suspended solids. Dissolved oxygen concentrations, nutrient levels, chemical contaminants and suspended solids provide an indication of the health of an ecosystem.

North Atlantic

Nutrient budgets that have been constructed for the Gulf of Maine-Georges Bank region indicate that nutrient-rich slope waters, which enter the areas through the Northeast Channel, dominate nutrients provided by other sources.

Gulf of Maine

Variations in surface temperature and salinity in the Gulf of Maine are associated with seasonal cycles (e.g., winter cooling, increased freshwater input in the spring). The surface temperature ranges from 4°C in March to about 18°C in August. The lowest salinity values occur in the western Gulf in the spring due to freshwater inflow and in the eastern Gulf during the winter due to the inflow of Scotian Shelf water. Several investigators have reported that nutrients are depleted in near-surface waters of the Gulf of Maine between May and October when phytoplankton production is high, and that nutrient concentrations are higher below the thermocline. Salinity along the coast is greatly influenced by input by local rivers, which results in a band of low salinity water that extends from the coast 20 km or more. Bottom waters, which are comprised of nutrient-rich slope water, are generally warmer and saltier than surface or middle layer waters. (NEFSC 1995)

Georges Bank

Waters on Georges Bank undergo considerable variations in temperature and salinity (Flagg 1987). This is due to wind forces, interaction with Gulf of Maine waters through the Northeast Channel, and the influx of Scotian Shelf waters (Flagg 1987). Temperature and salinity of Georges Bank water ranges from 3 to 16 °C and 33 to 32.2 ‰ from winter to summer, respectively (Flagg 1987). The shelf/slope front, which extends from Georges Bank to Cape Hatteras, is a region of strong horizontal salinity gradients year round.

Great South Channel, Cape Cod Bay, Stellwagen Bank

Great South Channel—The typical temperature range for surface water is 3 to 17°C between winter and summer. During the spring and summer, the channel becomes thermally stratified. The salinity remains stable during the year at 32-33 ‰ (Hopkins and Garfield 1979).

Cape Cod Bay—The Bay is thermally stratified in the summer. During this time, nutrient levels are highest in the western and southeastern portion of the Bay due to nearshore upwelling caused by southwest winds and resuspension of nutrients in very shallow waters, respectively (EPA 1993). In addition, nutrient levels in the Bay become depleted in late spring and summer because water in the bay remains static (Geyer *et al.* 1992). Dissolved oxygen levels ranged from a minimum of 70 percent saturation in October 1989 to supersaturation in March 1990 (Townsend *et al.* 1991; Geyer *et al.* 1992). Surface water temperature during the year ranges from 0 to 19°C, with salinity remaining stable between 31 and 32 ‰ (DOC 1994).

Stellwagen Bank—Stellwagen Bank is a high energy environment and is therefore unlikely to experience hypoxic events. Low dissolved oxygen would be expected near the end of the summer after an extended period of water column stratification (EPA 1993).

Middle Atlantic

Each of the water masses that characterizes the Middle Atlantic surface water has its own distinct characteristics. The shelf water temperatures seasonally exhibit spring and summer thermal stratifications and have relatively low salinity. Stratification of the water column results in decreased nutrient levels in the surface water. However, wind-induced upwelling may replenish nutrient-depleted surface waters (Pacheco 1988). Shelf waters are locally influenced by outflow from the Delaware and Chesapeake Bays. The Gulf Stream waters are less variable and have high temperature and salinity. The characteristics of the slope water are a combination of the adjoining Gulf Stream and shelf waters (MMS 1986). Slope waters, which are nutrient rich, provide a reservoir for nutrients in other areas through cross shelf transport, and upwelling (Pacheco 1988).

Delaware Bay, Chesapeake Bay

Delaware Bay—Delaware Bay is characterized by high salinities (Academy of Natural Sciences 1974) - 28 ‰ at the mouth to 8 ‰ in the upper boundary (Najarian 1991). The Bay is vertically well-mixed, but variations in river flow often result in short-term vertical stratifications. Freshwater from the rivers mixes with seawater and results in a horizontal salinity gradient along the north-south axis of the Bay (Versar 1991). The Bay has low suspended particulate matter (Versar 1991). A study conducted from 1987 to 1990 indicates that a relative maximum for nutrients (ammonia, nitrate, nitrite, and phosphate) and chlorophyll values exists at the mouth of Delaware Bay (Battelle 1992).

Chesapeake Bay—The temperature of surface water in Chesapeake Bay fluctuates considerably from 0 to 29°C over the year (EPA 1989). Salinity is highest at the mouth of the Bay and decreases towards the northeast. Salinity also varies with freshwater inflows: salinity decreases in spring with increased freshwater flow and decreases in the fall. The results of a study conducted from 1984 to 1992 indicate that phosphorus in the Bay was significantly lower especially near the mouth of the Bay, nitrogen levels were somewhat higher, and there was a continuous degradation of dissolved oxygen concentrations (EPA 1994). These results were confirmed by another study that found that significant reductions in phosphorus and corresponding improvements in dissolved oxygen have not been achieved (EPA 1991). Another study conducted from 1987 to 1990 indicated that relative maxima for nutrient (ammonia, nitrate, nitrite, and phosphate) and chlorophyll values existed at the mouth of Chesapeake Bay (Battelle 1992).

South Atlantic

The Gulf Stream influences the chemical characteristics of the shelf water. There is a general increase in salinity seaward to a maximum of 36 ‰ (MMS 1986). Dissolved oxygen is generally high and decreases from north to south and seaward (MMS 1986). In the inner-shelf zone, Atkinson *et al.* (1985) reported high turbidity, low salinity, thermal stratification, and a fairly distinct frontal zone. The most significant source of nutrients for the middle- and outer-shelf is from the Gulf Stream upwellings. Upwellings are common in three regions: (a) continental shelf break; (b) north of the major shoals; and (c) Charleston Trough northwest of the Charleston Bump (Steel 1993).

BIOLOGICAL ENVIRONMENT

One of the primary influences on the distribution of whales and turtles is food. Changes in the distribution of prey species result in changes in the distribution of whales and turtles. Phytoplankton are the base of the food chain for a wide variety of marine organisms. Zooplankton, which feed on phytoplankton and other zooplankton are the primary food source for listed species, such as sei, right, fin, and blue whales and serve as prey for planktivorous fish which are fed on by humpback and fin whales. Pelagic and benthic macroinvertebrates are fed on by the sperm whale (i.e., squid) and turtles. In addition, green turtles feed on macroalgae and seagrass.

The following descriptions of the biological environment are presented by regions, similar to previous sections, when appropriate, for phytoplankton, zooplankton, macrobenthos, fish, and seagrass beds.

Phytoplankton

North Atlantic

Phytoplankton in the Gulf of Maine/Massachusetts Bay/Cape Cod Bay area consist of a diverse assemblage of temperate and boreal representatives of both coastal and oceanic species (EPA 1993). The rich flora in this region are the result of the complex hydrogeography of the area. The peninsula of Cape Cod forms a biogeographical boundary between temperate and boreal species. Coastal areas are characterized by numerous embayments and river discharges. Seaward, Georges Bank and shoal areas restrict deep-water inflow through a series of channels. A counterclockwise eddy in the central Gulf of Maine mixes and links these environmental conditions into a regional system.

Gulf of Maine/Massachusetts Bay/Cape Cod Bay Complex

The species composition and successional patterns of the phytoplankton community of the Gulf of Maine/Massachusetts Bay/Cape Cod Bay Complex has been characterized (Smayda, 1992). The sparse winter (October through January) community is characterized by numerous species of low individual and total abundance, and is dominated by the diatom *Coscinodiscus excentricus*. Also present in low abundance during this period is the dinoflagellate *Ceratium tripos*. Low phytoplankton abundances during this period are caused by a combination of factors, including fewer daylight hours and low water temperatures. The winter community is replaced in March or April by the beginning of a spring diatom bloom, dominated initially by *Thalasiosira nordenskioeldii* and also characterized by *Porosira glacialis* and *Chaetoceros diadema*. The spring community, including about 30 species of *Chaetoceros*, undergoes a gradual restructuring as the water temperature increases. *Chaetoceros debilis* becomes dominant at a temperature of about 6°C and *Chaetoceros compressus* becomes dominant by June or July when the temperature increases to about 9°C. The spring bloom may also include a high abundance of the nuisance dinoflagellate species *Phaeocystis pouchetii*.

The successional pattern of *Chaetoceros* species during spring illustrates several additional bloom phenomena: (1) succession occurs primarily at the species level; (2) of the 30 or so species present at any given time, only several bloom simultaneously, and the timing of bloom occurrence varies among species; (3) not all species exhibit bloom phenomena with some persisting in low abundance for extended periods; and (4) the timing and rate of succession are not constant and species dominance can change abruptly with previously dominant species becoming insignificant rapidly (Smayda 1992).

The successional stage dominated by *C. compressus* is replaced as the summer proceeds by a combination of other diatoms and dinoflagellates, with the exact species composition varying depending on region. In shallower regions, the dominant diatoms are *Asterionella japonica, Chaetoceros cinctus, Chaetoceros constrictus, Skeletonema costatum,* and *Leptocylindrus danicus.* In offshore waters on Georges Bank, larger diatoms such as *Guinardia flaccida* and *Eucampia zoodiacus* may dominate. The diatoms are replaced by dinoflagellates. In nearshore waters, dominant species of dinoflagellates include *Peridinium faroense* and the red-tide species *Alexandrium tamarense, Scrippsiella trochoidea,* and *Heterocapsa triquetra.* Offshore waters are dominated by anoxia-causing ceratians, including *Ceratium longipes, C. tripos, C. fusus,* and *C. lineatum.* The coccolithophorid *Emiliania huxleyi* exhibits summer blooms in both nearshore and offshore waters (EPA 1993).

During the late summer/early fall, dinoflagellates are replaced again by localized increases in diatoms dominated by a complex of *Rhizosolenia* species including *R. alata, R. styliformis, R. imbricata,* var *shrubsolei, R. setigera,* and *R. hebetata* f. *semispina.* The *Rhizosolenia* species soon decline, leaving a sparse dinoflagellate assemblage dominated by *C. fusus* and including additional localized occurrences of *C. lineatum* and *Prorocentrum micans.* The transition into winter is characterized by a gradual increase in the dominance of *Coscinodiscus* as other diatoms decline (EPA 1993).

Researchers have reported that in this region, the abundance of the nanophytoplankton (<10 μm cells) component can exceed diatom abundance by a factor of 10 and dinoflagellate abundance by a factor of 100. Nanophytoplankton are extremely abundant in the region, ranging from 10^6 to 10^8 cells/L, and summer populations are about 100 times more abundant than winter-spring populations. Nanophytoplankton accounts for 80-95% of the daily primary production during summer as well as on an annual basis. There is a gradient of progressively increasing nanophytoplankton abundances with increasing distance offshore. The nanophytoplankton component includes species (e.g., *Nannochloris atomus*) that are known to be the cause of nuisance blooms in coastal and shallower waters (EPA 1993).

Outbreaks of nuisance and toxic phytoplankton species are common to the region. Blooms of the toxic dinoflagellate *A. tamarense* occurring far offshore on Georges Bank have led to toxic shellfish beds in nearshore waters. *A. tamarense* produce a family of neurotoxins collectively called saxitoxins (STX). STX is the cause of paralytic shellfish poisoning in molluscs commercially important to humans. (EPA 1993)

Georges Bank

Georges Bank is among the most productive continental-shelf ecosystems in the world. Annual phytoplankton production in the tidally mixed shallow water is three times the mean for world continental shelves (O'Reilly *et al.* 1987).

Chlorophyll *a* and primary production generally decrease from shallow to deep water over Georges Bank. Within the range of depths on the Bank, seasonal stratification of the water column, which takes place in the warmer months, is found only where it is relatively deep.

High production in shallow water during the summer is probably due to influx of "new" nitrate nitrogen into the euphotic layer there, at the front between unstratified water on top of the Bank and stratified water toward the periphery. During the colder, unstratified season, the relatively higher production in the shallows is probably related to higher water column average light intensities experienced by phytoplankton as they are mixed vertically throughout the shallower water column. (O'Reilly *et al.* 1987)

Phytoplankton biomass, approximated by chlorophyll *a*, varies over the year in what appears to be a characteristic pattern for temperate continental-shelf ecosystems. In shallow water, chlorophyll concentrations are highest in March. In deeper water, the peak is reached a little later in April. Concentrations are lowest in both shallow and deep waters during July and August, and these lows persist through September in deep water. Low chlorophyll coincides with well-established stratification of the water column. (O'Reilly *et al.* 1987)

The high summer rate of primary production explains much of the overall annual productivity of Georges Bank. Though phytoplankton biomass, estimated by chlorophyll, is lowest during the summer (one-half to one-third the spring and fall levels), summer production is comparable to the spring and fall blooms. An explanation for this paradox lies in production per unit of chlorophyll; this ratio is higher during the warm, stratified season when nanoplankton are dominant and incident solar radiation is highest. Over the year, the curve of production per unit chlorophyll roughly parallels the curves for photosynthetically active radiation and temperature, thus compensating for reduced summertime stocks of phytoplankton. (O'Reilly *et al.* 1987)

Major gradients in size composition of the primary producers are found between shallow and deep waters on Georges Bank. In the deeper, less productive water of the Bank, nanoplankton strongly dominate primary production and chlorophyll stocks. In the highly productive shallow water, netplankton is equal to nanoplankton or slightly more plentiful. These differences in size composition reflect differences in species; diatoms are more abundant in the shallow water. Such differences are ecologically significant because in addition to the amount of primary production, the abundance, species, and size composition of phytoplankton communities strongly determine the nature of the herbivore fauna and the transfer rate of energy, matter, and contaminants through the food web of Georges Bank. (O'Reilly *et al.* 1987)

Stellwagen Bank

The action of internal waves causes phytoplankton to move up and down in the water column. Phytoplankton concentrations are highest in December through early April (Marshall and Cohn 1982). In general, diatoms dominate the phytoplankton species. Zooplankton species are similar to those found in the Gulf of Maine and are described above (NOAA 1993b).

Middle Atlantic

Five regions of the Mid-Atlantic Bight shelf slope will be referred to in this section: Region 1 (1-20 m), Region 2 (20-40 m), Region 3 (40-60 m), Region 4 (60-200 m), and Region 5 (200-2000 m)(Figure 2-9). Phytoplankton biomass is approximated by chlorophyll *a* values (Pacheco 1988).

The annual cycle of chlorophyll *a* is generally bimodal in all five regions. The highest chlorophyll *a* concentrations occur during the spring bloom during February in Regions 1 and 2 (depths <40 m) and March in Regions 3, 4, and 5 (depths >40 m). The lowest concentrations occur from May through July in waters <40 m (Regions 1 and 2). At depths >40 m (Regions 3, 4, and 5), corresponding to mid- to outer- shelf and slope, chlorophyll *a* concentrations are low from May through October. A secondary peak in chlorophyll *a* occurs during November and December across the entire shelf. Additional peaks of abundance occur in late summer for the two nearshore regions; during September, at depths <20 m and in August at depths between 20-40 m. During the stratified season in and around the thermocline, a subsurface chlorophyll *a* maximum is present, where relatively high concentrations of phytoplankton are available as food for zooplankton. During the unstratified season, chlorophyll *a* and phytoplankton generally are distributed evenly throughout the water column. (Pacheco 1988)

Phytoplankton community size composition also varies over the year. Generally, netplankton strongly dominate the February-March spring bloom over the entire shelf and account for 70% of the standing stock. In contrast, nanoplankton generally dominate communities during the mid-year stratified periods when chlorophyll *a* concentrations are at a low. During the fall bloom, netplankton and nanoplankton contribute to the phytoplankton community chlorophyll *a* in near equal amounts. In waters <200 m (Regions 1-4), netplankton slightly dominate. (Pacheco 1988).

At depths <60 m (Regions 1-3), netplankton is slightly more abundant than nanoplankton over the annual cycle. Nanoplankton is slightly more abundant between 60-100 m and clearly dominates the annual chlorophyll *a* at depths >200 m. (Pacheco 1988)

Delaware Bay, Chesapeake Bay

Delaware Bay—The Delaware River Estuary represents a nutrient rich system, containing high nitrogen and phosphorus levels, where phytoplankton development is regulated, or influenced by a combination of interrelated factors, such as turbidity levels, stratification, and river flow. These physical factors influence the availability of light to the phytoplankton, and prevent higher productivity levels than could be attained in less turbid waters. In general, productivity decreases down the estuary to a low in the turbidity maximum zone (75-110 km into the estuary), then increases further down the estuary. Information on the composition and distribution of phytoplankton in the Delaware Estuary is very limited, as are studies of the picoplankters throughout the system, because past phytoplankton studies have emphasized diatoms and neglected many of the non-diatom categories. In addition, there is a lack of phytoplankton studies in the lower estuary, from the entrance area of the Delaware Bay to the turbidity maximum zone (Marshall 1992).

The upper estuary is dominated by diatoms, chlorophytes, cyanobacteria, and cryptomonads, with diatoms gaining greater dominance downstream and into the lower estuary. There is a transition downstream from dominant freshwater species to those characteristic of estuarine and neretic waters. The species that characterize the lower estuary are not unique, but are found in coastal waters and estuaries of the northeastern U.S. shoreline, including Chesapeake Bay and Narragansett Bay regions. In general, seasonal maxima occur in spring, summer, and fall, with different assemblages noted seasonally, with a transition from freshwater to estuarine species moving downstream. Typically, higher concentrations of phytoplankton occur upstream in summer and downstream during spring and fall. Lowest abundance of phytoplankton is associated with the turbidity maximum zone (Marshall 1992).

Characteristic species for the upper and mid-estuary are *Skeletonema costatum, Melosira granulata, Melosira varians, Asterionella formosa, Cyclotella striata, Fragilaria crotonensis, Actinastrum hanzschia,* and *Ankistrodesmus falcatus*. For the lower estuary, *S. costatum, Leptocylindrus danicus, L. minimus, Guinardia flaccida, Thalassiosira* spp., *Rhizosolenia* spp., and *Cryptomonas* sp. are common (Marshall 1992).

South Atlantic

Fritts *et al.* (1983) reported that phytoplankton abundances decrease seaward. The predominant phytoplankton from Cape Hatteras to south of Cape Canaveral and east to the Gulf Stream are diatoms. In the Gulf Stream, coccolithophores and dinoflagellates are predominant (Hurlburt 1967). Phytoplankton densities vary seasonally, but the Gulf Stream minimizes the amount of variation (MMS 1986). The stabilizing effect of the Gulf Stream contributes to the large diversity of diatoms and coccoliths that are found south of Cape Hatteras in comparison to north of Cape Hatteras (MMS 1986).

Zooplankton and Ichthyoplankton

North Atlantic

Zooplankton of the northeast coast of the U.S. has been under investigation since before the turn of the century. Although it has been demonstrated that large-scale (100-1000 km) seasonal and annual variability in abundance of zooplankton is associated with advective processes in the Northeast Atlantic, no large-scale changes in abundance of zooplankton off the northeast coast of the U.S. have been observed (NOAA, 1988). Within this region, the greatest variation in biomass from year to year is on Georges Bank itself; this is attributed to variable retention of zooplankton resulting from the seasonal formation and decay of the Georges Bank Gyre. (Sherman *et al.* 1987)

Gulf of Maine

Zooplankton in the Gulf of Maine are characterized by high numbers of species and low evenness. Calanoid copepods are the dominant zooplankton in the Gulf of Maine. Localized concentrations of other zooplankters include barnacle nauplii, euphausids, and ctenophores. In general, the calanoid copepod community consists of approximately seven to nine species with two to three of the members dominating. The dominant species, which constitute approximately 60 to 90% of the copepod biomass between January and June, are *Calanus finmarchicus, Pseudocalanus minutus,* and *Centropages typicus.* (EPA 1993)

In the winter, zooplankton populations decrease with only the adults surviving through the winter months to reproduce in the spring. Increases in abundance begin in March with the appearance of copepod nauplii. Zooplankton biomass peaks in the spring following the spring phytoplankton bloom. During the peak period (May-June), the calanoid community, including *C. finmarchicus,* a prey species of right whales, is dominant and reproduction is in progress. Populations decrease again in the summer months as a result of mortality in the post-spawning, over-wintered adults and high mortality in the spring brood possibly due to natural predation. Some changes in species composition occur in the fall; the calanoid copepod, *C. typicus,* may become the dominant species and constitute as much as 65% of the copepod population, replacing *C. finmarchicus.* The abundance of ichthyoplankton appears to follow the pattern of other zooplankton and is low in late winter, peaks in June, and declines considerably in August. (EPA 1993)

Significant differences in zooplankton communities are also noted in relation to depth although the calanoid copepods remain dominant in terms of overall biomass. The surface layer zooplankton (surface to 25 m) is dominated by small or young forms of copepods and ichthyoplankton. The surface layer communities of small and young copepods and ichthyoplankton are preyed upon during the nightly feeding migrations of large copepods, euphausids, and chaetognaths from deeper waters. The mid-depth community (25 to 100 m) is dominated by *Calanus* spp. Deeper than 100 m, large zooplankton, including copepods, chaetognaths, decapod shrimp, and euphausids, are dominant. (EPA 1993)

Georges Bank

Based on National Marine Fisheries Service, Northeast Fisheries Science Center studies of pooled 1977-1981 data, the seasonal pattern of zooplankton biomass is similar in all of the Georges Bank subareas: the central shoal, intermediate water, northern deep water, and southern deep water. Throughout the fall there is a gradual decrease to an annual winter low. In the northern deep water, the pattern differed slightly; the sharp increase in biomass comes later than it does in the other subareas, and there is a small secondary peak in late fall. (Sherman *et al.* 1987)

Total biomass is highest on the central shoal and in the intermediate water. In contrast, in the two deepwater areas, spring peak zooplankton volumes are about 75 $cm^3/100\ m^3$. A difference in biomass persists through the annual cycle, with winter lows of about 20 $cm^3/100\ m^3$ in the deeper water. Year-to-year variation is greater in shoal and intermediate depths and in spring and summer, when biomass levels are relatively high. (Sherman *et al.* 1987)

Five copepod species have been found to be dominant on Georges Bank. Zooplankton standing stocks, dominance patterns, and the abundance of the principal species (*Calanus finmarchicus, Pseudocalanus minutus, Centropages typicus, Centropages hamatus,* and *Metridia lucens*) on Georges Bank are unique compared with other parts of the North Atlantic Region. On Georges Bank, zooplankton abundance peaks in mid-spring and declines precipitously in summer. Prior to the spring peak, 80% of the dominance is shared between *P. minutus* and *C. typicus*. From January to June, *P. minutus* and *C. finmarchius* dominate the zooplankton community in all four subareas (central shoal, intermediate water, northern deep water, southern deep water). By spring, *P. minutus* dominance declines and *C. finmarchius* accounts for 70% of the dominance. In the second half of the year, dominance shifts to *C. typicus*.

Massachusetts and Cape Cod Bays

Zooplankton in Massachusetts and Cape Cod Bays consists mainly of neritic or coastal species. The central Gulf of Maine counterclockwise current carries oceanic plankton species into Massachusetts Bay; currents and plumes may mix nearshore and offshore species (EPA 1993).

Southern New England

Biomass and species composition of zooplankton in southern New England waters have not changed substantially over the past 70 years (NOAA, 1988). The persistent patterns of abundance and species composition reflect coherence within the range of interannual variability observed since the early part of the century. These findings are in contrast with the 30-year decline in zooplankton, including the copepod component, reported for large areas of the North Atlantic. It appears that the climatic changes influencing the zooplankton decreases in the northeast Atlantic are more pronounced in the open ocean areas of the North Atlantic drift. Based on studies conducted by the Northeast Fisheries Science Center (NEFSC), there are no large-scale influences of Gulf Stream eddies on populations of zooplankton or ichthyoplankton on the Northwest Atlantic shelf (NOAA, 1988).

Within southern New England (Figure 2-10), the distribution of zooplankton among inshore, mid-shelf, and offshore depth zones (<40 m, 40-100 m, and >100 m, respectively) is different. Variation of zooplankton standing stocks and seasonal abundance patterns vary among depth zones. It is believed that southern New England is a transition zone between the oceanic Georges Bank area and the continental shelf west of the Hudson Canyon, in which the principal driving force appears to be the large estuarine outflow from the Delaware and Chesapeake Bays. (Pacheco 1988)

Zooplankton biomass is bimodal; an initial pulse occurs in May followed by a low in July, and a second peak occurs in August, followed by a decline in autumn and winter. In southern New England waters, the bimodal peaks in zooplankton standing stock represent *C.*

finmarchicus and *P. minutus* dominance in spring and early summer followed by a large-scale *C. typicus* swarming in late summer and autumn.

In the southern New England area, *C. finmarchicus* abundance peaks in April and May. Peak values have been recorded at locations offshore (25,000 individuals/100 m^3), mid-shelf (80,000 individuals/100 m^3), and inshore (9,000 individuals/100 m^3) (Pacheco 1988).

P. minutus also has a spring peak in abundance. The onshore and mid-shelf seasonal patterns are similar with an April peak (100,000 individuals/100 m^3 and 60,000 individuals/100 m^3, respectively), followed by a decrease to an October minimum one order of magnitude lower than the peak abundance. In offshore waters this species reaches a peak of only 11,000 individuals/100 m^3 in April, followed by a precipitous decline to almost total absence in August, followed by a modest recovery in the fall. (Pacheco 1988)

Seasonal variation in abundance of *C. typicus* is less than the two previously discussed species, with peak abundance typically less than one order of magnitude above the annual low. There is no well-defined seasonal pattern, although greatest density is found late in the year and productivity seems to peak in midsummer. Abundance in each depth region varies from about 3,000 individuals/100 m^3 to about 20,000 individuals/100 m^3 (Pacheco 1988).

The copepod *C. hamatus* displays a different pattern of abundance. In inshore waters it rises from a winter maximum of 1,000 individuals/100 m^3 to a July maximum of 11,000 individuals/100 m^3. This pattern is repeated in mid-shelf waters, but with an order of magnitude lower density. In mid-shelf waters, there is a secondary fall peak not present in the shallower water. *C. hamatus* is never present in high numbers in the southern New England offshore waters, and is totally absent in July and August (Pacheco 1988).

In contrast, *M. lucens* is most abundant in offshore waters. In inshore waters it reaches peak abundance (1,100 individuals/100 m^3) in May and again in November. It is present in greater numbers in the mid-shelf region, peaking in May at 12,000 individuals/100 m^3 before declining to a fall/winter plateau of 3,000 individuals/100 m^3. In offshore waters, *M. lucens* is present at a density of 100,000 individuals/100 m^3 throughout most of the year (Pacheco 1988).

Middle Atlantic

Biomass and species composition of zooplankton in the Mid-Atlantic Region have not changed substantially over the past 70 years (Pacheco 1988).

Within the Mid-Atlantic Bight, the distribution of zooplankton among inshore, mid-shelf, and offshore depth zones ($<$40 m, 40-100 m, and $>$100 m, respectively) are different. Variation of zooplankton standing stocks and seasonal abundance patterns vary among depth zones (Pacheco 1988).

In the Mid-Atlantic Bight, zooplankton biomass increases from an annual low in winter to an annual high in autumn. Further south in the Mid-Atlantic Bight, *C. finmarchicus* abundance is diminished, and is replaced by *P. minutus* and *C. typicus* in late winter and early spring, followed by an increase in the standing stock of zooplankton from summer through autumn related to the growing abundance of cladocerans and other zooplankters in summer and large-scale swarming of *C. typicus* in autumn.

C. finmarchicus is less abundant in the Mid-Atlantic Bight than in southern New England waters. Greatest densities are reached on the midshelf, one order of magnitude greater than inshore densities. As in southern New England waters, the seasonal cycle reaches a peak in April and May, but there is a sharp decline in abundance in July, a feature not present in the southern New England area. This summer minimum is most pronounced in shallow waters but is discernible even in the offshore region (Pacheco 1988).

P. minutus also has a spring peak in abundance. In the inshore waters, *P. minutus* density is approximately 50,000 individuals/100 m^3 through the cold water months of February, March, and April. Density of this calanoid copepod falls to about 2,000 individuals/100 m^3 in July and August and reaches a minimum of 300 individuals/100 m^3 in the fall. This pattern also holds for the mid-shelf where the density is higher. In contrast, in the offshore waters, *P. minutus* shows a steady log-normal decrease from its spring peak of 10,000 individuals/100 m^3 to a November minimum of about 500 individuals/100 m^3 (Pacheco 1988).

C. typicus in offshore waters has no well-defined seasonal pattern and varies in the same abundance range as in southern New England waters. Greatest density is found late in the year and productivity seems to peak in midsummer. Abundance in each depth region varies from about 3,000 individuals/100 m^3 to about 20,000 individuals/100 m^3. However, in the two shallower regions of the Mid-Atlantic Bight, abundance ranges from 8,000 individuals/100 m^3 to 200,000 individuals/100 m^3 in November and December, respectively (Pacheco 1988).

C. hamatus abundance is greatest in the nearshore waters. Its density remains almost constant at 25,000 individuals/100 m^3 from February through July before falling to less than 100 individuals/100 m^3 in October. In mid-shelf waters, *C. hamatus* is found from March to October and reaches a July peak of about 400 individuals/100 m^3. This species is never abundant in offshore waters of the Mid-Atlantic Bight (Pacheco 1988).

In inshore waters, the population of *M. lucens* is small and variable, reaching a peak of about 1,100 individuals/100 m^3 in June and November. It is more common in the deeper regions of this area, reaching peaks of about 10,000 individuals/100 m^3 and showing no marked seasonal pattern (Pacheco 1988).

Delaware Bay

The major factor affecting distribution of zooplankton in the bay is salinity. Therefore, the lower portion of the bay is dominated by marine species, such as *Acartia tonsa, Pseudodiaptomas coronatus,* and *Temora longicornis.* Copepods account for more than 90% of all zooplankton. High abundances are more often found in the spring than in the summer

(Versar 1991). Versar (1991) suggests that the overall abundance of zooplankton in the bay has not changed since the turn of the century.

South Atlantic

Zooplankton concentrations are greater in the summer than the winter and decrease seaward (MMS 1986). Copepods dominate the inshore community, but several species (including euphausids and coelenterates) dominate the offshore community (MMS 1986). Ichthyoplankton are found year round in this region (Fahay 1975).

Macrobenthos

In Delaware Bay, spider crabs (*Libinia spp.*) and lady crabs are abundant in the summer months (R. Kropp, personal communication, 1995). Williams (1984) reported that spider crabs are most common along the breakwater in Delaware Bay during the spring and summer. This corresponds to observations by Kropp (personal communication, 1995) of spider crabs and lady crabs *(Ovalipes oscillatus)* in Delaware Bay from late spring to summer. *Libinia* have also been observed from Woods Hole, Massachusetts to North Carolina during the spring to late summer months. Millikin and Williams (1984) summarized the migrations of blue crabs, *Callinectes sapidus*. Blue crabs move up in the bay to lower salinity water to mate. After mating, *C. sapidus* migrate to higher salinity waters (i.e., mouth of the bay) that are suitable for larval development. This pattern of migration has been observed in Delaware and Chesapeake Bays. *Cancer irroratus* is primarily a marine species with a continuous population that occurs from southern New England to the Chesapeake Bight (Williams 1984; Musick and McEachren 1972). However, this species does occur in the higher salinity regions (i.e., lower bay) of estuaries during its life cycle. Haefner and Van Engel (1975) reported that *Cancer* crabs move into the higher salinity regions of the bay in the fall and move out of the bay in May.

Macroinvertebrates

Squid is the prime food for sperm whales. Squid, both *Loligo pealei* and *Illex illecebrosus* are assessed by the National Marine Fisheries Service. The most recent assessment, through 1992, is presented in NOAA (1993b). *Loligo* are distributed on the continental shelf and slope water from Canada to the Gulf of Venezuela. However, they undergo seasonal migrations, moving offshore in the later autumn and inshore in the spring and summer. *Loligo* stock size appears to be above average based on 1992 data. *Illex* are also concentrated on the continental shelf, but their geographical range is narrower than that of *Loligo,* from Labrador to Florida. They are frequently observed on the shelf between Cape Hatteras and Newfoundland during the spring and autumn. Currently, *Illex* abundances are average.

Fish

Herring, mackerel, capelin, and sand lance are small schooling fish that are the primary prey of humpback and fin whales. Distributions and abundances of these prey influence the distribution of their predators. The NMFS reports on the status of stocks for herring and mackerel through 1992 (NOAA 1993c). Herring, *Clupea harengus,* is distributed from Labrador to Cape Hatteras. In the past, herring abundances were assessed separately for the Gulf of Maine and Georges Bank stocks. Recently the assessments of these two stocks have been combined. The most recent data indicate that herring abundances are at record high levels. Mackerel, *Scomber scombrus,* has the same geographic distribution as herring. Mackerel abundances are also at record high levels. The migration patterns of herring and mackerel are somewhat different. Mackerel overwinter near Cape Hatteras. As the temperature increases, they migrate north following the 7°C isotherm. Herring overwinter in coastal areas from the outer Cape Cod south. In the spring, they are more dispersed. They aggregate for feeding and spawning in the North Atlantic (e.g., Gulf of Maine). Sand lance, *Ammodytes* spp., are habitat dependent and are associated with specific bottom types and sediments (G. Waring, personal communication, 1995). Concentrations of sand lance are often found on Stellwagen Bank, the edge of Georges Bank, and off of eastern Long Island and Block Island (G. Waring, personal communication, 1995). Because sand lance are prey of mackerel and herring, high abundances of sand lance occur at low abundances of mackerel and herring. Currently, mackerel and herring abundances are high; sand lance abundances are low. Mackerel and herring are not abundant in the South Atlantic even though they may "pass through" the area. Capelin, *Mallotus vvillosus*, is a small, boreal-arctic species that congregates in vast numbers around Newfoundland and Nova Scotia during the summer when they congregate in coastal waters to spawn. They rarely occur in large numbers in the Gulf of Maine and farther south. They are the preferred food of fin and humpback whales, as well as several species of sea birds during the summer in Canadian coastal waters of the western North Atlantic Ocean.

Seagrass Beds

Seagrass is often referred to as submerged aquatic vegetation (SAV). In Middle Atlantic, approximately 10 species occur in seagrass beds in Chesapeake Bay. The largest concentration of seagrass beds is in the SEUS. The three most abundance species are turtle grass *(Thalassia testudinum),* manatee grass *(Syringodium filiforme),* and shoal grass *(Halodule wrightii)*. Seagrass beds are sensitive to high wave action. Therefore they are most often found sheltered from high wave action. From Cape Canaveral south to Biscayne Bay, seagrass beds are located in lagoons behind the barrier islands. Because of the large number of canal inlets that discharge into the lagoons, this area is subject to fluctuations in salinity which affects species domination: turtle and manatee grass is most often found near the mouths of the inlets; shoal grass is most often found offshore of the inlet. South of Biscayne to the Florida Keys, extensive seagrass beds are found in Hawk Channel and behind the outer reef line (approximately 12 miles from shore). There is very little change in abundance of the seagrasses during the year (J. Thompson, personal communication 1995). Seagrasses are the preferred food of green turtles, *Chelonia mydas*, along the U.S. Atlantic coast.

Macroalgae

Hawksbill turtles are often associated with *Sargassum* rafts. Attached *Sargassum* exists in the Florida keys inside the outer reefs in a sheltered area. North of Biscayne, there is no attached *Sargassum.* The unattached Sargassam is transported northward by the Florida Current and Gulf Stream (J. Thompson, personal communication 1995).

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WHALES

Introduction: Cetaceans

Six species of endangered cetaceans, the right whale *(Eubalaena glacialis)*, the humpback whale (*Megaptera novaeangliae*), the fin whale *(Balaenoptera physalus)*, the sei whale *(Balaenoptera borealis)*, the blue whale *(Balaenoptera musculus)*, and the sperm whale *(Physeter macrocephalus)*, occur along the Atlantic coast of the United States. The right, humpback and fin whales are commonly found in coastal waters where they feed during the summer months. Some female and juvenile right whales winter in nearshore waters of Georgia and north Florida, where the females give birth to their calves. Juvenile humpback whales may winter off the middle Atlantic states. Sei whales are occasional visitors from more northern latitudes when oceanographic and planktonic conditions bring them to the southern extent of their range. Blue whales and sperm whales are mostly found further offshore and are rarely observed in shallow coastal waters. During the winter months, the abundance of all species decreases, and, in general, their distributions shift to the south.

The majority of U.S. Coast Guard operations occur in shallow waters less than 30 km from shore. A "take" is most likely to occur from a ship or boat. Therefore the species likely to be encountered during routine missions are fin whales, humpback whales, and right whales. USCG interactions with blue, sei and sperm whales are unlikely, and therefore, these species are not covered in detail in this document. Fin whales are the most numerous of the baleen whales in U.S. Atlantic coast waters. They are the fastest of the aforementioned species, and relatively few records exist of fin whale collisions with ships. Humpback whales are more robust and slower than fin whales. They can be quite gregarious, and exhibit feeding methods unique among the cetaceans. Entanglement in fishing gear is the primary source of human-induced mortality in humpback whales, but many of these whales in the North Atlantic bear scars from boat propellers, and some have severed flukes due to ship interactions.

Of all of these endangered whales, the status of the right whale is the most precarious. Despite various levels of international protection for over half a century, there are fewer than 350 right whales in the western North Atlantic Ocean, and the population appears to be increasing very slowly, if at all. Right whale habitat use coincides with coastal areas intensively used by humans for fishing, shipping and recreation. Unfortunately, this overlap may contribute to the slow recovery of the species. Because this population is so depleted, any adverse interactions are cause for concern.

High Use Habitats of Endangered Cetaceans

The majority of cetaceans in the western North Atlantic Ocean are found in continental shelf waters (Kenney and Winn 1987). The distribution of whales is often closely correlated with the distribution of their food (Katona and Whitehead 1988, Payne *et al.* 1990). The western margin of the Gulf of Maine is the most intensely used cetacean habitat on the northeast U.S. continental shelf (Kenney and Winn 1986). This is primarily because the area is extremely productive, and provides a variety of food for these whales. Within the continental shelf habitat, species are often separated by their prey preferences. The piscivorous fin and humpback whales overlap in their distribution, and are primarily found in the western Gulf of Maine and the mid-shelf area east of Chesapeake Bay. Within this general area, Stellwagen Bank, Jeffreys Ledge, Cape Cod Bay and the Great South Channel are considered important, "high-use" cetacean habitat. The planktivorous whales (right, sei, blue, and sometimes fin whales) tend to inhabit the western Gulf of Maine and the southwestern and eastern portions of Georges Bank, where upwelling drives high production of phytoplankton and zooplankton. The squid eating sperm whale is typically found well offshore along the edge of the continental shelf (Kenney and Winn 1986).

In general, the use of these habitats increases in the spring and summer, and decreases in the fall and winter. Some female right whales and their newborn calves are seen off the coasts of Georgia and Florida in December through March, and the majority of humpback whales migrate to the West Indies during the same period. The whereabouts of the majority of fin, blue, sei, right and sperm whales during the winter months is unknown. The springtime influx of whales into coastal waters is correlated with simultaneous increases in primary productivity.

Although the entire continental shelf is important to these endangered species, a few specific areas have been identified as being extremely important habitat for cetaceans. Cape Cod Bay, the Great South Channel, and the coastal areas of Georgia and northern Florida (Southeast U.S. or SEUS) have been designated as critical habitat for the northern right whale, and Stellwagen Bank was recently designated a National Marine Sanctuary. The USCG is very active in Cape Cod Bay, Stellwagen Bank, and the SEUS because these areas are used extensively by commercial ships and recreational boaters. The USCG has had an important role in SEUS right whale recovery actions in the last several years, and, in cooperation with NMFS personnel, will be patrolling Stellwagen Bank to ensure the safety of marine life within the sanctuary. The USCG is developing Endangered Species Act plans within each district to ensure that activities within critical habitat boundaries do not adversely affect endangered and threatened species.

The following is a description of endangered whales in the western North Atlantic Ocean. This information is provided as a foundation for the discussion of the impact of Atlantic coast USCG activities on endangered whales.

Right Whale *(Eubalaena glacialis)*

Population Status and Trends

The northern right whale, *Eubalaena glacialis*, was a prime target of early whale fisheries from the 1100s through the early 1900s due to its coastal nature, slow swimming speed, high oil yield, and the fact that it floats when dead (Brown 1986; Aguilar 1986). Due to this intense exploitation, it is now the rarest of the large whales and is in danger of becoming extinct. Historically, there was an eastern and western stock of right whales in the North Atlantic, but current evidence suggests that the eastern stock may be extinct or on the verge of extinction (Brown 1986; Best 1993). For the purposes of this report, we will limit our review to the western North Atlantic population.

The majority of right whales sighted in the North Atlantic Ocean are approximately 11-15 m in length and weigh up to 70 tons (Kraus *et al.* 1988). Females are larger than males. Right whales can be distinguished from other baleen whales by their black color, the absence of a dorsal fin, short, paddle-shaped flippers, a large head (more than 1/4 of the total body length), and a strongly bowed lower jaw. The distinct "V" shaped blow provides a means of identification from a distance. The distribution and size of thickened, cornified patches of epidermis (callosities) on the rostrum, chin and lower lips varies among right whales and can be used in conjunction with other unique features, such as scars and pigmentation patterns, to identify individuals (Kraus *et al.* 1986; Payne *et al.* 1983).

The pre-exploitation western North Atlantic population is estimated to have numbered 10,000 animals (NMFS 1991a). Commercial harvest of the species over the centuries resulted in the decimation of the population to possibly less than 50 animals at the turn of the century (Reeves *et al.* 1992, Kenny *et al.* 1995). Although protected by international law since 1935, current studies indicate that there are fewer than 350 right whales in the western North Atlantic (Knowlton *et al.* 1994). Based on three years of aerial survey data, CeTAP researchers (1982) estimate that there are 380 (95% CI= 688; dive time correction = 2.997) whales in the population. After eliminating animals known to be dead, 325 animals have been photographically identified and cataloged to date (Kenney *et al.* 1995). This latter estimate is the best available population estimate because it is believed to be a nearly-complete census (NMFS 1995) and very few new animals are photographed each year. However, some of these animals have not been seen in several years and could be dead. It appears that animals in the western North Atlantic are from a single stock (Knowlton *et al.* 1992). Although reduced to very low numbers, this is the largest remaining population of northern right whales, and it stands to benefit most from recovery actions (NMFS 1991a 1994; Kenney *et al.* 1995). The western North Atlantic population will be considered recovered when it reaches 60-80% of its pre-exploitation number (NMFS 1991a), or about 7,000 animals.

Despite the cessation of whaling, and the implementation of the Marine Mammal Protection Act (1972) and the Endangered Species Act (1973), this population of right whales appears to be growing at a very slow rate. In contrast to the closely related southern right whale *(Eublaena australis)* which is exhibiting signs of recovery in the eastern and western South Atlantic populations and the Australian population, the situation for northern right whales is less encouraging. South Atlantic stocks are increasing at 2 to 3 times the 2.5% (Knowlton *et al.* 1994) to 3.8% (Kenney *et al.* 1995) estimated increase for the North Atlantic population. This low rate of increase is surprising because the population is far below carrying capacity and should be growing exponentially (Pianka 1983). Numerous causes of this low rate of recovery have been proposed. Because female right whales were preferentially targeted by whalers, it is possible that there is a shortage of females in the population, but recent mtDNA evidence indicates that the ratio of males to females is not significantly different than unity (Brown *et al.* 1994). However, there are proportionally fewer parous females in the North Atlantic population (58/152 or 38%) than there are in the South Atlantic population (320/595 or 54%) (Brown *et al.* 1994). Overall, the northern population is increasing at a lower rate than expected, the pool of reproductively active females is not increasing, and calving intervals are longer than expected. This may be evidence of poor reproductive health in this population (Knowlton *et al.* 1994). This slow recovery could also be caused by inherently low reproductive rates (Reeves *et al.* 1978; Brown *et al.* 1994), inbreeding (Kraus *et al.* 1988; Schaeff *et al.* 1992), or reduction of the population below some "critical population size" (Allen 1974).

Seasonal Distribution

Generally, right whales are found along the east coast of North America (Figure 3-1, CeTAP 1982), but in the last century, have been seen as far north as Greenland, as far east as Bermuda and as far south as the Gulf of Mexico (NMFS 1991a). Right whales, like other large whales, are migratory animals (Gaskin 1982). Some female right whales have been observed to migrate over 2,900 km from their northern feeding grounds to the southern calving/wintering grounds (Knowlton *et al.* 1992). Seasonal movements are among the following five "high use" areas in the North Atlantic: 1) Cape Cod Bay, 2) the Great South Channel, 3) the Bay of Fundy, 4) the Nova Scotian Shelf, and 5) the coastal waters of Georgia and Florida.

Cape Cod Bay (CCB): Cape Cod Bay is primarily a spring feeding ground and nursery area for right whales. In February through April, an average of 40 animals arrive and feed in Cape Cod Bay (Marx and Mayo 1992). Between 1978 and 1987, more than half of all photographically identified animals were seen in this area. Peak abundance, including cow-calf pairs, is in April (Hamilton and Mayo 1990). Feeding, nursing, and mating behavior have all been observed in Cape Cod Bay (Schevill *et al.* 1986; Hamilton and Mayo 1990; Mayo and Marx 1990).

Great South Channel: In the spring, many animals (6% to 22% of the population, and 0% to 57% of all calves), also use the Great South Channel (GSC) as feeding and nursery ground (Kraus and Kenney 1991). Use peaks in May, when up to 179 animals have been seen in the area. Individuals are usually in temperature stratified waters north of a persistent thermal front and in water deeper than 100m. The movement of whales into the Great South Channel is apparently in response to extremely dense aggregations of zooplankton. It is likely that this is the primary feeding ground for the northern right whale (Kenney *et al.* 1995).

Bay of Fundy and the Scotian Shelf: In the summer and fall, the lower Bay of Fundy (BOF) is used as a feeding and nursery area for some animals, including nearly all mother/calf pairs. An additional summer/fall feeding ground, on the southern Nova Scotian shelf, is used almost exclusively by mature right whales (NMFS 1994).

Southeastern United States (SEUS): The coastal waters of Georgia and Florida are the only known calving ground and winter nursery area for the northern right whale. Typically, the majority of animals seen in this area are females about to give birth, females with their newborn calves, and some juveniles. In the winter of 1993-1994, there were 54 sightings of right whales in this region. Of these, thirty sightings were of mother/calf pairs, and 11 were of juveniles in surface active groups (Slay *et al.* 1994). The winter distribution of the remaining population, including all of the adult males and most of the juveniles, is unknown.

Originally it was assumed that right whales remained in these discrete high-use areas for well-defined periods of time (NMFS 1991a). However, recent satellite-telemetry data have shown that some animals regularly move among these high-use areas within seasons (Mate *et al.* 1992). In addition, right whale use of preferred habitats may vary with fluctuating prey availability. During 1986, major shifts in the distribution of many cetaceans occurred apparently in response to changes in prey abundance. Right whales remained in Cape Cod Bay and were also regularly seen on Stellwagen Bank and Jeffreys Ledge throughout the summer (Payne *et al.* 1990). Therefore, movements within and among these high-use areas may vary substantially from year to year.

Critical Habitat

The northern right whale was listed as endangered on June 2, 1970 (35 FR 8495). The NMFS approved a recovery plan in December, 1991, under Section 4(f) of the Endangered Species Act (NMFS 1994). One of the recommendations of the plan was that the designation of critical habitat was essential to the recovery of the northern right whale. On June 3, 1994, NMFS published the "Final Rule Designating Critical Habitat for the Northern Right Whale" (50 CFR Part 226). Based on the best available scientific information and after considering public comment, the following areas were designated critical habitat for the northern right whale, and are considered to be "essential for the reproduction, rest and refuge, health, continued survival, conservation and recovery of the northern right whale population:"

1. Great South Channel (GSC)
   41°40'N/69°45'W, 41°00'/69°05'W, 41°38'N/68°13'W, and 42°10'N/68°31'W

2. Cape Cod Bay (CCB)
   42°04.8'N/70°10.0'W, 42°12'N/70°15'W, 42°12'N/70°30'W, and 41°46.8'N/70°30'W

3. Southeastern United States (SEUS)
   31°15'N (approximately at the mouth of the Atlamaha River, Georgia), 30°15N (approximately Jacksonville, Florida) from the shoreline out to 15 nautical miles offshore, and the waters between 30°15'N and 28°00'N (approximately Sebastian Inlet, Florida) from the shoreline out to 5 nautical miles.

This designation does not restrict human activities within the critical habitat, but instead is a means of alerting interested parties, including Federal agencies, to the importance of the area, and helps to focus conservation efforts.

Food and Feeding Behavior

Right whales are known skim feeders (Nemoto 1970). As they swim through the water with their mouth agape, large volumes of seawater are filtered through a triangular opening in the baleen at the front of the mouth. As water flows through the mouth, zooplankton are trapped on the fine fringe of the inner surface of their baleen plates (Watkins and Schevill 1976, 1979; Kraus *et al.* 1982; Mayo and Marx 1990). The whale then closes its mouth periodically to swallow its prey. The majority of feeding occurs at depth, but occasionally skim feeding occurs at the surface. When skim feeding, individuals change swimming direction more often than when travelling (Mayo and Marx 1990).

The primary prey of right whales in the western North Atlantic are the calanoid copepod, *Calanus finmarchicus*, and juvenile euphausiids (Nemoto 1970, Watkins and Schevill 1976, Kraus and Prescott 1982; Murison and Gaskin 1989) and secondarily *Pseudocalanus minutus* and *Centropages sp.* (Mayo and Marx 1990). Both the density of plankton patches and the proportion of caloric-rich adult (Stage V) copepods appear to be factors influencing the foraging threshold of right whales (Kenney *et al.* 1986; Murison and Gaskin 1989; Mayo and Marx 1990; Payne *et al.* 1990). Kenney *et al.* (1986) estimated that the "average" 40,000 kg right whale would need up to 2.4 x 10^3 kcal m^{-3}. In other words, right whales must target extremely dense patches of zooplankton. A group of right whales was associated with such a patch (4.16 x 10^4 copepods m^{-3} or a median of 2.8 x 10^3 kcal m^{-3}) for four days while in the Great South Channel (Wishner *et al.* 1988). It is not know how right whales locate these dense patches of food.

Feeding behavior has been observed in Cape Cod Bay, Stellwagen Bank (Watkins and Schevill 1976, 1979, Payne *et al.* 1990), the Great South Channel (CeTAP 1982; Winn *et al.* 1995), Jeffreys Ledge, the lower Bay of Fundy (Kraus *et al.* 1982, Gaskin 1982) and the Scotian shelf (Brownell *et al.* 1986, NMFS 1991a), and is likely to occur in other areas as well when planktonic conditions are suitable. The broad-scale migratory movements of right whales appear to be correlated with zooplankton "blooms" in areas such as Cape Cod Bay (Mayo and Marx 1990) and the Great South Channel (Kenney *et al.* 1995). The majority of feeding in these areas occurs underwater, and surface skim feeding has not been reported south of New York (NMFS 1991a). Feeding has not been observed in the southern wintering grounds off Georgia and Florida, and it is possible that right whales fast while in that area (Kraus and Kenny 1991).

The vertical distribution of right whales is also influenced by the distribution of their prey. Recent evidence indicates that a foraging right whale modifies its dive patterns to follow the vertical movements of *Calanus finmarchicus*. In the Great South Channel, during years when zooplankton exhibited diel vertical migration patterns, there were diel differences in right whale diving behavior. However, in other years, vertical plankton distribution was more stable throughout the day, and there were no day-night differences in right whale diving patterns (Winn *et al.* 1995). Individuals studied by satellite-monitored radio tags exhibited tremendous variation in their dive patterns (Mate *et al.* 1992).

Reproduction
The coastal waters of Georgia and northeastern Florida are the only known calving ground of the northern right whale. The late November - early March calving season appears to peak in January. Females give birth to a single 4.0 to 5.5 m calf after a gestation period of at least 12 months (Klumov 1962; IWC 1986). The estimated age of first parturition, 7.57 years, is lower than that estimated for the Argentine population but it is likely the estimate for the northern right whale is artificially low due to a lack of data. The mean calving

interval for female right whales is 3.67 years and appears to be increasing (Knowlton *et al.* 1994).

From 1980 to 1992, 65 photo-identified cows gave birth to 145 calves (Knowlton *et al.* 1994). Sixty-six calves and 87 photo-identified non-calves, or 48% (153/319) of all cataloged right whales, have been observed in the SEUS region. Cows with newborn calves appear to stay in this region longer than other classes of right whales. This, combined with the tendency of cow-calf pairs to stay significantly closer to shore than other right whales (Kraus *et al.* 1993) may increase their risk of human interactions.

The use of a given nursery by females is culturally transmitted (Schaeff *et al.* 1992). Not all mother-calf pairs that are seen in the SEUS wintering grounds are seen the following summer in the Bay of Fundy (Knowlton *et al.* 1994). In addition, based on mtDNA data, one of the three known matrilines does not appear to bring its calves to the Bay of Fundy summer nursery area (Schaeff *et al.* 1993). Therefore, it is likely that at least one other nursery area exists.

Known Mortality Factors

Analyses of sighing data between the northern feeding areas (Bay of Fundy and Cape Cod Bay) and the southern calving areas (SEUS) indicate that about 17 percent of calves die within their first year of life. After the first year, mortality rates drop to an average of 3% for the next three years, or a total of 27% for the first four years of life (Kraus 1990). Thirty-two percent of this mortality and 53% of the documented non-neonatal deaths are human-induced. The estimated rate of mortality for adults is 1% (Kraus 1990) to 4% (Gaskin 1982). Even a few incidental deaths may greatly affect the rate of increase in a drastically reduced population with such a long reproductive cycle (Best 1988).

Sei whales *(Balaenoptera borealis)* (Mitchell 1975; Mitchell *et al.* 1986), sand lance, *Ammodytes spp.*, (Payne *et al.* 1990, Kenney *et al.* 1986) and other planktivous species could represent a source of competition for the preferred prey of the right whale, *Calanus finmarchicus*. In 1986, when *C. finmarchicus* levels were high in the Gulf of Maine, right whales, fin whales, and sei whales were the dominant cetaceans in the area. Although Kenney *et al.* (1995) and Knowlton *et al.* (1994) report an increase in sei whales in the GSC and Nova Scotian shelf, there is little quantitative evidence of direct competition between right whales and these species. In addition, *C. finmarchicus* populations are highly variable, and little of this variation is due to predation pressure (McLaren *et al.* 1989; Tande and Slagstad 1992)

It has been suggested that killer whales *(Orcinus orca)* may, in part, be responsible for the lack of bowhead whale population recovery in the Eastern Arctic (Mitchell and Reeves 1982). This could also be true for right whales. At least 3 percent (NMFS 1991a) to 9 percent (Kraus 1990, Kenney and Kraus 1993) of the cataloged right whales bear scars, primarily on the flukes, from killer whale attacks (Kraus *et al.* 1986, Kraus 1990). Killer whales are relatively uncommon in the North Atlantic, but have been observed in the coastal waters of Georgia and Florida (Layne 1965) and in the Gulf of Maine (Katona *et al.* 1988).

Deaths due to killer whale attacks have been documented for other species of baleen whales (Hancock 1965; Baldridge 1972; Silber *et al.* 1990).

Many investigators consider habitat change to be the key environmental factor affecting the rate of recovery of the right whale (NMFS 1991a, Gaskin 1991). Of primary concern are the anthropogenic sources of change such as pollution, oil and gas exploration, sea-bed mining, and a general increase in coastal activities due to an increase in human population along the east coast (NMFS 1994, EPA 1993). Numerous dump sites are located in Cape Cod Bay, near Stellwagen Bank (NMFS 1991a) and all along the east coast of the U.S. Many municipalities discharge treated and untreated wastewater into the coastal waters of New England, Georgia/Florida. These discharges, as well as dredging and dredge material disposal, may alter the physical and chemical properties of nearshore waters and sediments, making them unsuitable for right whale feeding and reproduction (EPA 1993). Intensive use by humans of areas such as Delaware Bay, the New York Bight and Long Island Sound may have resulted in the exclusion of right whales from areas they once frequented (Reeves *et al.* 1978). Pollution resulting from intentional or accidental releases of chemicals to coastal waters has also been suggested as an important factor in the apparent poor recovery of North Atlantic right whale populations (Gaskin 1991). Although trace concentrations of several chemicals have been found in tissue samples from right whales (Woodley *et al.* 1991), there is no direct evidence to date that right whales have been adversely affected by pollutants, either through a pollution-induced increase in mortality rates or decrease in reproductive rate or success (EPA 1993). In the future, the EPA has agreed to analyze tissue samples, obtained from biopsy sampling or strandings, for contaminants so that contaminant loads can be monitored (NMFS 1994).

Currently, there is no active drilling for oil and gas along the North Atlantic coastline. However, the Minerals Management Service (MMS) may offer leases for such activities as part of its 5-year outer continental shelf oil and gas leasing program (NMFS 1991a). Possible adverse effects to right whales include acoustic disturbance from seismic vessels and drilling rigs and pollution resulting from accidental releases during performance of these activities. Previous studies of oil exploration activities conducted off the east coast in the 1980s concluded that cetacean distributions around oil rigs were no different than distributions in undisturbed areas (Sorenson *et al.* 1984). Studies off the California and Alaska coastlines have shown that most species of cetaceans adjust to the presence of drilling equipment (Geraci and St. Aubin 1987). However, studies of bowhead whales in the Arctic indicate that individuals will often change course and behavior when exposed to active rigs and seismic vessels (Ljungblad *et al.* 1988; Richardson *et al.* 1985, 1986). Bowhead whales in the Beaufort react, at least briefly, to aircraft, ships, seismic exploration, marine construction and offshore drillsites (Richardson and Malme 1993). To date there is no conclusive evidence that this short term disturbance leads to long-term effects on individuals or populations (Richardson *et al.* 1995). Oil and gas exploration inevitably leads to increased ship traffic in the area, which, as discussed, is problematic for right whales.

Although right whales spend a great deal of time underwater (Mate *et al.* 1992) they also spend prolonged periods at the surface while surface skim feeding, resting and in surface courtship groups (NMFS 1991a). This, and the fact that many of the high-use areas for right whales include major shipping lanes or high-traffic areas along the east coast, makes them susceptible to interactions with ships. Vessel activities can change whale behavior, disrupt feeding practices, disturb courtship rituals, disperse food sources and injure or kill whales through collisions (NMFS 1994). Twelve percent of all photo-cataloged individuals have scars from ship propellers (S. Kraus, pers. com. 1995), and 27% (8/30) of right whale mortalities documented between 1970 and 1993 were due to collisions with ships (Kenney and Kraus 1993). Lately, research has pointed to ship-whale interactions as a possible barrier to the recovery of the species (Reeves *et al.* 1978; Kraus *et al.* 1988; Kraus 1990). The majority of human-induced right whale mortalities documented since 1970 were due to collisions with ships (Kenney and Kraus 1993). Right whales monitored by satellite telemetry frequently swam through or near the shipping lanes off Boston, Portland, ME, and New York (Mate *et al.* 1992). As has been documented for bowhead whales (George *et al.* 1994) the size and extent of scarring among right whales indicates that collisions are primarily with large vessels such as container ships, tankers or military vessels. These collisions are fatal to right whales approximately 19% of the time (Kraus 1990). Adjusting shipping lanes to reduce ship/whale collisions may be only partly effective because right whales appear to use much of the North Atlantic coastline (Mate *et al.* in prep).

More than half (57%) of the appropriately photographed population of right whales have scars indicative of entanglement in commercial fishing gear. Between 1975 and 1990, 14 right whales were observed tangled in fishing gear in the Gulf of Maine (Volgenau and Kraus 1990). Gill nets appear to be the most problematic type of fixed gear, but individuals appear to swim through all types of gear including wires, lobster gear, seines and cod traps. Gear and lines become wrapped around the peduncle or tail stock, around the pectoral fins or are caught in the gape of the mouth and become wrapped around the head (Kraus 1985; Kraus 1990; NMFS 1994). If animals are unable to surface to breathe, they will drown. Nets and lines may stay attached for long periods of time due to the use of synthetic, rot-resistant materials by the fishing industry. This may be especially dangerous for juveniles that become entangled while still actively growing. Of the 30 known mortalities since 1970, two (7%) have been attributed to entanglement in fishing gear (Kenney and Kraus 1993). In 1994, three whales were reported entangled in gear in the Gulf of Maine and Bay of Fundy, and two to three additional animals were reported to be injured by gill nets in the SEUS (NMFS 1995). At least two individuals ("Stars" and "Necklace") were entangled for more than four years and have been recently photographed without the gear (NMFS 1991a). Although entanglement is less likely to result in a direct mortality (2.9% of gear entanglements are fatal based on revised Kenney and Kraus 1993 data), it may weaken an animal, making it more susceptible to disease, killer whales or collisions with ships (Kenney and Kraus 1993). Seasonal and regional restrictions on fishing areas have been proposed as a means of minimizing interactions between the fishing industry and right whales. However, recent studies indicate that individual right whales do not remain in discrete areas for well defined periods or seasons. Regional closures may therefore be ineffective, and alternatives related to gear modifications or fishing methods may be necessary (Mate *et al.* in prep).

Recovery Program

Management can be most effective in reducing the sources of human mortality. Finn (1992), using an age and stage based population model, concluded that a reduction in ship strikes and (fishing) gear entanglements would significantly improve the growth of the population. The Right Whale Recovery Plan (NMFS 1991a) was developed to coordinate actions that will promote the recovery of the species so that protection under the Endangered Species Act is no longer necessary. In recent years, the NMFS has collaborated with numerous federal (including the USCG) and state agencies to implement major actions included in the right whale recovery plan. In addition to basic research efforts, numerous actions have been taken to reduce anthropogenic sources of mortality in both northern and southern right whale habitat. In the northern feeding areas, mariners are advised of the locations of right whales via NOAA weather radio broadcasts. In the southeast region, ten agencies are coordinating their efforts to educate mariners and prevent whale-ship collisions. Specifically, an early warning system, utilizing the extensive USCG communications system, the NAVTEX system, has been used to successfully mitigate ship strikes (Slay *et al.* 1994). This system is not always effective due to variations in the atmospheric conditions. However, it is backed up by "Notice-to-Mariner" broadcasts on VHF radio and by 1999 (mandatory use date) will be capable of enhancement through INMARSAT (International Marine Satellite), a satellite-based system unaffected by atmospheric conditions. Also, the Coast Guard has initiated a study of the feasibility of installing additional NAVTEX transmission devices. An extensive education program is also being developed through the University of Georgia.

Humpback Whale *(Megaptera novaeangliae)*

Population Status and Trends

The humpback whale *(Megaptera novaeangliae)* is the fifth largest of the baleen whales, reaching lengths in the Atlantic Ocean of 16 meters. The Latin name, roughly translated as "big-winged New Englander," is derived from the distinct long pectoral fins that are 1/3 the length of the body (and usually white in the North Atlantic) and the fact that these whales are common in the waters of New England. Other distinguishing features include fleshy protuberances or "tubercles" that cover the whale's rostrum, a small, variably shaped dorsal fin located 2/3 of the way back on the back, and well defined ventral grooves. The body of the humpback is generally black in color, but individually distinctive black and white pigment and scar patterns occur on the underside of the broad tail or "flukes", the belly and the pectoral fins. These patterns, along with dorsal fin shape and scarring, are used to identify individual whales (Katona *et al.* 1980, Katona and Whitehead 1981). Calves appear to inherit the fluke pigmentation patterns of their mothers (Rosenbaum and Clapham 1993).

Humpback whales are found in all of the world's oceans and tend to be more coastal and gregarious than other species. In the North Atlantic Ocean, there are at least two "stocks" of humpback whales - an eastern and a western stock. The western stock includes about 5500 animals and winters in the Caribbean Sea. The summer feeding grounds of this western stock include the Gulf of Maine, the Bay of Fundy, the Gulf of St. Lawrence and waters off Newfoundland (Figure 3-2). For the purposes of this report, our discussion will be primarily limited to whales in the western North Atlantic, and specifically, the Gulf of Maine feeding aggregation.

Before commercial exploitation, it is estimated that there were 125,000 humpback whales worldwide (Braham 1984, NMFS 1991b). By 1865, harvesting had reduced the western

North Atlantic population to 4,400-4,700 animals (Mitchell and Reeves 1983), and by 1932, to as few as 700 animals (Breiwick *et al.* 1983). Recent evidence indicates that humpback whales are increasing at an annual rate of 9.4%; however this calculated trend was not strong (r^2=0.33, 95% CI of slope=-0.12 to 0.30; Katona and Beard 1990). Current population estimates range from 2,000-6,000 individuals (Whitehead 1982) to 5,505 ± 2,617 individuals (95% CI; Katona and Beard 1990) in the western North Atlantic stock. CeTAP researchers (1982) estimated the mean number of humpbacks in US waters (Cape Hatteras to southern Nova Scotia) during the spring to be 658 ± 590 (95% CI). Recent estimates range from 5543 individuals (CV = 0.16; Katona *et al.* 1994) for all aggregations west of Iceland, to 294 whales (CV = 0.45) for the northeastern U.S. EEZ (NMFS 1995). Based on the College of the Atlantic humpback whale photograph catalog, the western North Atlantic population numbers some 800 animals (P. Stevick pers. comm., March 1995). A large-scale, multi-institutional effort is underway (Years of the North Atlantic Humpback or "YONAH") to further refine stock structure and population estimates for the western North Atlantic.

The humpback whale is a migratory species, and spends the summer in northern latitude feeding grounds (40° to 75° N) in areas of high productivity (NMFS 1991b). Because of the patchy distribution of their prey, humpback whales must target places where the chance of prey encounter is high. Like other baleen whales, they are found in areas of upwelling, along the edges of banks, and all along the continental shelf and other physically dynamic areas. Fine-scale movements among these features are most likely controlled by the distribution of their prey (Kenny and Winn 1986; Gaskin 1982; Payne *et al.* 1990, Brodie *et al.* 1978, Dolphin 1987a,b, Mayo *et al.* 1988). Although there appears to be some broad-scale, matrilineal feeding-site fidelity (Clapham and Mayo 1990, 1987a), shifts in summer distributions of humpbacks along the Newfoundland coast (Whitehead and Carscadden 1985), and in the Gulf of Maine (Payne *et al.* 1986) have occurred in apparent response to changes in prey abundance. Historically, humpback whales were most abundant in the northern Gulf of Maine, where herring and mackeral were plentiful. However, in the 1970s, herring and mackeral stocks declined due to increased commercial fishing effort. Simultaneously, sand lance stocks in the southern Gulf of Maine increased, and humpback whales moved south to exploit this alternative food source. Stellwagen Bank, Jeffreys Ledge, and the Great South Channel, became the primary humpback whale feeding areas in the western North Atlantic. In 1986, sand lance populations decreased, zooplankton populations increased, and humpback whales temporarily abandoned these banks and basins, and were replaced by plantivorous species such as right whales and small numbers of sei whales (Payne *et al.* 1990).

One of the primary feeding grounds of the humpback whale is Stellwagen Bank, a submerged glacial deposit of sand and gravel that extends for 37 km between Cape Cod and Cape Ann, Massachusetts. On 4 November, 1992, this area was designated a national marine sanctuary under Title III of the Marine Protection, Research and Sanctuaries Act. Drilling, dredging, and other activities considered to have adverse effects on the wildlife in the area are prohibited. Recreational and commercial fishing activities, while monitored, are not prohibited (MMC 1993). Since 1988, a dramatic decline in the use of Stellwagen Bank by adult humpback whales has occurred, apparently due to the decline in sand lance populations in the area (Weinrich *et al.* 1993).

There is increasing evidence that some juvenile humpback whales may remain in northern latitudes during the winter. Swingle *et al.* (1993) report an increase in juvenile humpback whales off the coast of Virginia, especially in the mouth of Chesapeake Bay, during January through March 1991-1992. Many of these individuals were observed feeding. Wiley *et al.* (1995) report an increase in stranded juvenile humpback whales along the Virginia and North Carolina coasts between 1985 and 1992. It appears that these mid-Atlantic waters are becoming an increasingly important winter habitat for juveniles, possibly due to the expanding range of humpback whales or changes in prey distribution (Wiley *et al.* 1995). Because this distribution overlaps with some of the busiest commercial and military shipping lanes on the east coast of the U.S., and due to the substantial anthropogenic use of the area, adverse interactions are likely (Wiley *et al.* 1993; Swingle *et al.* 1993; Wiley *et al.* 1995).

Individuals leave the feeding grounds in the fall and winter and swim south to the Caribbean, primarily to areas between 10° and 20° North latitude (Whitehead and Moore 1982). The endpoints of this migration are well established (Martin *et al.* 1984; Matilla *et al.* 1989; Katona and Beard 1990). However the exact route between the summering and wintering grounds is unknown, although it is likely to be well offshore (Clapham and Matilla 1990). Humpback whales from all of the western North Atlantic feeding areas use the same wintering grounds (Matilla *et al.* 1989; Katona and Beard 1990). The majority (85%) of whales from the western North Atlantic population winter on Silver and Navidad Banks (Balcomb and Nichols 1978; Whitehead and Moore 1982; Mattila *et al.* 1989), located off the north coast of the Dominican Republic. Virgin Bank, the northern Leeward Islands, Mona Passage, Puerto Rico and Samana Bay, Dominican Republic are also used, although to a lesser degree (Matilla and Clapham 1989). Individual speeds of 3.29 km/h (21° latitude/month) and 2.28 km/h (14.8° latitude/month) were calculated for two whales migrating between the Greater Antilles and Massachusetts Bay (Clapham and Mattila 1988). Currently, there is little evidence of age-class or sexual segregation among migrating humpback whales (NMFS 1991b).

On the wintering grounds, groups of 2 to 25 males compete for access to females, ramming each other or pounding with flippers or flukes (Tyack and Whitehead 1983; Baker and Herman 1984). Male humpback whales also produce very long, complex vocalizations or songs that appear to be part of a courtship display (Tyack 1981; Tyack and Whitehead 1983; Chu and Harcourt 1986). The significance of the few songs recorded on summer ranges (Matilla *et al.* 1987) is unknown (NMFS 1991b). While in these southern latitudes, it is likely that whales fast most of the winter, although some limited feeding has been observed (Baraff *et al.* 1991).

Food and Feeding Behavior
Humpback whales feed primarily on small schooling fish and krill (Nemoto 1970; Kreiger and Wing 1984, 1986). In the western North Atlantic, herring *(Clupea harengus)*, sand lance *(Ammodytes americanus)*, and capelin *(Mallotus villosus)* appear to be the preferred prey. Mackerel *(Scomber scombrus)*, small pollack *(Pollachius virens)*, haddock *(Melanogrammus aeglefinus)* and krill *(Meganyctiphanes norvegica)* are also exploited opportunistically (Meyer *et al.* 1979, Overholtz and Nicolas 1979, Whitehead 1987).

Humpback whales are considered "gulpers" (Nemoto 1970) and use innovative feeding methods to capture their prey. Feeding styles vary among whales and may be correlated with the species of prey and its distribution. In the Gulf of Maine, individuals often use their flukes and pectoral fins to slap the water, possibly to concentrate or stun prey into a tight mass that will be easy to engulf (Weinrich *et al.* 1992). The long, white pectoral fins may also be used to concentrate schooling fish (Sharpe and Dill 1993). A second method, "lunge feeding," involves rushing from below a school of fish with the mouth closed, and once the fish are trapped against the water's surface, opening the mouth, lunging through the school of fish and occasionally through the water's surface. The mouth is then closed, water is strained from the mouth and the prey are swallowed (Watkins and Schevill 1979). Humpbacks will lunge feed alone or in groups of up to 22 animals (Hain *et al.* 1982) and the technique is most dramatic when schools of fish or krill are close to the surface.

Bubble-feeding is the most unique of the feeding behaviors. Humpback whales force air from the mouth through the baleen plates to form a 4-7 m "net" of small, uniformly sized bubbles, or a "column" of randomly sized bubbles that encircle or confuse prey (Hain *et al.* 1982). Recent laboratory studies of herring and simulated bubble nets and columns have shown that these bubbles produce a strong startle response in schooling fish, and that fish rarely swim through bubbles even when startled (Sharpe and Dill 1993).

Reproduction

To date, reliable observations of copulation in humpback whales have not been published. Humpback whales reach sexual maturity at about 4 to 6 years of age. The gestation period is 10 to 12 months, and mothers usually nurse their calves for a year or less (Clapham 1992, Baraff and Weinrich 1993). Mothers and calves are closely associated throughout the period of lactation and usually separate at some point toward the end of the calf's natal year (Clapham 1992). Females usually calve every two to three years and have a mean annual reproductive rate of 0.41 calves per year (Clapham and Mayo 1990). At birth, calves are about 4 m long. Calving has occasionally been observed in consecutive years (Clapham and Mayo 1990, Weinrich *et al.* 1993). Therefore, females can produce viable offspring after becoming pregnant during post-partum estrus. Calves are born primarily in the winter in the Caribbean and accompany their mothers to high-latitude feeding areas during the following spring or summer. Migration routes and the location of feeding areas are probably learned by calves as they accompany their mothers (Martin *et al.* 1984, Baker *et al.* 1986).

Sources of Mortality

Very little is known about the natural mortality of humpback whales. Parasites, ice entrapment and fluctuating prey populations due to events such as El Niño may affect humpback mortality rates (NMFS 1991b). The only natural mass mortality on record was that recorded during November 1987 to January 1988, when 14 humpback whales died in the Gulf of Maine apparently after consuming mackeral contaminated with saxitoxin (Geraci *et al.* 1989). In the western North Atlantic, 14% (464/3365) of the appropriately photographed humpback whales bear scars, primarily on their flukes, from killer whale *(Orcinus orcas)* attacks (Katona *et al.* 1988; NMFS 1991b). Although humpback whales and killer whales have been observed feeding near one another without aggressive interactions (Dolphin

1987c), killer whales have been observed attacking and killing other species of baleen whales (Silber *et al.* 1990; Baldridge 1972; Hancock 1965).

The most common anthropogenic source of mortality for humpback whales in the western North Atlantic is entanglement in commercial fishing gear (Hoffman 1990; NMFS 1991b; Volgenau and Kraus 1990). Between 1975 and 1990, 47 humpback whales were reported entangled in various types of fishing gear. Five of these entanglements were fatal (10.6%). Overall, 12.4% of the photographed flukes and 6.3% of the tail stocks of the western North Atlantic population is scarred due to encounters with fishing gear (Volgenau and Kraus 1990). Twenty-five percent (5/20) of juvenile humpback whales stranded along the central and southeast Atlantic coastlines had injuries indicative of entanglement in fishing gear (Wiley *et al.* 1995).

Increasing vessel traffic along the continental shelf can result in acoustic and physical disturbance of the environment. To date, there is little information on the reaction of humpback whales to acoustic disturbance. Some studies indicate that whales may react to short term acoustic disturbances by moving away from the sound source, changing breathing and diving patterns, or through possible agonistic displays (NMFS 1991b). Proposed studies of marine mammal reactions to low frequency noise are currently under review. Studies in Hawaii revealed that increase in human activities in some coastal areas may have displaced humpback whale mother-calf pairs (Forestell 1986). However, the primary threat of overlapping shipping activities and humpback distributions is whale-ship collisions. Humpbacks are more habituated to vessel approach than any other cetacean in the Gulf of Maine (Watkins 1986). A large whale watching industry has taken advantage of this phenomenon; some whales even appear to be attracted to boats (S. Nieukirk, pers. obs.). Major shipping lanes into Massachusetts, New Hampshire and Maine cross the Great South Channel, Stellwagen Bank and Jeffreys Ledge feeding grounds (NMFS 1991b), and humpback whales are frequently seen near commercial vessels, fishing and tourist boats. If whales become habituated to such vessel traffic, the chance of collision could increase (Beach and Weinrich 1989). There is some evidence of increased incidents of ship collisions in the Gulf of Maine (NMFS 1991b). In a recent study of stranded humpback whales along the mid-Atlantic and southeast U.S., 30% (6/20) had injuries potentially associated with a ship strike (Wiley *et al.* 1995).

The Fin Whale *(Balaenoptera physalus)*

Population Status and Trends

The fin whale, *Balaenoptera physalus*, is the second largest of the cetaceans, reaching lengths of 24 m (Leatherwood *et al.* 1976) and weighing up to 73,000 kg (Minasian *et al.* 1984). These "greyhounds of the sea" are among the fastest of the baleen whales, and are reported to swim at speeds approaching 20 kts. For this reason, they became a commercially important species only after the development of fast catcher-boats and the depletion of other large species such as the right whale and blue whale (Leatherwood *et al.* 1976).

Fin whales have a long, slender body that is primarily dark gray or brown in color. The ventral sides of the belly, flukes and flippers are white. Like humpback whales, fin whales can be individually identified from their natural marks and scars. Distinctive features include the tall, falcate dorsal fin, the light pigmentation or "blaze" on the right side of the head, and the v-shaped, grey-white "chevron" on the back and sides (Agler *et al.* 1990). One of the most unusual features of the fin whale is its asymmetrical coloration. The right side of the head, lower lip, upper lip and a portion of the baleen is white, while the entire left side of the head is dark in color. It has been hypothesized that this coloration is a feeding related adaptation (Katona *et al.* 1993). However, to date there is no evidence of this (Tershey and Wiley 1992).

The average adult size calculated for fin whales in the western North Atlantic, 16.1 m, is smaller than for adults captured in Iceland (18.3 m), Canada (16.9-18.4m) and Norway (17.6-18.9m) (Hain *et al.* 1992). This may be due to sexual differences, seasonal or environmental factors, latitudinal differences, or a sampling bias. It may also be due to segregation in the population (Seargent 1977). It is unclear whether fin whales in the North Atlantic split into separate feeding stocks. Mitchell (1974) suggested that fin whales seen off the U.S., Nova Scotia, and Labrador coasts were from one or a few closely related populations. Fin whales often travel alone, but on average group sizes range from 2 to 3 animals, and can get as large as 65 animals. Large groups (more than 10 whales) are uncommon (CeTAP 1982).

Pre-exploitation fin whale population estimates for the entire North Atlantic Ocean range from 30,000 to 50,000 individuals (Katona *et al.* 1993). World-wide, there are currently an estimated 105,000 to 125,000 fin whales (Wursig 1990). During the CeTAP (1982) study, 24% of all cetaceans, and 51% of all baleen whales counted were fin whales. Between Cape Cod and Labrador, 7,200 fin whales were estimated to be on the continental shelf between 1966-1971 (Mitchell 1974). Hain *et al.* (1992) estimate that, after correcting for animals underwater during aerial surveys, there were 1,500 animals on the Cape Hatteras to Cape Cod continental shelf area during the fall and winter, and 5,000 animals on the shelf in the spring and summer. If fin whales are increasing at a rate similar to that estimated for unexploited stocks of right whales in the southern hemisphere (6.8%), then there could currently be over 10,000 fin whales in the western North Atlantic (Hain *et al.* 1992), and the population will have recovered to about 1/3 to 1/4 of its pre-exploitation size. Because the fin whale is the most numerous of the large cetaceans, it probably has the largest impact on the continental shelf ecosystem, and may be a valuable indicator of the health of this area (Hain *et al.* 1992).

Reproduction and Calving

Female fin whales become sexually mature at 4 to 6 years of age and bear a single calf about every two years (Slijper 1978). Female fin whales that summer in the Gulf of Maine produce a calf every 2.71 years (Agler *et al.* 1993). Calving is likely to occur in winter, and, based on stranding data, may take place between October and January in the mid-Atlantic bight. Like other species of baleen whales, calves grow rapidly while ingesting very high-fat milk, and are weaned within 5 to 7 months (Slijper 1978), and probably accompany their mothers to more northern latitudes. Stranding data indicate that young calves (8 m to 12 m in length) appear to move as far north as Cape Cod (42 N), where they are found stranded in all other months except March (Hain *et al.* 1992).

Seasonal Distribution

Fin whales are the most common of the large whales in the temperate waters of the western North Atlantic, and are found all along the continental shelf between Cape Hatteras and southeastern Canada in all seasons (Figure 3-3, Hain *et al.* 1992). Their distribution is cosmopolitan, with a less distinct, seasonal latitudinal migration than other rorquals (Evans 1987). The distribution, abundance and general ecology of the species is poorly understood, primarily because fin whales were not heavily exploited by commercial whalers in U.S. waters to the degree they were in other areas. However, studies have recently been organized to fill these gaps in our understanding of fin whale ecology. They are commonly seen on the shelf in water 2-100 m deep, and rarely on the continental slope or beyond. Jeffreys Ledge, Stellwagen Bank and Cape Cod Bay experience a spring influx of fin whales, and by summer, numbers may reach 3,000 in the Gulf of Maine (CeTAP 1982). There is some evidence of feeding site fidelity in females (Clapham and Seipt 1991), although this varies among individuals (Seipt *et al.* 1990). During the fall and winter, three quarters of these whales leave the area, and the distribution of the remaining whales contracts to the mid-shelf east of NJ, Stellwagen and Georges Bank. It is not known where the majority of the population spends the winter; however, recent acoustic data indicate that fin whales are present far offshore during the winter months (Clark *et al.* 1993). During the winter and spring, the area east of the Delmarva Peninsula and the mouth of the Delaware Bay appear be an important habitat (CeTAP 1982).

Food and Feeding Behavior

The sand lance (*Ammodytes* spp.) is also an important food source for fin whales (Watkins and Schevill 1979; Overholtz and Nicolas 1979; Payne *et al.* 1990) Additional prey items include other schooling fish, euphausids, and copepods (Mitchell 1975). Herring may have been the preferred food item at one time, but due to the decline in stocks in recent years, may no longer be an important food source (CeTAP 1982). Fin whales will feed either alone, or, when food is densely concentrated, in groups of 2 to 65 animals, and will "lunge feed" when food is close to the surface. As they make a horizontal approach to a school of fish, individuals will open their mouths just before reaching the school, often rolling to their right (Tershey and Wiley 1992), engulf the fish with ventral pleats extended, and roll upright to surface for a breath (Watkins and Schevill 1979). In Newfoundland, several authors observed fin whales in fairly large, stable, foraging groups and speculated that fin whales may coordinate their foraging activities to minimize prey dispersion (Perkins and Whitehead 1977; Whitehead and Carlson 1988), and because high density prey patches are uncommon (Piatt 1990). Fin whales usually feed at depth, and although it is rarely observed, limited observations suggest that sub-surface feeding behavior is similar to that of lunge feeding (Tershey and Wiley 1992). Feeding was observed in 14% of all CeTAP (1982) sightings, and occurred primarily in the spring and summer, and along the Great South Channel to Jeffreys Ledge and east of Montauk Point.

As previously discussed for right whales and humpback whales, the distribution of fin whales is likely a function of the distribution of their food (Katona and Whitehead 1988). Capelin abundance alone accounted for 63% of the seasonal variation in baleen whale abundance in Newfoundland waters (Piatt *et al.* 1989). Because of their large size, fin whales may depend on higher density prey patches than other, smaller, baleen whales. However, the foraging thresholds of baleen whales may vary in relation to the overall abundance of their prey (Piatt and Methven 1992). Fin whales are euryphagous, and therefore in years when their preferred prey are scarce (i.e. 1986), their distribution within the Gulf of Maine varied to a lesser degree than that of stenophagous species (Payne *et al.* 1990).

Sources of Mortality

Very little is known about the natural causes of mortality in fin whales. In the last century, 72 fin whales have stranded along the east coast of the U.S. The cause of death in most of these animals is unknown. Fin whales stranded most often on Cape Cod, Cape Hatteras and Long Island during all months of the year (Hain *et al.* 1992). There have been six recorded strandings of neonate fin whales (animals less than 8 m in length) along the east coast of the U.S. All of these animals stranded south of New Jersey (40° N latitude). At least one fin whale death was reported during the humpback-whale mass-mortality that was linked to saxitoxin (Geraci *et al.* 1989). Lambertson (1986) reported the nematode *Crassicauda boopis* appears to be a common parasite in many fin whale kidneys and may cause renal failure and possibly death in this species.

There have been few reports of killer whale scars on finback whales. This could be because these scars appear primarily on the flukes in other species, and fin whales rarely raise their flukes during a terminal dive. Fin whales are also fast swimmers, and may be able to elude killer whales. However, there are reports in the literature of killer whales attacking fin whales (Tomilin 1957).

Fin whales are one of the more difficult cetaceans to approach by boat (Katona *et al.* 1993; Watkins 1986). However, some of the photographed fin whales have prominent scars indicative of boat collisions (i.e. "Braid", whale #0081) (Agler *et al.* 1990; Seipt *et al.* 1990). In the Smithsonian Institution's Marine Mammal database, there are nine records of fin whale ship collisions or propeller scars between 1980 and 1994 (NMFS 1995). While feeding, fin whales often change direction unpredictably and seem unaware of boats in the area (S. Nieukirk, pers. obs.).

Fin whale vocalizations are among the lowest on earth. Typically, calls are about 20 Hz, occur in pulses 8-12 seconds apart, and are possibly part of a reproductive display (Watkins 1981; Watkins *et al.* 1987). Fin whales react strongly to low-frequency ship sounds (Watkins 1986), and therefore may be adversely affected by low frequency acoustic disturbances such as those produced by large ships. If fin whales become acclimated to the increasing vessel traffic in coastal waters, they may be more susceptible to collisions with ships.

Fin whales are often caught in fish traps deployed in offshore Canadian waters. Between 1969 and 1986, 12 fin whales were entangled in fishing gear, usually groundfish gill nets, in inshore waters of Newfoundland (Hoffman 1990). Five of these whales (42 %) died. Between 1975 and 1992, nine fin whales were reported to be entangled in fishing gear in U.S. waters. Two of these entanglements were fatal.

Sei Whale *(Balaenoptera borealis)*

Population Status and Trends

Sei whales are slightly smaller than fin whales, and in the Atlantic grow to 19 m. A single head ridge, tall (0.25-0.6 m) and strongly falcate dorsal fin located 2/3 of the way back on the back, and lack of asymmetrical jaw coloration distinguish it from the fin whale. The body is dark grey on the back and sides, and is often covered with oval shaped scars possibly due to lamprey bites inflicted during migrations into warmer waters. Sei whales have 32-60 very short ventral grooves that terminate between the flippers and the navel (Leatherwood *et al.* 1982). Sei whales travel alone or in groups of 2-5 individuals, but may form dense aggregations when food is concentrated and plentiful (Leatherwood *et al.* 1976). They are the fastest swimmers of the great whales and can attain speeds in excess of 38 km/hr (24 miles/hr; Minasian *et al.* 1984)

There are two stocks of sei whales in the western North Atlantic Ocean. One is off eastern Nova Scotia and the other is in the Labrador Sea (Mitchell and Chapman 1977). These two stocks, plus a third in the Gulf of Mexico are thought to number 2,600 individuals (Leatherwood *et al.* 1976). Sei whales in the southern Gulf of Maine have been photographically matched to individuals sighted on both Georges Bank and the Scotian Shelf; thus individuals periodically seen in the Gulf of Maine may be from the Nova Scotia stock. However, very little is known about sei whales in the western North Atlantic, and given the previously reported record of a sei whale moving 4,000 km in 10 days (Brown 1977), this may not be the case.

There are no current estimates of the abundance of sei whales in U.S. waters of the western North Atlantic Ocean. The most recent data are from the CeTAP (1982) study, where it was estimated that were 253 (CV=0.63) individuals in U.S. waters during the spring. There are insufficient data to determine the trend for this population of sei whales.

Seasonal Distribution

The two western North Atlantic stocks of sei whales tend to remain in offshore waters north of about 40°N latitude during the summer feeding season (Figure 3-4). Individuals from the Nova Scotia stock appear to move periodically into shelf waters primarily in spring and summer, probably seeking food (CeTAP 1982). Typically, they are found in the deeper waters off the shelf-edge (Kenney and Winn 1986; Hain *et al.* 1985).

Sei whales were regularly seen on Stellwagen Bank and Jeffreys Ledge during June - September 1986, a time when *Calanus finmarchicus* levels where unusually high (Payne *et al.* 1990). Therefore movements of sei whales into Gulf of Maine coastal waters may reflect changes in local prey distribution.

Food and Feeding Behaviors

In northern latitudes sei whales feed primarily on surface-dwelling plankton such as copepods and euphasids (Leatherwood *et al.* 1982). Individuals also feed opportunistically on a wide variety of planktonic crustaceans and small shoaling fish (Jonsgard and Darling 1977; Watkins and Schevill 1979). It is possible that this species competes directly with right whales, fin whales and humpbacks on a local scale for food. Sei whales are primarily skim feeders (Mitchell 1976, Nemoto 1970), and do not usually dive deeply. Unlike other baleen whales, individuals do not surface at an acute angle, but instead the head, back and dorsal fin appear at the surface simultaneously (like a submarine). When diving, sei whales rarely arch the back or raise the flukes. Instead, they submerge as they surfaced and often travel just below the surface, leaving a series of "fluke-prints" in their wake. Sei whales may feed in this manner for long periods of time (Leatherwood *et al.* 1976). Studies in the Gulf of Maine confirm that most submergences were between 45-90 seconds and long dives were infrequent (Schilling *et al.* 1992). Individuals often stay within a small area ($\sim$0.5 km^2) and often change swimming direction when exploiting dense patches of plankton (Schilling *et al.* 1992).

Known Mortality Factors

Because the distribution of sei whales is usually well offshore, there are virtually no data on human interactions. There are no reports on record of entanglement in fishing gear, and few reports of collisions with ships. However, the New England Aquarium did report a sei whale carcass hung on the bow of a container ship in Boston Harbor (NMFS 1995).

Blue Whale *(Balaenoptera musculus)*

Population Status and Trend

The blue whale, *Balaenoptera musculus*, is the largest of all the cetaceans, averaging 30 m in length and weighing up to 136 MT. The body is bluish gray in color and often mottled with white spots. The dorsal fin is quite small (less than 30 cm) and is located further down the back than in other species (Leatherwood *et al.* 1976).

Blue whale populations are severely depleted in all oceans of the world despite international protection since 1966. Currently, it is believed that only a few hundred blue whales are in the western North Atlantic (Mitchell 1974, NMFS 1995). There are insufficient data to calculate a minimum population estimate and current population trend (NMFS 1995).

Reproduction

The gestation period is about 12 months, and females calve every 2 to 3 years. Calves are 7 to 8 meters in length and can weigh up to 3.6 MT. The location of calving grounds of blue whales in the North Atlantic is unknown.

Seasonal Distribution

Blue whales are found worldwide, but primarily in the higher latitudes. In the western North Atlantic Ocean, they are found from the Arctic Ocean south to the mid-latitudes (Figure 3-5). There are limited records as far south as Florida (Yochem and Leatherwood 1985). Blue whales are rare visitors to U.S. coastal waters (CeTAP 1982; Wenzel *et al.* 1988). The only photodocumented sightings in the Gulf of Maine occurred during the 1986-1987 episodic influx of plantivorous cetaceans. These movements into coastal waters were likely in response to an unusual abundance of zooplankton. Three individuals were seen in the Gulf of Maine, and one individual was seen less than 2 km from shore (S. Nieukirk, pers. obs.). Recent acoustic evidence indicates that blue whales may spend most of their time in deep water and their range may extend further south than expected. Because blue whale vocalizations are individually unique, scientists were able to track an individual as it moved from NE of Bermuda to the Bahamas and back during a period of 43 days (Gagnon and Clarke 1993)

Food and Feeding Behavior
Blue whales are planktivorous, and feed on swarms/dense patches of krill, often lunging or rolling at the surface when consuming their prey.

Known Mortality Factors
Because the distribution of blue whales is usually well offshore, there is likely to be very little interaction with humans. There are no documented collisions with ships, and few reports on record of entanglement in fishing gear. However, one of the rare visitors to the Gulf of Maine was seen trailing a rope wrapped around the pectoral fin during part of the time it was in the area (NMFS Cetacean Entanglement Database, Record #87, 9 August 1987).

Sperm Whale (*Physeter macrocephalus*)

Population Status and Trend
The sperm whale, *Physeter macrocephalus*, is the largest of the odontocetes or toothed whales. Males can reach lengths up to 18.3 meters, and are larger than females, which rarely exceed 12.2 meters in length (NMFS 1994). Sperm whales have an extremely large, square head that can be one-third the length of the entire body. The long, narrow lower jaw contains 20-50 conical teeth, and the interior of the mouth and part of the lower jaw are white. There are no teeth in the upper jaw. The body is dark gray in color, and, except for the head, appears wrinkled. The sperm whale has no dorsal fin, but instead a doral hump is followed by a series of bumps or "knuckles" along the dorsal surface of the tail stock. Sperm whales, like other odontocetes, have a single exterior blowhole, that, in this species, is asymmetrically situated on the left side of the head (Leatherwood *et al.* 1976).

An estimate of the total number of sperm whales in U.S. waters is not available, but there are some data on seasonal abundance estimates. There are an estimated 219 (CV=0.36) sperm whales in continental shelf and shelf-edge waters between Cape Hatteras and Nova Scotia during the spring and summer. This estimate is based on CeTAP (1982) spring and summer data and is not corrected for missed animals. Estimates based on more recent data range from 337 (CV=0.50) to 736 (CV=0.36) sperm whales (NMFS 1995). There are insufficient data to determine a population trend for this species.

Reproduction
Sperm whales have one of the lowest (if not the lowest) reproductive rates of all cetaceans. Females reach sexual maturity at about 9 years of age, and calve every 3 to 6 years after a gestation period of 15 months. Males do not become sexually mature until 20 years of age. A complex social structure results in age-class and sexual segregation during the majority of the year.

Seasonal Distribution

Sperm whales inhabit all oceans of the world, and are found primarily in deep water. Like the other cetaceans discussed in this report, their distribution is most influenced by the distribution of their prey. Sperm whales feed heavily on squid. In the western North Atlantic, most species of squid are found in deep water, and migrate into shallower waters in the summer and fall (Figure 3-6, NMFS 1993). The sperm whale generally does not occur in the Gulf of Maine or the Georges Bank area. In the winter, the majority of sperm whales in U.S. waters are located east and northeast of Cape Hatteras. In spring, this distribution shifts to the north, and sperm whales are seen on southern Georges Bank and the mid-Atlantic Bight. During the summer, this distribution expands to include the northern edge of Georges Bank and the Northeast Channel. Adult males often are common during the summer on the continental shelf south of Nova Scotia, particularly over a submarine canyon called the Gully (Whitehead *et al.* 1992). Sperm whales also begin to move onto the continental shelf south of New England. In the fall, this movement onto the shelf peaks (CeTAP 1982; Hain *et al.* 1985; NMFS 1995). It is unclear whether sperm whales in U.S. waters are a discrete stock or part of stocks in the northwestern and northeastern Atlantic.

Food and Feeding Behavior

Sperm whales are known for their spectacular diving abilities. Individuals can remain submerged for over an hour and can dive to depths of 3000 m. The primary prey of sperm whales is squid, including the giant squid.

Known Mortality Factors

Currently, there are few records of human induced mortality of sperm whales, other than that from the sperm whale fishery which was banned in 1982, in U.S. waters, other than that from the sperm whale fishery which was abandoned in 1982. Subsistence hunting of sperm whales in the Azores and Madeira ceased in the mid-1980s (Evans, 1987). Because of their offshore distribution, sperm whales are less likely to be affected by most human activities, and when affected, reports of any interactions are less likely to be reported (NMFS 1995). Sperm whales have become entangled in and killed by submarine cables (Slijper 1978). A sperm whale became entangled in and subsequently was released from a swordfish drift net on Georges Bank (NMFS 1995). Because this individual was injured by the encounter with the net, it was listed as a mortality. There are several reports of entanglement of sperm whales in swordfish and shark gill nets and in longlines set for sablefish and halibut in the eastern North Pacific Ocean. Encounters with fishing gear often result to injury; carcasses of sperm whales stranded on the U.S. Atlantic coast often exhibit signs of entanglement injury. It is probable, however, that sperm whales become entangled in fishing gear much less frequently than humpback and fin whales.

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SEA TURTLES

Five species of sea turtle, the leatherback sea turtle *(Dermochelys coriacea)*, the Atlantic or Kemp's ridley sea turtle *(Lepidochelys kempi)*, the green sea turtle *(Chelonia mydas)*, the loggerhead sea turtle *(Caretta caretta)*, and the hawksbill sea turtle *(Eretmochelys imbricata)* occur year-round or on a seasonal basis along the Atlantic coast of the United States, including Puerto Rico and the U.S. Virgin Islands. (The non-breeding population of green turtles are considered to be threatened rather than endangered.) The loggerhead turtle is classified as a threatened species throughout its range; green turtles, with the exception of breeding populations in Florida and on the Pacific coast of Mexico which are endangered, also are threatened. The other three species are endangered throughout their ranges in US territorial waters.

Loggerhead and green turtles, and to a lesser extent leatherback turtles visit sandy beaches of the U.S. south Atlantic coast from southern Florida to Cape Hatteras, North Carolina to lay eggs each year. Hawksbill turtles occasionally lay eggs on beaches along the southernmost shores of Florida. All four of these species also use sandy shores of Puerto Rico and the U.S. Virgin Islands for reproduction. Kemp's ridley turtles all nest along the Gulf of Mexico coast of northern Mexico. During summer months, all but hawksbill turtles may venture northward along the Atlantic coast as far as Canada.

High-Use Habitats of Threatened or Endangered Sea Turtles

Although their distributions overlap, each of the five threatened or endangered sea turtles found in the western north Atlantic Ocean has a unique migration pattern and seasonal distribution. Little is known about the distribution of any of the sea turtles during the year or more of pelagic existence after hatching on the natal beach. The young turtles apparently swim offshore and congregate along drift lines and convergence zones, particularly those where rafts of sargassum, *Sargassum* spp., accumulate (Carr 1986a,b; Witherington 1994a). In the North Atlantic Ocean, the juveniles may be carried eastward by the Gulf Stream toward the Azores Islands and eventually be carried back by the North Atlantic gyre to the U.S. coast (Carr 1986a). There are no reports of the abundance of juvenile turtles in sargassum rafts.

During the summer, loggerhead turtles, particularly late juveniles and sub-adults, are abundant all along the coast from southern Florida to Long Island, New York, including southern Chesapeake Bay, and eastern Long Island Sound (Henwood 1987; Keinath *et al.* 1987; Morreale *et al.* 1989; Shoop and Kenney 1992; Schmid 1995). Juvenile Kemp's ridley turtles have a similar summer distribution in the western Atlantic. Loggerhead and ridley turtles migrate south toward warmer Florida and Gulf of Mexico waters in the fall and, with the exception of a few stragglers, are not encountered north of Cape Hatteras in the winter. (Shoop and Kenney 1992). In some years, large numbers of juvenile ridleys are observed during the summer, feeding in shallow waters of Buzzards Bay and Vineyard Sound, Massachusetts (Carr 1967; Lazell 1980). Other feeding and growth areas for loggerhead and ridley turtles, and to a lesser extent green turtles, along the middle and north Atlantic coast of the U.S. include Pamlico and Core Sounds, North Carolina, Delaware Bay, Raritan Bay, and New York Harbor (Minerals Management Service 1991; Epperly *et al.* 1992, 1995a; Shoop and Kenney 1992). Loggerheads and ridleys also are abundant off Cape Hatteras during their migrations north in April and May and south in November (Musick *et al.* 1994). Large numbers of sea turtles occur during the winter in nearshore waters of North Carolina south of Cape Hatteras where water temperatures remain above 11°C (Epperly *et al.* 1995b). Large numbers of loggerheads have been observed in bottom waters of the Canaveral Ship Channel off the central Florida coast in February, apparently in hibernation (Butler *et al.* 1987).

More than 85 percent of the nesting of loggerhead turtles on U.S. shores occurs along the east coast of Florida, particularly between Boca Raton in the South and New Smyrna Beach in the north (Shoop *et al.* 1985). Smaller numbers of loggerheads nest on secluded beaches along the coasts of Georgia, South Carolina, and North Carolina as far north as Cape Hatteras (Shoop *et al.* 1985). The highest density of nesting occurs along Melbourne Beach between Sebastian Inlet and Cape Canaveral (Jackson *et al.* 1988). During the nesting season, which extends from late April to early September in Florida, with peak nesting in June and July, large numbers of adult female loggerheads congregate off nesting beaches, which they may visit at night up to seven times in a season to deposit eggs (NMFS & USFWS 1991a).

Leatherback turtles are much less abundant than loggerhead turtles throughout their range. Therefore, it may not be appropriate to describe high-use habitats for this primarily oceanic, pelagic species. During the summer months, leatherbacks are most abundant in nearshore waters of the western Atlantic from approximately Cape Henry, NJ, to the northern Gulf of Maine, including Cape Cod Bay, with most sightings along the south shore of Long Island (Prescott 1988; Shoop and Kenney 1992). During winter months, large numbers of leatherbacks sometimes are observed off the coast of Florida between St. Augustine and Cape Canaveral (Knowlton and Weigle 1989). The largest numbers of leatherback strandings also occur along the Florida Atlantic coast in the winter, suggesting that these large turtles are abundant offshore Florida during that season (NMFS & USFWS 1992).

The largest nesting aggregation of leatherbacks on U.S. territorial shorelines is at Sandy Point, St. Croix, U.S. Virgin Islands (Boulon 1992; Boulon *et al.* 1994). The waters adjacent to Sandy Point up to and inclusive of the waters from the hundred fathom curve shoreward to the level of the mean high tide, with boundaries at 17°42'12' N and 64°50'00" W has been designated as critical habitat for leatherback turtles (NMFS 1994a). Jack Bay also supports large numbers of nesting sea turtles (Mackay 1994). Leatherback nesting has been reported frequently on Culebra, a small island east of Puerto Rico (Tucker 1990; NMFS & USFWS 1992). Even larger numbers of leatherbacks have been observed nesting on beaches in Florida (Meylan *et al.* 1994). During the nesting season, extending from April to July, female leatherbacks may be abundant off nesting beaches.

Although green turtles venture along the Atlantic coast as far north as New England during the summer and are frequently observed feeding in shallow coastal waters around Long Island (Burke *et al.* 1992), they rarely occur in large numbers north of Cape Hatteras (Epperly *et al.* 1992). During early summer months, sub-adult green turtles are common in hard bottom, polychaete reef areas off southeast Florida from Biscayne Bay to Cape Canaveral (Henwood and Ogren 1987; Wershoven 1989; Ehrhart *et al.* 1990; Guseman and Ehrhart 1990; Wershoven and Wershoven 1992).

Green turtles nest frequently (about 3 to 5% of the frequency of loggerhead turtles) on Melbourne Beach and southward to Jupiter and Miami, Florida (Witherington and Ehrhart 1989a; Davis *et al.* 1994; Meylan *et al.* 1994; Owen *et al.* 1992, 1994). They also nest on beaches in Puerto Rico and the U.S. Virgin Islands (NMFS & USFWS 1991b). During the nesting season, which is in the summer, adult females may be abundant off nesting beaches.

Hawksbill turtles are tropical and rarely occur in large numbers along the U.S. Atlantic coast north of Florida (Witzell 1983; NMFS & USFWS 1993). Hawksbills are observed frequently in the Florida Keys and as far north as Palm Beach County (Lund 1985). They also are common around Puerto Rico, particularly the Puerto Rican islands of Mona, Culebra, and Vieques, and in the U.S. Virgin Islands (NMFS & USFWS 1993). They are particularly abundant in shallow waters between Cayo Luis Pena and Culebra where they feed on the abundant sponges on the local coral reefs (Vincente and Carballeira 1992). Nesting occurs between April and August in Florida and is restricted to the coastal beaches from Volusia County in the north to Monroe County in the south (Witzell 1983). In Puerto Rico and the U.S. Virgin Islands, nesting is common on isolated beaches and extends from May to October (Witzell 1983).

The Loggerhead Turtle (*Caretta caretta* Linnaeus, 1758)

Population Status and Trends

The loggerhead sea turtle (*Caretta caretta*) is listed as threatened throughout its range under the Endangered Species Act (USFWS 1986). It is the most common and seasonally abundant turtle in inshore coastal waters of the Atlantic (NMFS & USFWS 1991a). Estimates of the abundance of loggerheads along the U.S. Atlantic coast are made difficult by the short time turtles spend on the surface where they can be spotted from a plane or boat. Radio-tagging experiments have shown that loggerheads spend about 2.3 minutes out of each hour on the surface (3.8 percent) (Thompson 1988). An estimated 7,000 and 10,000 individuals of both sexes of this turtle occur during the summer in coastal waters from North Carolina to the Gulf of Maine (CeTAP 1981; Shoop and Kenney 1992). Aerial surveys performed by the National Marine Fisheries Service between Cape Hatteras, North Carolina and Key West, Florida between 1982 and 1984, corrected for submergence time, yielded an estimated peak abundance of sea turtles in spring and summer of 387,594 (±20,154, 95% CI) individuals with straight line carapace lengths (SLCL) of 60 cm or greater (Thompson 1988). Most of these were loggerheads. The two estimates are not additive because loggerheads readily move between northern (north of Cape Hatteras) and southern waters on a seasonal basis (Epperly *et al.* 1992).

Most nesting in U.S. territory occurs on sandy shores between Key Biscayne, Florida and Cape Hatteras, North Carolina (Shoop *et al.* 1985). An estimated 50,000 to 70,000 loggerhead nests are deposited annually on beaches in the southeastern United States, mostly along the east coast of central and south Florida (NMFS & USFWS 1991a). Between 1980 and 1983, an annual average of 52,073 (±16,459, 95% CI) nests were excavated by female loggerheads along the south Atlantic coast (Thompson 1988). Between 1979 and 1992, the number of loggerhead nests reported annually from track surveys in Florida alone ranged from 10,121 to 68,614 (Meylan *et al.* 1994). Female loggerheads may nest from one to six, and exceptionally seven, times per year (Dodd 1988). The average renesting frequency for loggerheads on beaches from Florida to North Carolina is in the range of 1.37 to 4.18 times per year. Murphy and Hopkins (1984) derived a stochastic mean of 4.1 nests per female per year. However, Cook (1994) reported that most female loggerheads (53%) nested once in a season at Bald Head Island, NC, only 19% nested four or more times in a season. If an average of 2.5 nests per female per year is used, these numbers of nests recorded each year indicate that 20,000 to 28,000 female loggerhead turtles nest along the Atlantic coast of the United States each year. Remigration intervals for female loggerhead turtles along the U.S. Atlantic coast are in the range of one to seven years, with most females returning to nest every two to three years (Richardson *et al.* 1978; Bjorndal *et al.* 1983). At an average remigration frequency of 2.6 years, the total number of adult female loggerhead turtles in the U.S. Atlantic coast nesting population is in the range of 52,000 to 72,800 individuals. There probably is a nearly equal number of adult males; sub-adults represent approximately 80% of the loggerheads recorded off Cape Canaveral (Schmid 1995). Thus, there is reasonable agreement between the direct counts and the nesting frequency estimates of the total population of loggerhead turtles along the Atlantic coast of the U.S. of about 387,000 sub-adult and adult loggerhead turtles (with SLCL > 60 cm).

The estimated population of loggerhead turtles along the southeast coast of the United States remained relatively stable at about 387,000 individuals during the early 1980s (Thompson 1988). An estimated 10,000 to 23,000 loggerheads are killed by fishing activities along the Atlantic and Gulf of Mexico coasts each year (Henwood and Stuntz 1987). This loss can be made up by a 1 percent survival of hatchlings (Thompson 1988). However, Frazer (1986) estimated that a survivorship of 0.25 percent from egg to reproducing adult is needed to sustain the loggerhead population. Estimated survivorship from egg to adult in a declining population, such as that at Little Cumberland Island, GA, between 1965 and 1981, is 0.09 to 0.19%.

Owen *et al.* (1994) reported that loggerhead nesting on beaches of the Brevard County portion of the Archie Carr National Wildlife Refuge (Melbourne Beach, Florida) remained relatively constant around a mean of 9,400 nests/year (447/km) during the 1980s, but increased by 43% to an average of 13,425 nests/year (640/km) in the first three years of the 1990s. A similar pattern was observed at Patrick Airforce Base, just north of the Archie Carr Wildlife refuge (Bagley *et al.* 1994). In addition, the hatching success of eggs has increased in recent years, resulting in increased recruitment per unit reproductive effort. The trend is less clear in South Carolina where there was a 26.4% decline in loggerhead nesting between 1980-82 and 1985-87, followed by a decrease or stoppage of the decline along different parts of the South Carolina coast between 1985-87 and 1990-92 (Hopkins-Murphy and Murphy 1994). Shoop and Ruckdeschel (1982) suggested that improved survival of sub-adult loggerheads along the southeast Atlantic coast in the early 1980s may be due to the increased food supply provided by disposal of bycatch by shrimp trawlers. However, attraction of loggerheads to the vicinity of shrimp boats by bycatch disposal may lead to an increase in entanglement in shrimp trawls and increased strandings along the shore.

The hypothesis of improved survival is supported by the stranding statistics from the Sea Turtle Stranding and Salvage Network (Teas and Martinez 1989, 1992; Teas 1992, 1993, 1994a). The number of loggerheads stranded along the U.S. Atlantic coast has declined from 1,072 individuals in 1988 to 793 individuals in 1993 (Table 3-1). Most strandings are in Florida, and these have declined from a high of 550 in 1989 to 259 in 1993. The stranding data do not extend long enough to determine if the trend is real or merely represents a phase of a multi-year cycle. However, the improving trend, if it is real, could be due in part to the fact that use of turtle-excluding devices (TEDs) in shrimp trawls became mandatory in 1990, making enforcement possible by the U.S. Coast Guard and others of this turtle conservation measure (Crowder *et al.* 1994; Hopkins-Murphy and Murphy 1994).

Seasonal Distribution
During their first three to five years after hatching, the so-called "lost year," juvenile loggerheads are pelagic, drifting and feeding in the *Sargassum* community (Carr 1986a,b). During this long pelagic period, the young turtles may make several transits of the North Atlantic Ocean in the Great Gyre of the Gulf Stream and Azorean Current. They are often encountered around the Azores Islands and Madeira (Carr 1986a,b; Bolten *et al.* 1993, 1994). Juveniles grow from about 4.5 cm to a length of about 40 cm SLCL before they adopt a coastal distribution as sub-adults (Dodd 1988). However, some sub-adults up to 65 cm SLCL may be encountered drifting in the Gulf Stream and Azorean Current (Bolten *et al.* 1994).

The center of distribution of sub-adult ($\approx$40 - 80 cm SLCL) and adult (>80 cm SLCL) loggerhead turtles along the U.S. Atlantic coast seems to be in central Florida off Cape Canaveral (Schmid 1995). Loggerheads captured over several years off Cape Canaveral were mostly (80%) sub-adults, and were most abundant between November and January. The abundance of sub-adults decreases between April and July when adults become more abundant. Adult males are most abundant in April and May and adult females are most abundant in May through July (Henwood 1987; Schmid 1995). Most sub-adult loggerheads tagged off Cape Canaveral during the winter move northward during the spring and summer to as far north as southern Chesapeake Bay (Schmid 1995). Large numbers of sea turtles, particularly loggerheads migrate into coastal bays, particularly Core Sound, in the spring and feed there throughout the summer (Epperly *et al.* 1995a).

Sub-adult loggerhead turtles migrate northward in the spring and become abundant during spring and summer months in coastal waters off New York and the middle Atlantic states, particularly in the southern part of Chesapeake Bay (Figure 3-7, Henwood 1987; Keinath *et al.* 1987; Morreale *et al.* 1989; Shoop and Kenney 1992). Between 2,000 and 10,000 sub-adult loggerhead turtles use Chesapeake Bay south of the Potomac River for feeding during the summer (Keinath *et al.* 1987). Smaller numbers are encountered particularly in July, in Delaware Bay (Eggers 1989). Loggerheads also are encountered frequently in Long Island Sound, New York Harbor-Raritan Bay, and along the south coast of Long Island during the summer (Morreale *et al.* 1989). Loggerheads frequently strand due cold stunning between

November and January each year along the north shore of Long Island Sound and in the Bays of eastern Long Island (Morreale *et al.* 1992). Loggerheads occur only rarely north of Long Island around Cape Cod and in the Gulf of Maine (Shoop and Kenney 1992). Several sub-adult loggerheads strand along the south shore of Cape Cod Bay each winter (Matassa *et al.* 1994). The stranded turtles measure 27 to 47 cm SLCL, indicating that they are late juveniles and early sub-adults.

Migratory behavior seems to be cued to sea surface temperatures, with preferred water temperatures off Cape Hatteras falling in the range of 14°C to 28°C (Coles *et al.* 1994). In the fall, loggerheads migrate southward to coastal waters off the south Atlantic states, particularly Florida, and the Gulf of Mexico, with peak numbers passing Cape Hatteras in November (Musick *et al.* 1994). Some juvenile loggerheads remain through the winter in nearshore waters of North Carolina south of Cape Hatteras where water temperatures remain at or above 11°C (Epperly *et al.* 1995b). In the winter and spring, they congregate off southern Florida before migrating northward to their summer feeding ranges (CeTAP 1982). Peak numbers of northward-migrating sub-adult loggerheads occur off Cape Hatteras in April and May each year (Musick *et al.* 1994). During the winter, the turtles tend to aggregate in warmer waters along the western boundary of the Gulf Stream off Florida (Thompson 1988). They also may hibernate in bottom waters and soft sediments of channels and inlets along the Florida coast (Ogren and McVea 1981; Butler *et al.* 1987).

Adult female loggerheads nest above the high tide line and sometimes in vegetation at the top of the beach (Carr 1952) on sandy shores from about Boca Raton to New Smyrna Beach, Florida and in scattered locations along the coasts of Georgia, South Carolina, and Florida (Shoop *et al.* 1985). They seem to prefer continental over island beaches (Dodd 1988). Approximately 90 % of the loggerhead nesting activity in the U.S. is in Florida (Meylan *et al.* 1994). Some loggerhead nesting occurs in the Florida Keys (Wells and Bellmund 1990; Wilmers 1994) and rarely along the U.S. Atlantic coast north of Cape Hatteras (Dodd 1988). There are three genetically distinct populations of nesting loggerheads along the U.S. Atlantic coast: Florida, Georgia/South Carolina, North Carolina (Sears 1994).

In Florida, nesting may occur from late April (rare) to the beginning of September, with peak nesting activity in June and July (NMFS & USFWS 1991a). In Georgia, South Carolina, and North Carolina, nesting occurs from mid-May to mid-August. Most nesting occurs at night, usually associated with high tide (Dodd 1988). Each nest may contain from 43 to 198 eggs and a female may nest one to as many as seven times in a season at 13- to 15-day intervals (Dodd 1988). The eggs hatch after 49 to 76 days, depending on temperature. Average hatching success in nests laid along the U.S. Atlantic coast is in the range of 55 to 80 percent, with nearly 100 percent successful hatch having been reported in a few cases (Dodd 1988). The newly hatched turtles may remain in the nest for two to seven days before emergence (Miller 1982). Hatchlings emerge from a nest all at once, usually at night (Demmer 1981). The newly emerged turtles immediately crawl toward the sea, probably orienting toward the reflected light of the moon (Dodd 1988). Once in the water the juvenile turtles swim rapidly offshore at a speed of about 20 m/min (1.2 km/hr) (Salmon and Wyneken 1987). The period of beach occupation by adult females, eggs, and juvenile loggerheads is a period of great vulnerability to natural and anthropogenic disturbance (NMFS & USFWS 1991a).

Feeding and Growth

Pelagic stage juvenile loggerheads feed opportunistically on available small prey associated with *Sargassum* weeds. Witherington (1994b) identified 43 categories of plant, animal, and synthetic materials in the stomachs of juvenile turtles (4.0 to 5.6 cm SLCL). The most abundant food items were jelly fish (coelenterates and ctenophores) small crustaceans, hydrozoans, insects, gastropods, and pieces of *Sargassum*. About 17% of the juvenile turtles examined had ingested plastics and 63% had ingested tar balls.

Sub-adult and adult loggerheads are primarily bottom feeders, foraging in coastal waters for benthic molluscs and crustaceans (Bjorndal 1985). During feeding, they spend more than 57 minutes of each hour submerged (Thompson 1988) and between 25 to 58 percent of their time on the bottom (Standora *et al.* 1994). Dives last from about 4 to as long as 172 minutes (Renaud and Carpenter 1994).

Sub-adult loggerheads collected in lower Chesapeake Bay feed primarily in deep water in river mouths on horseshoe crabs *Limulus polyphemus*, cancer crabs *Cancer* spp., and blue crabs *Callinectes sapidus*, with traces of *Sargassum* weed (Lutcavage 1981; Lutcavage and Musick 1985; Keinath *et al.* 1987). In New York coastal waters, they feed primarily on small benthic crabs and smaller amounts of molluscs, algae, plastic, and debris (Burke *et al.* 1990). More than 75% of the diet of sub-adult loggerheads feeding around Long Island in the summer consists of crabs, particularly spider crabs *Libinia* spp. and Atlantic rock crabs *Cancer irroratus*. Two loggerheads collected off Nova Scotia had been eating primarily pelagic prey associated with *Sargassum* weed (Bleakney 1965). Loggerheads have been observed feeding on horseshoe crabs, blue crabs, and occasionally mullet *Mugil cephalus* in Mosquito Lagoon, Brevard County, Florida, and on sponges and basket star fish off Palm Beach, Florida (Mortimer 1981).

During the first three to five years of life, juvenile loggerhead turtles grow from about 4 cm to 40 cm, a rate of 7 to 11.6 cm/y. Sub-adults in coastal lagoons of Florida grow at a mean rate of 5.9 cm/y (Mendonça (1981). Schmid (1995) estimated, based on tag-recapture studies, that loggerheads along the east coast of central Florida grow at a rate of 5.56 cm/y. Foster (1994) performed a similar tag-recapture study in Florida and fitted the data to a Von Bertalanffy growth function. She estimated that juvenile loggerheads grow from a hatching length of 4.5 cm to a length of about 10 cm in one year. After 10 years, the turtles reach a length of about 48 cm SLCL, and after 20 years they are about 70 cm long. Growth rate slows as the turtles approach sexual maturity, which may occur after 12 to 45 years in the wild (Zug *et al.* 1983; Frazer and Ehrhart 1985; Foster 1994) when the turtles are about 74 to 90 cm SLCL (Dodd 1988; Foster 1994). Adult loggerheads from the Florida population may grow to more than 120 cm SLCL and weight more than 180 kg (Ehrhart and Yoder 1978).

Known Mortality Factors

Between 1980 and 1983, there were 6,691 reported strandings of loggerhead turtles along the U.S. Atlantic and Gulf of Mexico coasts (Thompson 1988). Most strandings (77 %) were along the southeast coast from North Carolina to Florida; 12% of strandings were along the coasts of the Gulf of Mexico. Only 11% of strandings of loggerhead turtles occurred north of North Carolina. Less than 1 percent of strandings occurred along the shores of the Gulf of Maine, including Cape Cod Bay.

In recent years, the Sea Turtle Stranding and Salvage Network has provided detailed summaries of sea turtle strandings along the Atlantic and Gulf coasts of the United States (Teas and Martinez 1989, 1992; Teas 1992, 1993, 1994a). Between 1988 and 1993, most loggerhead strandings occurred in Florida; other Atlantic states with high stranding frequencies include Georgia, South Carolina, North Carolina, and Virginia (Table 3-1). Five to 27 strandings have occurred each year in New Jersey and New York. There have been relatively few strandings in most years in other northeastern states, in Puerto Rico, and in the U.S. Virgin Islands.

Strandings of loggerhead turtles occur most frequently along the Atlantic coast of Florida in April through September (Table 3-2). A similar seasonal pattern exists for the other southern states. In most years, strandings in New Jersey are most frequent between July and November. Strandings occur most frequently in Massachusetts and New York along the south shore of Cape Cod Bay and the north shore of Long Island in the fall and winter; these strandings may be caused by cold stunning (Morreale *et al.* 1992; Matassa *et al.* 1994). Like most marine turtles, prolonged exposure of loggerheads to low water temperatures, below about 8°C, may result in dormancy, shock, and death. Seventeen loggerheads were cold-stunned and stranded in Cape Cod Bay in December 1992 (Teas 1993). Cold Stunning is not restricted to the northern U.S. Cold stunning incidents, involving loggerhead and green turtles, have been documented several times in the northern part of the Indian River Lagoon system in east central Florida (Witherington and Ehrhart 1989b; Schroeder *et al.* 1990).

Stranded loggerheads documented by the Sea Turtle Stranding and Salvage Network were examined for different anomalies that might reveal something about the cause of stranding. It was recognized that the anomalies may not have been the cause of death of the turtles. Boat-related injuries (propeller or collision damage) occurred in 7.3 to 13.5% of stranded loggerheads (Table 3-3). Carapace, plastron, and skull injuries that could have been caused by interactions with vessels accounted for an additional 10 to 17% of anomalies in stranded turtles. These results suggest that vessel collisions are an important source of mortality among stranded loggerhead turtles. Injuries caused by boat/turtle interactions have increased from about 105 turtles in 1986 to about 140 turtles in 1993 (Teas 1994a,b). Loggerheads suffered the most boat-related injuries, followed by green turtles. A wide variety of other injuries was recorded in stranded loggerheads, including some due to predation, probably by sharks, and interactions with commercial and recreational fishing gear.

The major sources of mortality of sea turtles, including loggerheads, caused by human activities include incidental take in bottom trawls, particularly shrimp and summer flounder nets (Henwood and Stuntz 1987; Thompson 1988; National Research Council 1990;

Anonymous 1992; Chester *et al.* 1994), and coastal gill net and pound net fisheries (Thompson 1991; Henwood *et al.* 1992; NOAA & NCDE 1992; Witzell and Cramer 1995), ingestion of marine debris (Carr 1987; O'Hara 1989; Sadove and Morreale 1990; Lutz 1990; Witzell and Teas 1994), and channel dredging (Thompson 1988; NMFS 1992). Loss of nesting habitat along the south Atlantic coast caused by coastal development and disturbance of nesting habitat probably also has slowed recruitment of sea turtles (NMFS 1994a).

Shrimp fishing is the best quantified and probably the dominant source of anthropogenic mortality among North Atlantic loggerhead turtles (Thompson 1988; National Research Council 1990). Before regulations were enacted in 1987 requiring use of TEDs on shrimp nets, an estimated 7,913 to 18,148 loggerheads were killed each year in shrimp nets along the southeast coast of the United States. An additional 3,555 to 4,716 loggerhead turtles were killed this way each year in the Gulf of Mexico, bringing the total killed in the shrimp industry to approximately 10,000 to 23,000 individuals per year. The National Research Council (1990) estimated an annual mortality of loggerheads due to the commercial shrimping of 5,000 to 50,000 individuals in U.S. waters. Crowder *et al.* (1994) reported that use of TEDs has decreased strandings of sea turtles along the coast of South Carolina by 42 to 52%. Henwood *et al.* (1992) estimated that compliance with the TED regulations has resulted in a 67% reduction in mortalities of all sea turtles, including loggerheads, due to capture in shrimp trawls. In the Atlantic, the estimated turtle mortalities decreased from an estimated 7,395 without TEDs to 3,200 turtles with current TED regulations. If there was 100% TED coverage, estimated mortalities in the Atlantic due to shrimp trawling would decrease to 217 individuals.

Other fisheries account for 500 to 5,000 mortalities per year (National Research Council 1990). Three loggerhead turtles were reported entangled in lobster gear between 1983 and 1991 by the Sea Turtle Stranding and Salvage Network (NMFS 1994b). Two of the turtles were in New Jersey and one was in New York. Two of the turtles died. Loggerhead and other turtles are trapped and sometimes killed in pound nets set in shallow waters of Pamlico and Core Sounds, North Carolina, and southern Chesapeake Bay (Thompson 1991). An estimated 1,063 sea turtles, 60% of them loggerheads, were caught in the summer flounder *Paralichthys dentatus* trawl fishery along the U.S. southeast coast between November 1991 and February 1992 (NOAA & NCDE 1992; Epperly *et al.* 1995b). Between 89 and 181 of the turtles may have died. In 1992, 123 loggerhead turtles were captured in the pelagic long-line fishery for tuna, *Thunnus* spp., and swordfish, *Xiphias gladius*, in the western North Atlantic (Witzell and Cramer 1995). In 1993, an estimated 116 loggerheads were captured.

Dredging operations and collisions with boats may account for an additional 50 to 500 loggerheads per year each (National Research Council 1990). Between 1980 and 1991, 70 loggerheads were entrained in hopper dredges in the Cape Canaveral entrance channel, Florida, and 22 loggerheads were entrained in the King's Bay entrance channel, GA (Dickerson *et al.* 1992). Entrainment in electric power plant cooling water intakes accounts for fewer than 50 loggerhead deaths per year (National Research Council 1990). On the U.S. east coast, the largest number of sea turtle entrainments has been at the St. Lucie nuclear power plant located on Hutchinson Island, Florida. During the first 15 years of operation (May 1976 to December 1990), 2,193 sea turtles of all five species were removed from the cooling water intake canal (Ernest *et al.* 1989; NMFS & USFWS 1991a). Loggerheads accounted for nearly 85 percent of all captures. Most turtles were released alive, but approximately seven percent died before release.

Ingestion of or entanglement in plastic debris undoubtedly contributes to the death of many loggerhead turtles each year; however, the magnitude of this mortality is difficult to estimate (National Research Council 1990). Ten percent of 33 necropsied loggerheads that had stranded in the New York Bight contained ingested synthetic materials, mostly plastics (Sandove and Morreale 1990). Loggerheads in the New York Bight become entangled most frequently in pound nets and lobster pot lines. More than 50% of the necropsied loggerheads that stranded on beaches of south Texas between 1986 and 1988 contained ingested marine debris (Plotkin and Amos 1990). Most of the ingested material was buoyant plastics. More than seven percent of the turtles stranded in Texas were entangled in commercial and recreational fishing gear. More than 20% of the loggerheads examined near Malta in the central Mediterranean Sea were contaminated with plastic or metal litter or had ingested tar balls (Gramentz 1988). Of 22,547 sea turtles (72.4% of them loggerheads) stranded on shores of the Atlantic and Gulf of Mexico coasts of the U.S. between 1980 and 1992, 676 (3%) were affected in some way by debris (Witzell and Teas 1994). Of the different species of sea turtles, loggerheads were least affected by entanglement; when entanglement occurred, it most frequently involved monofilament lines with fish hooks, fishing nets, and rope. More than 40 loggerheads stranded along the south Atlantic coast of the U.S. had ingested monofilament lines or hooks; a few had ingested plastic or balloons. Fourteen loggerheads stranded on the south Atlantic coast had ingested or become contaminated with oil or tar balls.

The nesting environment of loggerhead turtles, sandy beaches, is a very desirable environment for human usage. Most human uses of the shoreline interfere with its use as loggerhead nesting habitat (NMFS & USFWS 1991a). Loggerheads prefer to nest above the high tide line. This area of the shore often is altered or destroyed by coastal development that results of armoring of the upper shore with sea walls, rock revetments, riprap, sandbag installations, groins, and jetties to control beach-front erosion. Armoring has occurred along approximately 21% of the beach-front in Florida and 10% of the beach-front in Georgia and South Carolina. This beach armoring prevents loggerheads from nesting in optimal supra-tidal habitat; nests layed in front of sea walls often are inundated by high tides and destroyed.

Despite extensive coastal engineering activities to prevent it, beach erosion continually decreases the amount of desirable beach-front land available for human use. Beaches often are restored by beach nourishment, which involves pumping, trucking or scraping sand onto the beach to rebuild it (NMFS & USFWS 1991a). Beach nourishment may adversely affect nesting turtles by disturbing nesting females or burying nests if carried out during the nesting season. The texture of the imported sand may not be suitable for nest construction. In addition, beach nourishment may result in compaction of the surface of the beach so that it is too hard for nest construction. The few studies performed to date on effects of beach nourishment on nesting success of loggerhead turtles have not demonstrated significant adverse effects (Broadwell 1992).

Artificial lighting of loggerhead nesting beaches can adversely affect nesting success of adult females and survival of newly hatched turtles (Witherington 1990; NMFS & USFWS 1991a). Emergence patterns of nesting females are cued to lighting patterns on the shore. Unnatural light intensities or light wavelengths on the shore may deter emergence or result in false crawls (emergence without nesting). White light from mercury vapor lamps deterred emergence and nesting of loggerheads, but light from low pressure sodium vapor lights did not (Witherington 1990).

In the presence of artificial lights, newly hatched loggerhead turtles tend to become disoriented (unable to maintain a uniform orientation) or misoriented (failing to move toward the ocean and most often moving toward the light). These effects increase with increasing light intensity and are greatest for light in the near-ultraviolet and green range (Witherington 1990). Yellow lights and low pressure sodium vapor lights produce little or no disorientation or misorientation in hatchling loggerheads. Disoriented and misoriented hatchlings suffer high mortalities from desiccation, entrapment in debris or vegetation on the beach, and predation.

Vehicular traffic on nesting beaches may disrupt nesting activity of females, compact the sand interfering with nest construction, destroy nests, kill hatchlings migrating down the beach, disorient adults and hatchlings by vehicular headlights, and create ruts in the beach that hatchlings find difficult to surmount in their rush to the sea (NMFS & USFWS 1991a). Increased uses of all types of beach-front property by humans can disrupt nesting activities of adults and ocean finding success of hatchlings (Fangman and Rittmaster 1994).

Kemp's Ridley Turtle (*Lepidochelys kempii* Garman, 1880)

Population Status and Trends

The Kemp's ridley and its congener the olive ridley *L. olivacea* are the smallest living sea turtles; adult females have shell lengths of 62 to 70 cm and weigh 35 to 45 kg (National Research Council 1990; USFWS & NMFS 1992). Pelagic-phase juvenile ridleys range in size from 5 to 20 cm SLCL; sub-adults are 20 to 60 cm long; and mature adults generally are longer than 60 cm SLCL (Marquez 1994). The olive ridley is a tropical species and its distribution in the western Atlantic Ocean is from Venezuela to Brazil and among the islands of the Caribbean Sea to as far north as the south coast of Puerto Rico (Reichert 1993). Kemp's ridley turtles are distributed throughout the Gulf of Mexico and into the Atlantic Ocean. Most of the ridleys that visit the east coast of the U.S. are juveniles, averaging 25 to 30 cm long and weighing 3 kg or less (NMFS 1988; NOAA 1991).

The Kemp's ridley turtle is the most endangered sea turtle in the world (Goombridge 1982) and is listed as endangered throughout its range (USFWS 1986). The number of females nesting at the only significant ridley nesting beach has dropped from an estimated 40,000 individuals in 1947 to 500 to 600 females in the mid 1980s (Pritchard 1990; Marquez 1994). Only 842 nests were found in 1988 (Ross *et al.* 1989). The number of nesting females has declined at a rate of about three percent per year since 1978 (Thompson 1988). Recent estimates of the fecundity of female ridleys indicate that as few as 400 females may nest each year (Rostal *et al.* 1992). The total world population of adults, mostly in the Gulf of Mexico, is approximately 2,200 individuals, down from an estimated 162,400 individuals in

1947 (Marquez 1989). As many as 200 to 300 sub-adult ridleys were sighted historically each year in Chesapeake Bay (Byles 1989). Between six and fifteen young ridleys were sighted each summer in lower Chesapeake Bay between 1979 and 1986 by Keinath *et al.* (1987). This is the most severe population decline documented for any species of sea turtles (National Research Council 1990). The decline is thought to have been due to predation (animal and human) of eggs on the major nesting beach and incidental take in commercial fisheries in the U.S. and Mexican Gulf of Mexico and in the western North Atlantic (Marquez 1994).

Nearly all reproduction takes place along a single 15-km stretch of beach near Rancho Nuevo, Mexico, about 322 km south of Brownsville, Texas (Marquez 1994). One to three nests may be layed each year on Padre Island, Texas. An additional 70 to 95 nests may be deposited elsewhere along the Mexican coast between Playa Lauro Villar, Tamaulipas, Mexico and Isla Aguada, Campeche, Mexico, compared to 650 $\pm$100 nests at Rancho Nuevo. Nesting occurs in a highly synchronized manner with large numbers of females (called an arribada) coming ashore within a period of a few hours during daylight (National Research Council 1990; Marquez 1994).

Sexually mature males and females migrate toward the nesting area in early spring. Courtship and mating occur during several weeks before the females emerge (Owens 1980). Mating occurs about 4 weeks before nesting. The females come ashore to dig nests and deposit eggs during April through July and occasionally into August. Nesting takes only about 45 minutes and each female may lay from one to four clutches of eggs, averaging about 2.3 (Pritchard 1990), over several days. Each clutch contains an average of 104 eggs. The average number of eggs deposited per nest has decreased from 110 in 1966 to 97 in 1992 (Marquez 1994). Most females nest every year after reaching sexual maturity.

The eggs hatch after about 50 to 55 days (Ross *et al.* 1989). The hatchlings migrate rapidly down the beach and out to sea where they spend a period of perhaps two years in the pelagic zone. They are about 20 cm long at the end of the pelagic period (National Research Council 1990). It may require 6 to 10 years for a female to reach sexual maturity (Marquez 1994).

Seasonal Distribution

The Kemp's ridley sea turtle is found mainly in the Gulf of Mexico (Hildebrand 1982), but small numbers of juveniles and sub-adults also occur during the summer along the Atlantic seaboard from Florida to Long Island Sound, Martha's Vineyard, and occasionally north of Cape Cod, in Cape Cod Bay, Massachusetts Bay, the Gulf of Maine, and as far north as the Canadian Maritime Provinces (Lazell 1980). Groups of dozens of young ridleys occasionally are observed feeding in shallow waters of Vineyard Sound and Buzzards Bay, Massachusetts (Carr 1967; Lazell 1980). The northern and northeastern Gulf of Mexico are prime foraging areas for juvenile, sub-adult, and post-nesting female ridleys (Marquez 1994). They often are observed associated with portunid crabs *Callinectes* spp., their favorite prey (Ogren 1989).

Virtually all the Kemp's ridley turtles in Atlantic waters are juveniles and sub-adults. It is generally thought that hatchlings and young juveniles from the western Gulf of Mexico drift to the east in the Gulf gyres and are caught in the eastern Gulf Loop Current (Collard and Ogren 1990). They are carried by the Florida Current through the Straits of Florida into the Gulf Stream, in which they are carried up the eastern seaboard of the U.S. (Collard 1987; Marquez 1994). By the time they reach New England waters, the juvenile ridleys are 24 to 30 cm SLCL and are able to swim against the current. They forage in shallow coastal waters of New England, New York, and New Jersey and gradually migrate southward as the summer progresses.

Although Carr (1980) suggested that the juvenile ridleys that are carried by the Gulf Stream as far north as New England and especially those carried all the way to Europe can not return to the Gulf of Mexico and are lost to the reproducing population, recent studies have shown that juvenile and sub-adult ridleys do migrate southward from New England waters toward Florida and the Gulf of Mexico.

Turtles that were tagged off Cape Canaveral, Florida, migrated north in the spring as water temperatures increased and south in the fall as water temperatures dropped (Henwood and Ogren 1987; Schmid 1995). The longest recorded northward migration was about 880 km. Three sub-adult ridleys that were tagged and released at Virginia Beach, Virginia, in the fall migrated southward in nearshore waters (Keinath *et al.* 1992). One turtle got as far south as Cape Canaveral, Florida, before the transmitter stopped. A young ridley tagged in eastern Long Island in October was tracked as it swam southward for a distance of 350 km in two weeks (Standora *et al.* 1992). The turtle intersected the Gulf Stream off Virginia and was drifting northwestward in the current when contact was lost in mid-December. Of 3,245 yearling ridley turtles tagged and released off the west and southwest coasts of Florida as part of the Sea Turtle Head Start Program, 92 were recovered after 1 to 1,563 days (Manzella *et al.* 1988). Sixty-six percent of the returns were from the Atlantic; the rest were from the Gulf of Mexico. Two of 8,562 ridleys released off Texas were recovered off North Carolina; six were recovered off Georgia and South Carolina, and one was recovered off France. These results suggest that many of the juvenile ridleys that enter the coastal waters of the eastern Gulf of Mexico eventually swim or are carried by water currents around the southern tip of Florida into the Atlantic Ocean. Just under 46% of the returns were from Atlantic coast states north of Florida, indicating that once ridleys move into the Atlantic, there is a high likelihood that they will be carried northward along the coast by the Gulf Stream. There were three recoveries from Chesapeake Bay, three from the New York Bight area, and one each from the coasts of France and Morocco. Young ridleys are the most abundant sea turtles that strand during fall and winter on northward-facing shores of Long Island (Morreale *et al.* 1992) and are the second most abundant sea turtles in southern Chesapeake Bay (Keinath *et al.* 1987). In some years ridleys are common in the lower York and Potomac Rivers, Virginia (Barnard *et al.* 1989). Between 211 and 1,083 young ridleys visit southern Chesapeake Bay each summer (Keinath *et al.* 1994). The data of Keinath *et al.* (1992) indicate that sub-adult ridleys summering in Chesapeake Bay do migrate southward toward the Gulf of Mexico in the fall and winter.

There is a gradient in size of young ridley turtles along the Atlantic coast. Most ridleys observed in New England waters are 20 to 30 cm long, with a mean length 27.1 cm in turtles stranded in Cape Cod Bay (Danton and Prescott 1988); in Chesapeake Bay they average slightly longer than 30 cm (NMFS 1988). Ridleys captured in South Carolina and Georgia had a mean carapace length of 34.8 (range 20.3 to 57.2 cm) (Henwood and Ogren 1987). The mean size of ridleys in the vicinity of Cape Canaveral, Florida is 37.0 cm (range 21.5 to 60.3) (Schmid 1995). A 66-cm individual reported by Henwood and Ogren (1987) off Cape Canaveral was considered to be sexually mature. This size gradient indicates that small ridleys may forage and grow rapidly in the north and move south as they grow. Juvenile ridleys feeding in coastal waters of Long Island Sound during the summer may grow at a rate of 500 g or more per month (Morreale *et al.* 1989; Standora *et al.* 1989). Because ridleys may remain in Florida waters for several years until they reach sexual maturity, the southern Atlantic population contains a wider range of sizes than northern populations.

Adults are restricted almost entirely to the Gulf of Mexico, where they range widely between northern (U.S.) and southern (Mexico) regions, but rarely east of Alabama in the northern Gulf (Pritchard and Márquez 1973). The distribution of juveniles is restricted primarily to U.S. waters of the northern Gulf of Mexico from Texas to Florida and along the Atlantic coast. There have been reports of large numbers of adult Kemp's ridley turtles congregating offshore just south of the U.S. border shortly before the onset of the nesting season at Rancho Nuevo in April, May, and June (National Research Council 1990).

Food and Feeding Behavior

Following a pelagic feeding stage shortly after hatching and lasting for several months (Carr 1986a,b), the juvenile ridleys move into shallow coastal waters to feed and grow. The young sub-adults often forage in water less than one meter deep (Ogren 1989), but they tend to move into deeper water as they grow.

Little is known about the feeding behavior and food preferences of hatchling Kemp's ridley turtles during their pelagic stage (National Research Council 1990). During the pelagic period, they presumably feed on zooplankton and floating matter, including *Sargassum* weed and the associated biotic community (Pritchard 1979).

In coastal waters of New York, young ridleys consume several species of crabs, including in order of decreasing preference, spider crabs *Libinia emarginata*, lady crabs *Ovalipes ocellatus*, and rock crabs *Cancer irroratus* (Morreale and Standora 1992). In Chesapeake Bay, sub-adult ridleys concentrate in seagrass *(Zostera* and *Rupia)* beds and feed primarily on blue crabs *(Callinectes sapidus)* and cancer crabs *(Cancer irroratus)* (Lutcavage 1981; Byles 1989). Juvenile to adult ridleys stranded on Texas beaches contained a wide variety of foods in their digestive tracts; crabs were most abundant, followed by molluscs and small fish (Shaver 1991). More than 60 percent of the turtles contained some plant materials in their stomachs, but it represented less than one percent of the total gut contents.

Sub-adults and adults feed on a variety of mostly demersal or benthic crabs, shrimp, clams, snails, squid, sea urchins, starfish, coelenterates, and even small fish (Dobie *et al.* 1961; Pritchard and Marquez 1973; Bjorndal 1985). Crabs seem to be the favorite food throughout their range. Juvenile and sub-adult ridleys in Florida and Georgia were observed to feed on the crab *Ovalipes ocellatus* and *Heppatus ephiliticus* (De Sola and Abrams 1933; Carr 1952). Blue crabs *Callinectes sapidus* are the favorite food of sub-adult ridleys in Virginia (Hardy 1962; Musick 1979). In New England waters, they probably feed primarily on shallow-water benthic crustaceans. Because of their preference for crabs and other primarily shallow-water demersal prey, juvenile and adult ridley turtles concentrate in coastal waters less than 100 m deep throughout their range (Thompson 1988). They make long dives to the bottom and may feed on the bottom for an hour or more at a time; one turtle was observed burrowing in the bottom of Long Island Sound (NMFS 1988).

Growth of Kemp's ridley turtles seems to be faster than that of loggerheads. Typical growth rates of ridleys tagged in Texas are in the range of 2.28 to 19 cm/y SLCL (McVey and Wibbles 1984). Ridleys tagged and recaptured off Cape Canaveral, Florida, had a mean growth rate of 8.28 cm/y (Schmid 1995). A growth model proposed by Marquez (1972) indicated that ridleys reach a length of about 40 cm after about four years and reach sexual maturity at a carapace length of 60 cm after about six or seven years. Captive ridleys reach a length of about 40 cm and a weight of about 12 kg after two years (Fontaine *et al.* 1985).

Known Mortality Factors

Several stages in the life cycle of Kemp's ridley turtles are sensitive to natural and anthropogenic disturbance. Recent data from the Sea Turtle Stranding and Salvage Network indicates that fewer ridleys than loggerheads (63 to 143 per year versus 793 to 1072 per year) strand along the east coast of the U.S. (Table 3-4). This undoubtedly is due mainly to the much smaller population size of ridleys than of loggerheads in the western Atlantic Ocean. Most of the ridleys that strand along the U.S. Atlantic coast strand in Florida and Georgia (Table 3-4). In some years, relatively large numbers also stand in North Carolina and Virginia. Most strandings in the northeastern U.S. are in New York (north shore of Long Island) and Massachusetts (north shore of Cape Cod), and usually are due to cold stunning.

Each year between November and January when ocean water temperatures are falling, small numbers of ridley turtles become stranded and die on beaches of inner Cape Cod and along the north shore of Long Island, due to cold stunning (NOAA 1991). When the water temperature drops below about 12°C, the metabolic rate of these cold-blooded reptiles decreases to the point where they are unable to swim and digest food; they become comatose and may die if not warmed quickly. A total of 115 ridley turtles stranded on Cape Cod beaches between 1977 and 1987 (Danton and Prescott 1988). In the winter of 1985/1986, 52 turtles (41 ridleys, nine loggerheads, and two green turtles) stranded in Long Island Sound (Meylan and Sadove 1986). Nine of the ridleys and one each of the loggerheads and green turtles survived following gradual warming at a rehabilitation center. Similar cold strandings have occurred as far south as the Indian River lagoon, Florida (Wilcox 1986; Morreale *et al.* 1992). During the winters of both 1986 and 1987, 28 ridleys stranded along the north shore of Long Island; six of the turtles survived. In all three years the strandings all took place between November and March, with most strandings in December. Between 1987 and 1993, 0.3 to 3.3% of all species of turtles stranding each year are cold-stunned (Table 3-3).

Other contributing causes to strandings of all turtles, including ridleys, include boat collisions, entanglement in shrimp trawls and other fishing gear, ingestion or fouling with man-made debris and petroleum/tar balls, and various injuries of uncertain origin (Table 3-3). Ridleys are particularly susceptible to being taken in shrimp trawls and bottom fishing gear.

A major cause of sea turtle mortality attributable to man is entanglement in fishing gear, particularly shrimp nets (National Research Council 1990). Henwood and Stuntz (1987) estimated an annual incidental capture of approximately 47,000 sea turtles of all species, with an estimated mortality of about 11,000 in the shrimp fisheries of the Gulf of Mexico and southern U.S. coast of the Atlantic. These estimates are thought to be low (National Research Council 1990). Of all the turtles killed during commercial shrimping, 500 to 5,000 are Kemp's ridley turtles.

Other fishing-related deaths, caused by entanglement in lobster gear (O'Hara *et al.* 1986) and pound nets (Morreale and Standora 1989), may result in an additional 50 to 500 deaths of Kemp's ridley turtles each year. Ridley turtles, being benthic feeders, tend to become entangled in debris, including abandoned fish and crab traps, on the bottom. They frequently become trapped in pound nets in coastal waters of the New York Bight (Sadove and Morreale 1990). Between November 1991 and February 1992, 30 ridleys were caught in the summer flounder trawl fishery off North Carolina, and one ridley died (NMFS & NCDE 1992; Epperly *et al.* 1995b).

The total incidental catch of Kemp's ridley turtles associated with the different commercial fisheries in the U.S. Gulf of Mexico and the Atlantic Ocean may approach 6,000 individuals per year, representing 7.5 percent of the hatchling ridleys produced each year, assuming that the 800 nests produced a total of 80,000 hatchling ridley turtles each year. This extra mortality undoubtedly is contributing to the rapid decline in the population of Kemp's ridley turtles.

Large numbers of sea turtles, including some Kemp's ridley turtles, die from eating or becoming entangled in plastic and other man-made debris (O'Hara 1989; National Research Council 1990). Sea turtles are particularly prone to becoming entangled in monofilament fishing line and phantom fishing nets (Balazs 1985). Plastic bags and plastic particles are the most common forms ingested; they probably are mistaken for food. Ridley turtles seem to be less susceptible to entanglement than other species of sea turtles (Witzell and Teas 1994). Sub-adult ridleys in the northeast U.S. and along the Atlantic coast of Florida rarely, if ever ingest plastic debris (Bjorndal *et al.* 1994; Burke *et al.* 1994).

Under some circumstances, chemical pollution may be a threat to ridley turtles. As part of the Sea Turtle Head Start Program, 12,422 one-year-old ridley turtles were tagged and released between 1979 and 1987 (Manzella *et al.* 1988). In 1982, 1,325 ridleys were released 6 to 10 km off the Texas coast in floating patches of *Sargassum* weed. More than 28 percent of the turtles washed ashore within 14 days of release, and most were coated with oil or had ingested tar balls, probably associated with the *Sargassum*. Because early pelagic stage ridleys are thought to congregate and feed in rafts of *Sargassum*, they may be vulnerable, as juvenile loggerhead turtles are (Carr 1987), to floating oil and nondegradable debris that tends to collect in driftlines of *Sargassum*. Young ridleys off Texas (Plotkin and Amos 1990) may have a high incidence (>50%) of fouling with oil or tar. Ridleys feeding in *Sargassum* rafts or on benthic prey, may accumulate metal and organic contaminants from their prey. Closely related olive ridley turtles *(Lepidochelys olivacea)* collected from coastal Ecuador contained elevated concentrations of copper, lead, and zinc in their bones (Witkowski and Frazier 1982).

Heavy rains, storms and erosion may damage or destroy eggs on the nesting beach. Because all nesting takes place along a single beach, a single severe storm during the nesting season can destroy a large part of a year class of turtles. In 1988, Hurricane Gilbert severely scoured the nesting beach at Rancho Nuevo; in 1989, the returning females were displaced about 15 km to the north (National Research Council 1990). It is uncertain if the storm damage contributed to a lower than usual nesting success.

The main threat to eggs and newly emerged hatchlings is from predation by fish, birds, mammals, and man. Since 1966, the Mexican government has posted armed guards on the nesting beach to protect the nests from poachers (National Research Council 1990). However, it is more difficult to protect the eggs and hatchlings from animal predators.

The Leatherback Turtle (*Dermochelys coriacea* Vandelli 1761)

Population Status and Trends

Leatherback turtles (*Dermochelys coriacea*) are the largest and most distinctive of the living sea turtles. Because of their distinct anatomy and physiology, they are placed in a separate family, the Dermochelyidae, containing a single species (NMFS & USFWS 1992). They reach a length of 150 to 170 cm SLCL and a weight of 500 and exceptionally 900 kg. Large outstretched front flippers may span 270 cm in an adult. Lacking a keratinized shell, they are covered instead with a tough hide. Leatherbacks have a layer of subcutaneous fat 6 to 7 cm thick and circulatory adaptations to reduce the rate of heat loss through the flippers (Greer *et al.* 1973). They respond to drops in ambient temperature by increasing metabolic heat production and so can maintain an internal body temperature well above ambient (Standora *et al.* 1984; Paladino *et al.* 1990). A leatherback in 7.5°C seawater was able to maintain its core body temperature at 25.5°C (Friar *et al.* 1972). This endothermy allows leatherbacks to survive and feed in colder temperate waters than other sea turtles can tolerate. Therefore, leatherbacks are more widely distributed as adults than other sea turtles in temperate and boreal waters throughout the world. However, all leatherbacks return to subtropical and tropical shores to nest.

Leatherback turtles are the second most common turtle along the eastern seaboard of the United States, and the most common north of the 42°00'N latitude. Between 100 and 900 leatherbacks visit coastal and continental shelf waters of the western North Atlantic Ocean between Canada and North Carolina each year, with peak abundance in summer (Shoop and Kenney 1992). As many as 115,000 adult female leatherbacks remain world-wide (Pritchard 1982). Nevertheless, the leatherback sea turtle is listed as endangered throughout its range (USFWS 1986).

Because they are a largely oceanic, pelagic species, estimates of their population status and trends have been difficult. In addition, only a small fraction of the North Atlantic population nests on beaches of the continental United States, mostly in Florida (National Research Council 1990; Meylan *et al.* 1994) and the U.S. Virgin Islands (Boulon *et al.* 1994). Leatherbacks that visit U.S. Atlantic waters nest primarily along the coasts of Surinam and French Guiana, and to a lesser extent on the island of St. Croix and at Culebra, Puerto Rico (National Research Council 1990; NMFS & USFWS 1992; Boulon *et al.* 1994). Nesting is scattered along isolated beaches throughout the Caribbean. Nesting females do not have the nest-site fidelity exhibited by Kemp's ridley turtles and tend to move to different beaches in different years (Tucker 1990). Therefore, it has been difficult to estimate temporal trends in population size. However, it appears that populations of leatherbacks in the North Atlantic are stable.

Nearly all nesting occurs in the tropics. An estimated 50% of the adult female leatherbacks nest along the west coast of Mexico (Pritchard 1982). Most nesting of the Atlantic/Caribbean population occurs along the mainland coast of the southern Caribbean from Costa Rica to Columbia, from French Guiana to Surinam and in Trinidad and the Dominican Republic (National Research Council 1990; NMFS & USFWS 1992).

Between 10 and 188 leatherback nests are reported each year along the Atlantic coast of Florida (NMFS & USFWS 1992; Meylan *et al.* 1994). Between 10 and 25 female leatherbacks probably account for all the nests deposited each year along the Atlantic coast of Florida (NMFS & USFWS 1992). Nesting in Florida is wide-spread but erratic from year to year and from one place to another. Most of the remaining leatherbacks nesting on U.S. shores occurs in the U.S. Virgin Islands (St. Croix, St. Thomas, and St. John) and in Puerto Rico, including the small islands of Culebra, Vieques, and Mona (NMFS & USFWS 1992). Fifty to 70% of the total nesting on St. Croix occurs at Sandy Point (NMFS & USFWS 1992). Between 18 and 55 leatherback turtles nest each year at Sandy Point, a 3-km beach on St. Croix (Boulon 1992; Boulon *et al.* 1994). Because of the importance of Sandy Point, St. Croix for leatherback nesting, it has been designated as critical habitat for leatherback turtles (NMFS 1994a). There is one record of a leatherback turtle nesting on a North Carolina beach (Pritchard 1989).

Each female may nest up to ten times (mean frequency five to seven times, depending on year) in a single season (Tucker 1989) at intervals of about 10 days. Females usually nest only every other year (National Research Council 1990; Boulon *et al.* 1994). Most nesting takes place during March and April (NOAA 1991). A typical nest on a Culebra beach contains about 30 to 115 eggs (mean 70), each about 5.4 cm in diameter (Hall 1990). Some of the eggs do not have a yolk and are infertile. The eggs hatch after about 65 days.

Seasonal Distribution

Leatherback turtles are common during the summer in North Atlantic waters from Florida to Massachusetts, the Canadian Maritime Provinces, and occasionally as far north as Baffin Island (Figure 3-8, Goff and Lien 1988). New England and Long Island Sound waters support the largest populations on the Atlantic coast during the summer and early fall (Lazell 1980; Prescott 1988; Shoop and Kenney 1992). Leatherbacks are observed frequently in lower Chesapeake Bay and off the mouth of the bay during the summer, where they probably are feeding on the locally abundant jellyfish (Barnard *et al.* 1989)

Leatherbacks are sighted only rarely north of Cape Hatteras during the winter. Three leatherbacks were sighted in Core Sound, just south of Cape Hatteras, in December 1989 (Epperly *et al.* 1992). In some years, they are abundant in nearshore waters off the east coast of Florida. Knowlton and Weigle (1989) reported sighting 168 leatherbacks in coastal waters between Sebastian Inlet and St. Augustine in February 1988. During most of the year, they are pelagic and remain far offshore in oceanic waters. However, periodically, especially during the summer, they may come relatively close to shore pursuing their jellyfish prey (Lee and Palmer 1981).

Leatherback turtles nest on tropical beaches, after which the adults move into temperate waters to feed. Most leatherbacks that visit New England waters are adult males, usually longer than about 150 cm and weighing more than 450 kg (NOAA 1991). Adults migrate extensively throughout the Atlantic basin in search of food. There are numerous records of leatherback turtles in New England and as far north as Nova Scotia and Newfoundland (Goff and Lien 1988). Sightings off Massachusetts are most frequent in the late summer months (Shoop *et al.* 1981, CeTAP 1982; Shoop and Kenney 1992).

In the spring, following breeding and nesting in the tropical Caribbean and Florida, leatherback turtles move northward beyond the shelf break, aided by the northward flow of the Gulf Stream. Therefore, there are few sightings of leatherbacks in coastal and outer continental waters in the spring months (CeTAP 1982). They appear in offshore waters of the middle Atlantic states and in the Gulf of Maine in late May to June, and in shelf waters from June through October (Shoop *et al.* 1981; Shoop and Kenney 1992). In New England waters, they are seen most frequently in the southern Gulf of Maine, including Cape Cod and Massachusetts Bays. Leatherbacks occur most frequently in coastal waters of Newfoundland in August and September when water temperatures are at their highest (Goff and Lien 1988).

During the summer, they move into fairly shallow coastal waters, apparently following their preferred jellyfish prey. In the fall, leatherbacks move offshore and begin their migration south to the winter breading grounds in the tropical Caribbean (Payne *et al.* 1984). Leatherbacks may travel great distances between nesting and feeing areas. Tagging studies have shown that some of the leatherbacks that visit New England waters nested in the U.S. Virgin Islands and along the southern coast of the Caribbean or in the Guianas (Boulon 1989; National Research Council 1990). A 157-cm leatherback found entangled in fishing nets near Fox Harbor, Newfoundland, on 17 September 1987 bore a tag indicating that it had migrated 5,000 km from French Guiana, South America in 128 days at an estimated speed of at least 39 km/day (Goff *et al.* 1994).

Food and Feeding Behaviors

Leatherback turtles are pelagic feeders, though they can dive to considerable depths. They feed throughout the water column to depths of at least 1,000 m (Eckert *et al.* 1989) on jellyfish and other gelatinous zooplankton, such as salps, ctenophores, and siphonophores (Limpus 1984). Most feeding dives average about 60 m, but frequently extend to 300 to 400 m (Eckert *et al.* 1986, 1989) where they feed on deep water gelatinous zooplankton, such as siphonophores and salps. Their seasonal inshore movements in New England waters have been linked to inshore movements of their preferred prey, the jellyfish *Cyanea capillata* (Lazell 1980; Payne and Selzer 1986). A leatherback collected near Malta in the Mediterranean Sea contained in its stomach two species of siphonophores and one species of scyphozoan (den Hartog 1980). Leatherbacks feed primarily on the medusa *Rhizostoma plumo* off the coast of France (Dugay 1983).

Leatherbacks have a notched upper jaw, an adaptation for grasping soft prey (Pritchard 1971). They also possess a long digestive tract, about nine times longer than the length of the carapace, and a large caecum for holding the large amount of watery, gelatinous prey they need to consume to fulfill their caloric needs (Bjorndal 1985).

Known Mortality Factors

Many of the same natural and anthropogenic factors affecting survival of loggerhead and Kemp's ridley turtles also affect leatherbacks. In 1987 and 1988, 119 and 63 leatherbacks, respectively, stranded along the U.S. coast (National Research Council 1990). Most of the strandings occurred along the coasts of Delaware, New Jersey, and New York. There was only one stranding in New England. The cause of death of most of these turtles is not known. Being temperate water species, leatherbacks do not seem to be sensitive to cold temperatures, and strandings can not be attributed to cold stunning.

Between 1988 and 1993, between 69 and 135 leatherback turtles were stranded on the U.S. Atlantic coast each year (Table 3-5). Most strandings were in Florida and New York. In some years, there were several strandings in either or both New Jersey and Massachusetts. The causes of these strandings are not known, but entanglement in fishing gear may be a major factor.

Leatherbacks apparently are not caught frequently in commercial shrimp nets. However, they are very susceptible to entanglement in other fishing gear and plastic debris (Mager 1985; Witzell and Teas 1994). Because they are adapted to a pelagic existence, they have trouble maneuvering in tight places and swimming backwards, and have difficulty avoiding obstructions in shallow waters (Payne and Selzer 1986; NOAA 1991). In January-February, 1992, a leatherback turtle became entangled and died in a summer flounder trawl south of Cape Hatteras (Epperly *et al.* 1995b). Leatherbacks have been entangled in lobster gear (O'Hara *et al.* 1986; Sadove and Morreale 1990) and long-lines (Balazs 1985) in New York Bight and New England waters. In 1992, 50 leatherbacks were taken in the long-line fishery between Cape Hatteras and the Grand Banks (Brady and Boremen 1994). An estimated 356 leatherbacks were captured in 1992 and 242 in 1993 in the entire long-line fisheries for tuna and swordfish in the western North Atlantic Ocean (Witzell and Cramer 1995). Records from the Sea Turtle Stranding and Salvage Network show that 45 leatherback turtles became entangled in lobster gear between 1983 and 1993 in coastal waters of New Jersey, New York, and southern New England (NMFS 1994b). Eleven of the entangled turtles died. The large front flippers (often one meter long) of leatherbacks often bear cuts, chafing marks, or are severed altogether, possibly due to entanglement (Fretey 1982).

Because of their preferred diet of gelatinous zooplankton, particularly jellyfish, leatherback turtles often ingest floating plastic debris, mistaking it for food (Wallace 1985; O'Hara 1989). Plastic bags blocked the stomach openings of 11 of 15 leatherbacks that washed ashore on Long Island during a two-week period (Balazs 1985). The largest leatherback ever recorded washed ashore dead on the coast of Wales entangled in fishing gear and with a large piece of plastic blocking the entrance to its small intestine (Eckert and Eckert 1988).

Although leatherbacks are not harvested commercially for meat or other products, there is extensive subsistence harvesting of the females that come ashore to nest throughout much of the tropical nesting range, including Guyana, Trinidad, and Columbia (National Research Council 1990). Egg collecting is also intense in some areas.

The Green Sea Turtle (*Chelonia mydas* Linnaeus 1758)

Population Status and Trends
The green turtle *Chelonia mydas* is the largest of the thecate (hard-shelled) sea turtles. Adult green turtles may reach a length of 110 cm or more SLCL and a weight of at least 150 kg (Witherington and Ehrhart 1989b). It is listed as threatened throughout its range, except for breeding populations in Florida and the Pacific coast of Mexico, which are listed as endangered (USFWS 1986; NMFS 1994a). These turtles once were very abundant throughout shallow coastal waters in tropical and subtropical climates; their rapid decline in the twentieth century is attributed in part to heavy predation by man on eggs and adults for food and shell products (Thompson 1988; NMFS 1994a). A commercial fishery for this species extended from Texas to North Carolina (Thompson 1988). The maximum annual catch of green turtles in the Indian River was 2,500 in 1886, but the annual catch had declined to 500 individuals by 1895. Annual catches in this area of Florida were in the range of 200 to 500 individuals in 1970 to 1974 (Thompson 1988). Late in the last century, as many as 2,800 adult females nested each year on Dry Tortugas (near Key West), but this nesting population was harvested to extinction early in this century.

Adult green turtles mate off nesting beaches during the summer months. The females then emerge at night to deposit their eggs in the upper intertidal and supratidal zones of sandy shores (NMFS & USFWS 1991b). Each female may lay from one to seven clutches of eggs, each containing 110 to as many as 136 eggs, in a season. Reemergence intervals for green turtles are in the range of two to four years. Females have moderately high site fidelity, returning to the same beach within years and over years to nest (Johnson and Ehrhart 1994). Unless preyed upon by animals, particularly raccoons (Wells and Bellmund 1990), and human predators, hatching success of green turtle eggs usually is high. However, human disturbance of nesting habitat may reduce egg survival substantially (NMFS & USFWS 1991b).

The greatest green turtle nesting in the Florida Keys is on Long Key (Wells and Bellmund 1990). Between 30 and 35% of the green turtle nesting in the U.S. occurs along a 33-km stretch of barrier island coast between Melbourne Beach in Brevard County and Wabasso Beach in Indian River County (Tritaik 1994). A record 477 green turtle nests were recorded at Melbourne Beach in 1990 (Owen *et al.* 1992). Forty-four green turtles nested at

Jupiter/Carlin Park, Florida in 1992 (Davis *et al.* 1994). In 1992, there were between 12 and 50 green turtle nests per kilometer, with a mean of 29 nests/km, along the shore of the Archie Car National Wildlife Refuge in south Florida (Owen *et al.* 1994). The total number of green turtle nests each year at the refuge has ranged from 32 in 1984 to 686 in 1992 with strong years interspersed with weak years. Between 1979 and 1992, the number of green turtle nests reported each year along the entire east coast of Florida has ranged from 62 to 2,509 (Meylan *et al.* 1994). Green turtle nesting also occurs frequently on islands off Puerto Rico, such as Mona Island and Isla Caja de Muertos (van Dam *et al.* 1990; Diaz 1994). In 1993, green turtles nested on 55% of the beaches on St. Croix monitored by Mackay (1994). Heaviest nesting was at Sandy Point National Wildlife Refuge and at Jack's Bay.

Seasonal Distribution

Green turtles are found in moderate numbers along the coasts of Florida, in the U.S. Virgin Islands and Puerto Rico, and throughout the Gulf of Mexico (NMFS & USFWS 1991b). An estimated 1,500 green turtles, most of them sub-adults, use coastal waters of east central Florida each year (Ehrhart 1983) and the numbers of juveniles in this area may be increasing (Thompson 1988). Based on the relative numbers of green turtles stranded along the U.S. southeast coast each year, Thompson (1988) estimated that green turtles represent three to four percent of the total turtle numbers on the southeastern U.S. This represents about 600 to 800 nesting females in May to August each year and approximately 11,000 to 16,000 total green turtles along the U.S. southeast coast throughout the year. There appears to have been a gradual increase since about 1980 in the number of green turtles nesting each year and the total population in Florida waters (Thompson 1988; NMFS 1994a).

Green turtles may venture as far north as the New York Bight and New England in small numbers during the summer, where some become cold-stunned each year by falling water temperatures in the fall and winter (Burke *et al.* 1992; Morreale *et al.* 1992). Green turtles, the only species of sea turtle that is a strict herbivore as an adult, feed in shallow coastal waters on sea grasses and marine algae; they are abundant wherever these plants are abundant. Sub-adult green turtles are occasionally observed feeding in the late summer on seagrass beds in Chesapeake Bay (Barnard *et al.* 1989) and along the shores of Long Island (Burke *et al.* 1992). They are the second most frequently caught sea turtle by recreational fishermen in coastal waters of North Carolina (Epperly *et al.* 1992). Important feeding areas for green turtles include the Indian River Lagoon and Florida Keys on the Atlantic coast of Florida, and Florida Bay, Homosassa, Crystal River, and Cedar Key on Florida's west coast (NMFS & USFWS 1991b). Both juvenile (<20 cm SLCL) and sub-adult (20 to about 90 cm SLCL) green turtles are abundant in the Indian River lagoon and on nearby offshore sabellariid reefs and hard bottoms (Henwood and Ogren 1987; Wershoven 1989; Ehrhart *et al.* 1990; Wershoven and Wershoven 1989, 1992; Guseman and Ehrhart 1990). More than 80% of the green turtles captured by Schmid (1995) off Cape Canaveral, Florida were sub-adults shorter than 40 cm SLCL. Sub-adult green turtles are most abundant in Florida coastal waters during the winter. They probably migrate northward to summer feeding grounds in North Carolina, Chesapeake Bay, and the New York Bight in the spring and return to Florida waters in the fall.

Feeding and Growth

Post-hatchling green turtles, like other sea turtles, disappear or are very hard to fine for a year or more after hatching. They are presumed to congregate along drift-lines and convergences, particularly those containing masses of floating *Sargassum* weed. Carr (1986a) cites nine reports of juvenile green turtles ($\leq$ 20 cm) associated with *Sargassum* rafts. While associated with the floating algae, they undoubtedly subsist on the *Sargassum* itself as well as the small plants and animals associated with the drift line and *Sargassum*.

After green turtles become sub-adults and shift to benthic feeding in coastal waters they are nearly completely herbivorous (NMFS & USFWS 1991b). Green turtles are the only living herbivorous marine turtles; they subsist as sub-adults and adults entirely on seagrasses and marine algae (Bjorndal 1985). Most local populations of green turtles feed on either seagrasses or marine algae, but rarely both. A favorite seagrass food of green turtles throughout the Caribbean and south Florida is *Thalassia testudinum*. *Thalassia* is a highly productive grass and can support as many as 138 adult female green turtles per hectare (Bjorndal 1982). Individual green turtles may maintain a grazing plot of seagrass which they repeatedly re-graze, helping to maintain the rapid growth of the new, more nutritious young leaves (Bjorndal 1985). In the Mosquito Lagoon, Brevard County, Florida, sub-adult green turtles weighing 7 to 50 kg graze exclusively on the seagrasses *Syringodium filforme*, *Halodule wrightii*, and *Halophila* sp. (Mortimer 1981).

Reef areas off Broward County, Florida do not contain seagrasses. Most of the sub-adult green turtles that congregate there feed on marine algae associated with the reefs (Wershoven and Wershoven 1989). The predominant food of these turtles is algae of the family Gelidiaceae, including *Pterocladia, Gelidium,* and *Geliciella* spp.

During feeding, sub-adult green turtles do not wander far, but remain within a small area of a km^2 or less (Nelson 1994). A typical dive cycle during feeding in Florida lasts about 33 minutes, of which one minute is spent at the surface between dives, and 30 minutes is spent on the bottom foraging on seagrass or algae (Nelson 1994). Thus, green turtles in their feeding grounds are hard to monitor because they spend more than 50 minutes of each hour submerged.

In waters around Long Island, NY, green turtles feed primarily on algae, followed by the seagrass *Zostera marina* (Burke *et al.* 1992). The most abundant algae consumed by the green turtles are *Fucus, Sargassum, Codium,* and *Ulva*. Some green turtles consumed small numbers of molluscs crabs and synthetic materials. The crabs and molluscs could have been ingested with the preferred algae and grass.

The growth rate of green turtles in Australia is about 1.0 cm/y and decreases with size (Limpus and Walter 1980). In waters around the Bahamas, Florida, the U.S. Virgin Islands, and Puerto Rico, green turtles grow from a length of 30 cm to 75 cm in about 17 years, an annual growth rate of 2.6 cm/y (Bjorndal and Bolten 1988; Boulon and Frazer 1990; Bjorndal *et al.* 1995). In the wild, green turtles may reach sexual maturity in 20 to 50 years (Frazer and Ehrhart 1985).

Known Mortality Factors
The same natural and anthropogenic disturbances to shoreline habitat and to offshore waters that adversely affect loggerhead populations also affect populations of green turtles throughout their range in U.S. waters (NMFS & USFWS 1991a,b). Between 1988 and 1993, 138 to 200 green turtles were stranded each year along the east coast of the U.S. (Table 3-6). Most strandings each year were in Florida, followed by North Carolina. In some years, large numbers of green turtles strand in Puerto Rico. Green turtles are relatively rare visitors north of Virginia, and the stranding records reflect this. An occasional green turtle is stranded in New York or Massachusetts, usually as a result of cold-stunning (Morreale *et al.* 1992). Twenty-five green turtles have been stranded in Georgia between 1979 and 1993 (Maley *et al.* 1994). Many of the strandings along the south Atlantic coast may have been associated with entrapment in shrimp trawls; strandings of green and other sea turtles has decreased since institution of TED requirements for shrimp trawls (Maley *et al.* 1994). Between November 1991 and February 1992, two green turtles were caught in summer flounder trawls south of Cape Hatteras; both turtles were alive when released (Epperly *et al.* 1995b). Between 1988 and 1989, 266 sub-adult green turtles stranded in a six-county area from Brevard to Broward County (Ehrhart *et al.* 1990). Several turtles were ensnared and killed by an abandoned gill net.

Green turtles ranked second to loggerhead turtles in frequency of propeller and boat collision wounds (Teas 1994b). The incidence of entanglement in anthropogenic debris was about the same for green and loggerhead turtles along the southeast U.S. coast; given the much larger population size of loggerheads than greens, this pattern indicates that green turtles are unusually vulnerable to entanglement (Teas 1994a; Witzell and Teas 1994). Green turtles seem to be particularly vulnerable to entanglement in fish hooks, monofilament line, and fishing nets. They are also sensitive to entanglement in non-fishing gear and marine debris. About 45 green turtles stranded along the U.S. southeast Atlantic coast had been impacted by petroleum or tar balls (Witzell and Teas 1994). However, they are not particularly prone to ingesting synthetic materials, such as plastics (Sadove and Morreale 1990).

The Hawksbill Turtle (*Eretmochelys imbricata* Linnaeus, 1766)

Population Status and Trends
The hawksbill sea turtle *Eretmochelys imbricata* is a medium-sized sea turtle, slightly larger than the ridley turtle. Adult nesting females have a carapace length of about 87 cm and weigh about 80 kg (NMFS & USFWS 1993). Hawksbills nesting in Puerto Rico had carapace lengths of 67.1 to 85.6 cm SLCL (Thurston and Wiewandt 1976). The largest hawksbill on record weighed 125 kg. Hatchlings are about 4.2 cm long and weigh 13 to 20 g (Witzell 1983).

The hawksbill turtle is a tropical and subtropical species, inhabiting warm waters of the Atlantic, Pacific, and Indian Oceans (Witzell 1983; NMFS & USFWS 1993). In U.S. territorial waters, hawksbills occur along the U.S. coast of the Gulf of Mexico, especially in south Texas, along the Gulf and Atlantic coasts of Florida, particularly around reefs off Palm Beach County and in the Florida Keys where the warm Gulf Stream comes close to shore, and in Puerto Rico, particularly the islands of Mona, Culebra, and Vieques, and in the U.S.

Virgin Islands. Hawksbills are listed as endangered throughout their range world-wide (USFWS 1986). Their decline throughout their range is attributed in large part to hunting pressure for their valuable shells (NMFS 1994a).

Hawksbills are solitary nesters, making it difficult to gain insights into their population sizes in areas where they nest (Witzell 1983). An estimated 4,975 hawksbills nest each year throughout the wider Caribbean Sea (including U.S. territories) (Meylan 1989). As many as 36 female hawksbills lay about 160 to 200 nests each year on Mona Island in Puerto Rico between May and January (Dodd 1978; van Dam *et al.* 1990, 1992). Several hawksbills nest year-round on Isla Caja de Muertos, Puerto Rico (Diaz 1994). Between 15 and 30 hawksbills may nest on beaches in St. Croix each year between June and November (Dodd 1978; Eckert 1992). Between 46 and 99 hawksbill nests have been recorded each year at Buck Island Reef National Monument each year between 1987 and 1992 (Hillis 1994a,b). Only a few nests are deposited between April and August each year on Florida beaches (Lund 1978; Meylan *et al.* 1994). Juveniles and sub-adults tend to remain and feed on coral reefs near their natal beaches (Witzell 1983). Hawksbills show a high fidelity to their nesting beach and return to the same or a nearby beach year after year (Bjorndal *et al.* 1985).

Hawksbills nest over a long season, April through August in Florida, and May through January in Puerto Rico (Witzell 1983). Mating occurs off nesting beaches. Females usually come ashore at night and are easily disturbed by lights and activity on the beach. Nesting requires one to three hours and may be repeated several times a year (average 4.5 times per year). There are a few records of as many as 12 clutches of eggs being produced by a single female in a season (Melucci *et al.* 1992). Remigration occurs at intervals of two to three years. Clutch size increases with age of the female; in Florida and the U.S. Caribbean it averages about 140 eggs per nest, with a maximum of about 200 eggs. In Puerto Rico, the average number of eggs per nest is 124, with a range of 114 to 134 (Thurston and Wiewandt 1976). Hatching occurs after about 60 days of incubation, and hatching success averages about 80% on U.S. beaches (NMFS & USFWS 1993).

Most nesting populations of hawksbills are considered to be declining due to overexploitation of adults for their shells and nesting habitat destruction (Witzell 1983). In the U.S. Caribbean, and the Florida Keys, hawksbills were severely depleted during the 20th century due mainly to overexploitation. At present, since the banning of sale of turtle shell products, they may no longer be in decline, but their numbers are not increasing (NMFS & USFWS 1993). In the western North Atlantic and Caribbean Sea, hawksbill nesting populations have continued to decline (Meylan 1989). There appears to be a low but positive net recruitment rate to the nesting population at Buck Island reef in St. Croix (Hillis 1994a,b).

Seasonal Distribution

Like most sea turtles, hatchling hawksbills are pelagic for a period of one to several years. Carr (1987) identified ten instances of sightings of juvenile hawksbills associated with offshore *Sargassum* rafts. When the juveniles reach a carapace length of about 20 to 25 cm, they return to coastal waters to feed and grow as sub-adults (NMFS & USFWS 1993). Sub-adult and adult hawksbills feed in shallow, high-energy habitats over reefs, rock bottoms or other hard substrates that support dense populations of sponges, which are their favorite foods (Witzell 1983; NMFS & USFWS 1993). Many hawksbills are relatively sedentary, rarely making long migrations (Carr 1977); others have been documented to make migrations over great distances (Witzell 1983). Young hawksbills tagged in the U.S. Virgin Islands were subsequently recovered in the islands and at locations distant from them, suggesting that some of the turtles are migratory (Boulon 1989). After nesting at Buck Island reef on St. Croix, tagged female hawksbills dispersed throughout the Caribbean (Hillis 1994a,b). One turtle was recovered dead in the Miskito Cays, Nicaragua. Three hawksbills tagged on Buck Island, St. Croix, remained in the vicinity of the U.S. and British Virgin Islands and Puerto Rico (Groshens and Vaughan 1994).

There have been a few reports of hawksbills in the western Atlantic Ocean as far north as Cape Cod (Bleakney 1965; Lazell 1980) and Virginia (Musick 1979). They are occasionally encountered in North Carolina waters (Schwartz 1961, 1976). Three hawksbills were stranded in Georgia between 1979 and 1993 (Maley *et al.* 1994).

Feeding and Growth

Like other species of sea turtles, hatchling hawksbills congregate in *Sargassum* rafts to feed and grow for a year or more after emerging from the nest (Witzell 1983; NMFS & USFWS 1993). While in the *Sargassum* rafts, they consume pelagic fish eggs and larvae, small invertebrates associated with the floating algae, and the *Sargassum* itself.

Sub-adults and adults are omnivorous scavengers. Their narrow sharp beaks are well adapted for foraging in crevices of coral reefs and rock outcroppings (Witzell 1983). Witzell (1983) lists dozens of food items consumed by hawksbills throughout their range. They seem to have a preference for benthic invertebrate prey, particularly sponges. Between Cayo Luis Pena and Culebra Island, Puerto Rico, hawksbills forage on sponges inhabiting the coral reefs lining the bottom in 12 to 15 m of water (Vincente and Carballeira 1992). The favorite food was the haplosclerid sponge *Niphates digitalis*. About 75 percent of the sponge in the area showed evidence of grazing by hawksbills. Some hawksbills from the area had been grazing on the sponges *Geodia neptuni* and *Chondrilla nucula*. Eleven hawksbills found stranded on the shores of Puerto Rico contained predominantly desmosponges in their stomachs (Vincente 1994). The most abundant sponges in the hawksbill stomachs were *Chondrilla nucula, Chondrosia collectrix,* and *Geodia* spp. Hawksbills from the coast of Costa Rica have a similar diet (Carr and Stancyk 1975).

There is little information about the growth rates of wild hawksbill turtles. Hawksbills from the southern Bahama Islands grow at a rate of 2.4 to 5.9 cm/y (Bjorndal and Bolten 1988). Adult females in Costa Rica grow at a rate of about 0.3 cm/y (Bjorndal *et al.* 1985). Sub-adult hawksbills from the vicinity of St. Thomas, U.S. Virgin Islands grow at a rate of about 3.36 cm/y (Boulon 1983). As for other marine turtles, 30 or more years may be required for hawksbills to reach sexual maturity (Limpus 1992).

Known Mortality Factors

Hawksbill turtles are subjected to many of the natural and anthropogenic disturbances that other sea turtles in U.S. Atlantic waters are. However, their limited distribution along the east coast of the U.S. subjects them to less involvement with U.S. commercial and recreational fisheries. Strandings of hawksbills are restricted almost exclusively to Florida, Puerto Rico, and the U.S. Virgin Islands (Table 3-7). Total strandings along the Atlantic coast have ranged from 10 to 38 per year since 1988. There was one hawksbill stranding in South Carolina in 1988 and one in Massachusetts in 1989. The disturbances contributing to these strandings are not known but probably are similar to those contributing to strandings of other sea turtle species along the Atlantic coast (Table 3-3).

Hawksbills appear to be unusually vulnerable to ingestion of marine debris, particularly plastics. Plotkin and Amos (1990) reported that 87.5% of hawksbills stranded along the coast of the northwest Gulf of Mexico had ingested marine debris. Nearly 90% of the debris ingested by hawksbills is plastic bags, plastic and styrofoam particles, and tar (Balazs 1985) Six hawksbills that were stranded also were entangled in marine debris or fish nets. Juvenile hawksbills frequently are reported entangled in monofilament gill nets, fishing line, and synthetic rope (Balazs 1985).

Because of the great value of the carapace of hawksbill turtles, called tortoiseshell or bekko, there is a large illegal trade in sub-adult and adult hawksbill turtles, particularly in Puerto Rico, the U.S. Virgin Islands, and the wider Caribbean (NMFS & USFWS 1993). As many as 250,000 hawksbills from the wider Caribbean were slaughtered between 1970 and 1989 for tortoise shell exports to Japan alone (Canin 1989). The primary source of hawksbill mortalities in Puerto Rico waters is believed to be poaching at sea for meat and tortoiseshell (NMFS & USFWS 1993).

Egg poaching also is common in Puerto Rico and the U.S. Virgin Islands (Matos 1987). Although the incidence of poaching has decreased in recent years because of policing of nesting beaches, the loss of eggs from isolated beaches is considered great (NMFS & USFWS 1993).

Vehicular traffic, particularly recreational vehicles, is a serious problem at Sandy Point National Wildlife Refuge in St. Croix, and other hawksbill nesting beaches in the U.S. Virgin Islands and Puerto Rico (Basford *et al.* 1988; NMFS & USFWS 1993). Although the practice is illegal, it continues to be commonplace. Vehicles may compact the sand, making it unsuitable for nest-building, crush emerging hatchlings, create disturbance from noise and headlights that will deter emergence and nesting of adult females, and create ruts in the sand that will make it difficult for hatchlings to migrate to the sea.

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Table 3-1. **Strandings of Loggerhead Turtles *Caretta caretta* along the U.S. Atlantic Coast from 1988 to 1993, all months combined each year. From Teas and Martinez (1989, 1992) and Teas (1992, 1993, 1994).**

State	1988	1989	1991	1992	1993
Florida	504	550	337	354	259
Georgia	160	136	118	121	99
South Carolina	92	76	60	66	82
North Carolina	158	124	107	192	133
Virginia	120	111	91	121	150
Maryland	0	1	13	14	21
Delaware	0	0	0	5	12
New Jersey	18	15	27	27	15
New York	14	5	16	16	12
Connecticut	0	1	0	1	0
Rhode Island	1	1	1	0	0
Massachusetts	5	4	6	17	9
New Hampshire	0	0	0	0	0
Maine	0	0	0	0	0
Puerto Rico	0	0	18	0	1
U.S. Virgin Islands	0	0	0	1	0
Total Atlantic Strandings	1072	1024	801	934	793

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Table 3-2. Temporal pattern of strandings of Loggerhead Turtles *Caretta caretta* along the Atlantic Coast of Florida. From Teas and Martinez (1989, 1992) and Teas (1992, 1993, 1994).

Month	1988	1989	1991	1992	1993	Total
January	23	40	17	3	17	100
February	22	23	14	14	6	79
March	43	19	19	23	24	128
April	36	37	62	58	25	218
May	50	68	52	72	54	296
June	48	32	38	43	48	209
July	42	73	26	34	24	199
August	95	111	27	29	26	288
September	50	48	25	42	17	182
October	31	60	22	19	10	87
November	32	29	14	9	4	88
December	32	10	21	8	4	75
Total	504	550	337	354	259	2004

Table 3-3. Percent incidence of anomalies (not necessarily the cause of death) of turtles (all species) stranded along the U.S. Coasts of the Gulf of Mexico and Atlantic Ocean. From Teas and Martinez (1989, 1992) and Teas (1992, 1993, 1994).

Anomaly	1987	1988	1989	1990	1991	1992	1993
Boat-related injury (prop. or collision	7.3	8.6	8.2	8.7	13.0	10.3	13.5
Carapace damage (unknown cause)	7.3	10.3	9.6	10.4	10.4	12.2	12.2
Plastron damage (unknown cause)	1.3	0.9	1.0	1.2	1.3	2.1	1.5
Skull injuries	2.4	2.4	2.8	2.3	2.1	2.5	2.4
Skull missing	2.1	3.2	3.4	1.8	2.2	3.6	2.1
Skull & flipper(s) comb. missing	7.0	7.4	7.2	7.8	7.0	7.8	5.4
Flipper(s) missing (unknown cause)	4.0	7.7	6.3	6.7	8.0	6.3	5.9
Flipper(s) missing (man-induced)	1.9	0.9	0.3	0.1	0.1	0.2	0.2
Partial flipper damage (unknown cause)	7.9	9.5	7.8	8.0	6.1	8.7	9.1
Bullet wounds	0.8	0.5	0.7	0.5	0.4	0.3	0.3
Apparent shark wounds	1.2	1.0	1.9	2.8	3.2	2.4	2.3
External tumors	1.5	1.3	1.9	2.7	3.3	2.8	2.0
Apparent deliberate mutilation	3.3	3.0	2.8	1.6	1.9	1.8	1.2
Tar or oil impact	0.6	0.2	0.2	0.6	1.1	0.2	0.9
Cold stunning	3.4	0.3	5.3	2.9	2.2	2.4	3.4
Entangled in fishing line	0.7	0.6	1.1	1.0	1.3	1.5	0.8
Entangled in fishing net	0.2	0.3	0.2	0.4	0.6	0.6	0.4
Entangled in non-fishing gear materials	0.3	0.2	0.3	0.6	0.6	0.3	0.4
Rope(s) tied to flippers , neck or body	0.6	0.7	0.4	0.2	0.2	0.1	0.3
Ingested fishing line	0.9	1.1	0.3	1.6	1.4	0.1	1.9
Fish hook in mouth	0.1	0.3	0.3	0.2	0.4	0.2	0.2
Ingested plastic (non-fishing gear)	3.8	4.9	3.2	2.3	5.8	3.8	3.9
Fishing hook in gut	0.8	0.7	0.0	1.8	1.2	1.3	3.0

Table 3-4. Strandings of Kemp's Ridley Turtles *Lepidochelys kempi* along the U.S. Atlantic Coast from 1988 to 1993, all months combined each year. From Teas and Martinez (1989, 1992) and Teas (1992, 1993, 1994).

State	1988	1989	1991	1992	1993
Florida	68	15	14	2	10
Georgia	37	21	26	11	37
South Carolina	6	4	5	6	5
North Carolina	11	2	6	12	29
Virginia	13	5	6	14	17
Maryland	0	0	1	0	1
Delaware	0	0	0	1	0
New Jersey	0	1	3	1	4
New York	2	12	10	7	4
Connecticut	0	0	0	0	0
Rhode Island	0	0	0	0	0
Massachusetts	4	26	11	9	36
New Hampshire	0	0	0	0	0
Maine	0	0	0	0	0
Puerto Rico	0	0	0	0	0
U.S. Virgin Islands	0	0	0	0	0
Total Atlantic Strandings	141	86	82	63	143

Table 3-5. Strandings of Leatherback Turtles *Dermochelys coriacea* along the U.S. Atlantic Coast from 1988 to 1993, all months combined each year. From Teas and Martinez (1989, 1992) and Teas (1992, 1993, 1994).

State	1988	1989	1991	1992	1993
Florida	26	27	24	17	15
Georgia	2	5	36	11	5
South Carolina	1	12	11	34	12
North Carolina	1	9	6	7	13
Virginia	3	3	5	7	3
Maryland	0	0	0	1	0
Delaware	0	0	0	1	1
New Jersey	7	3	11	5	28
New York	14	11	24	9	28
Connecticut	0	0	1	0	2
Rhode Island	1	7	11	9	13
Massachusetts	13	0	5	8	5
New Hampshire	0	0	0	0	0
Maine	0	1	0	0	0
Puerto Rico	0	1	1	1	0
U.S. Virgin Islands	1	0	0	1	0
Total Atlantic Strandings	69	79	135	111	125

Table 3-6. Strandings of Green Turtles *Chelonia mydas* along the U.S. Atlantic Coast from 1988 to 1993, all months combined each year. From Teas and Martinez (1989, 1992) and Teas (1992, 1993, 1994).

State	1988	1989	1991	1992	1993
Florida	121	173	155	123	118
Georgia	5	2	1	1	1
South Carolina	0	2	1	2	0
North Carolina	20	14	4	28	10
Virginia	2	2	0	0	2
Maryland	0	0	0	0	0
Delaware	0	0	0	0	0
New Jersey	0	0	0	0	1
New York	0	0	1	1	0
Connecticut	0	0	0	0	0
Rhode Island	0	0	0	0	0
Massachusetts	0	1	1	1	0
New Hampshire	0	0	0	0	0
Maine	0	0	0	0	0
Puerto Rico	3	1	18	11	3
U.S. Virgin Islands	2	5	7	5	3
Total Atlantic Strandings	153	200	188	172	138

Table 3-7. Strandings of Hawksbill Turtles *Eretmochelys imbricata* Along the U.S. Atlantic Coast from 1988 to 1993, all months combined each year. From Teas and Martinez (1989, 1992) and Teas (1992, 1993, 1994).

State	1988	1989	1991	1992	1993
Florida	7	6	17	5	19
Georgia	0	0	0	0	0
South Carolina	1	0	0	0	0
North Carolina	0	0	0	0	0
Virginia	0	0	0	0	0
Maryland	0	0	0	0	0
Delaware	0	0	0	0	0
New Jersey	0	0	0	0	0
New York	0	0	0	0	0
Connecticut	0	0	0	0	0
Rhode Island	0	0	0	0	0
Massachusetts	0	1	0	0	0
New Hampshire	0	0	0	0	0
Maine	0	0	0	0	0
Puerto Rico	1	1	6	30	5
U.S. Virgin Islands	3	2	2	3	0
Total Atlantic Strandings	12	10	25	38	24

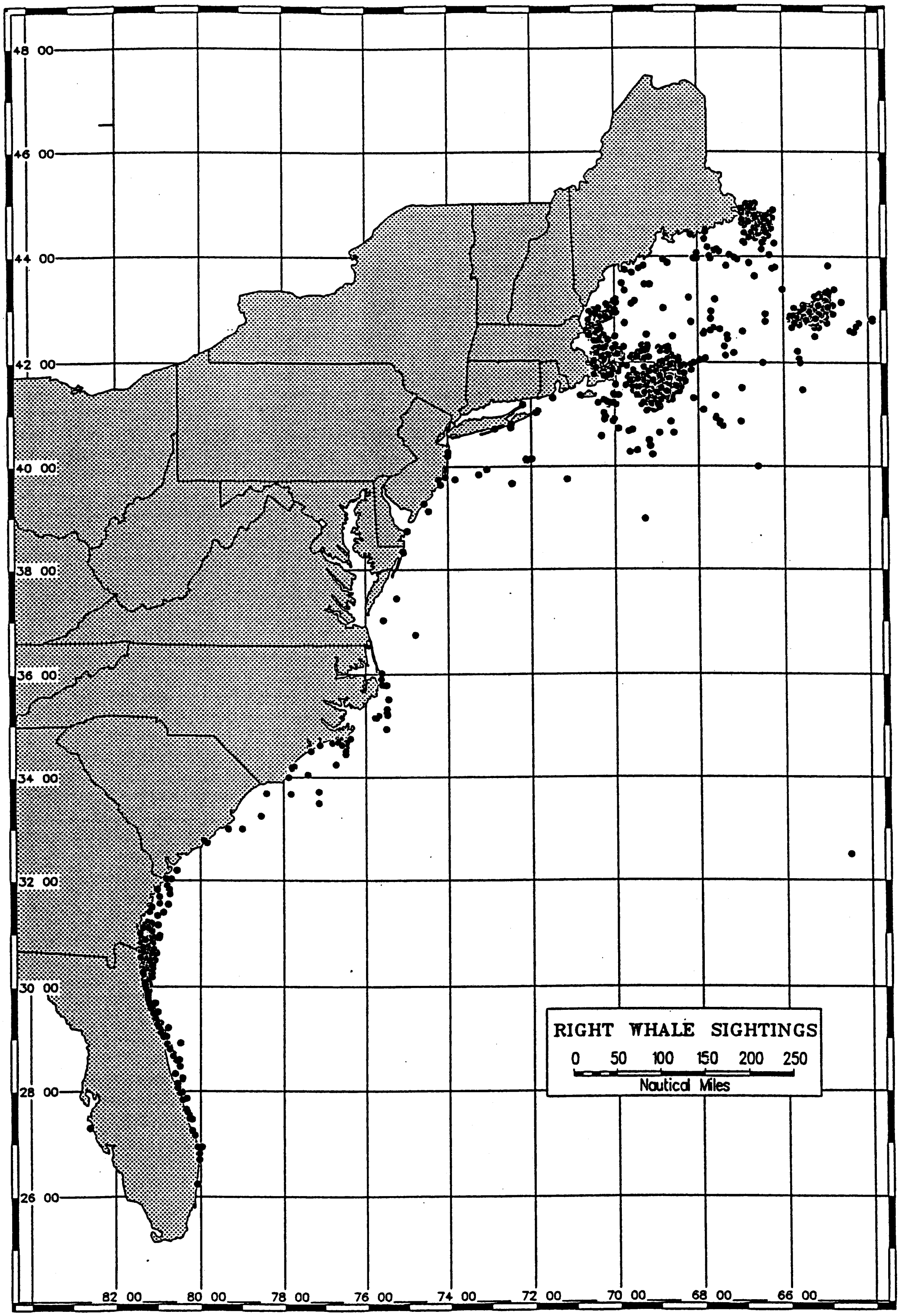

Figure 3-1. Cumulative sightings, 1960-1992, of Right whales along the East Coast of the United States

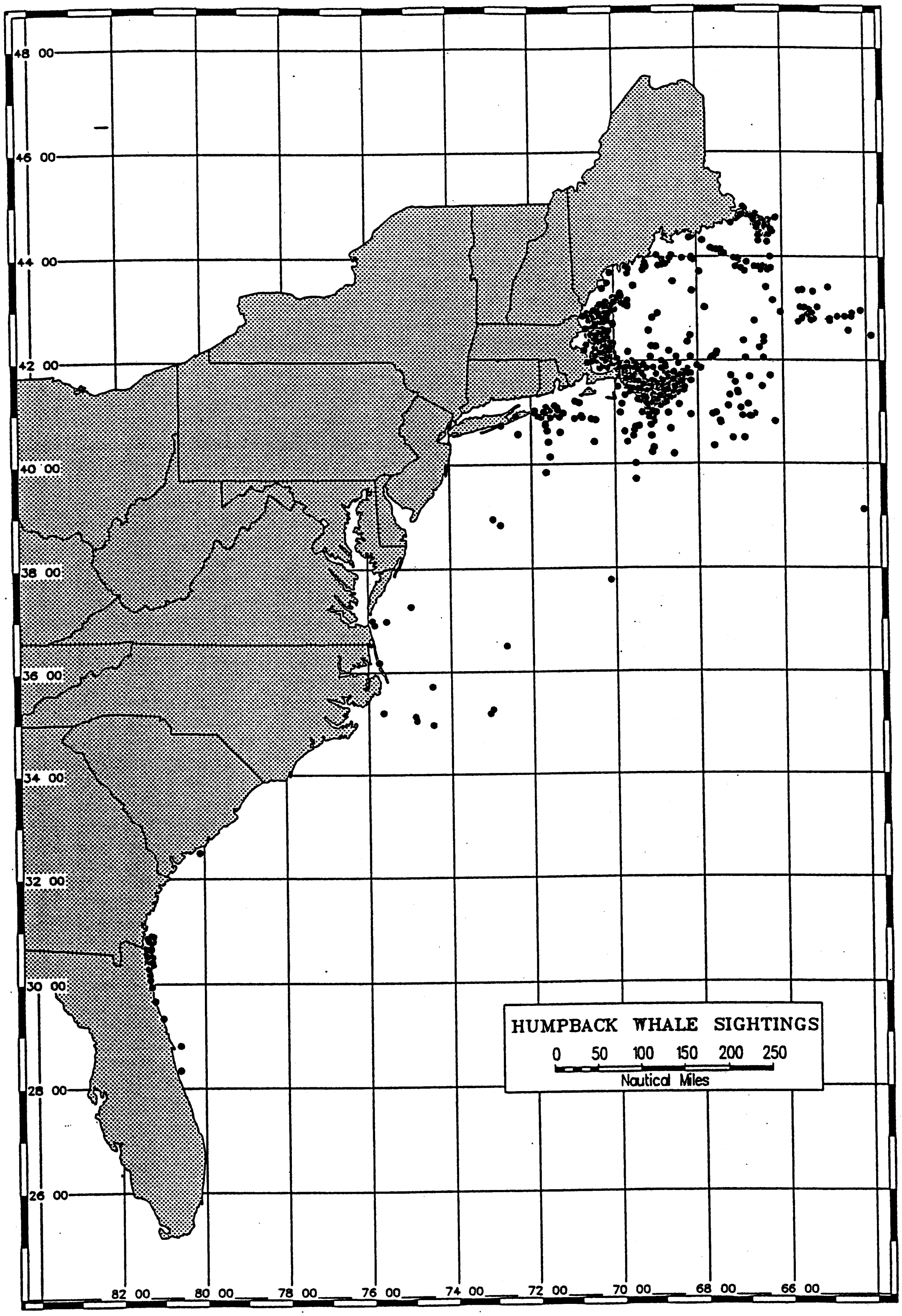

Figure 3-2. Cumulative sightings, 1960-1992, of Humpback whales along the East Coast of the United States

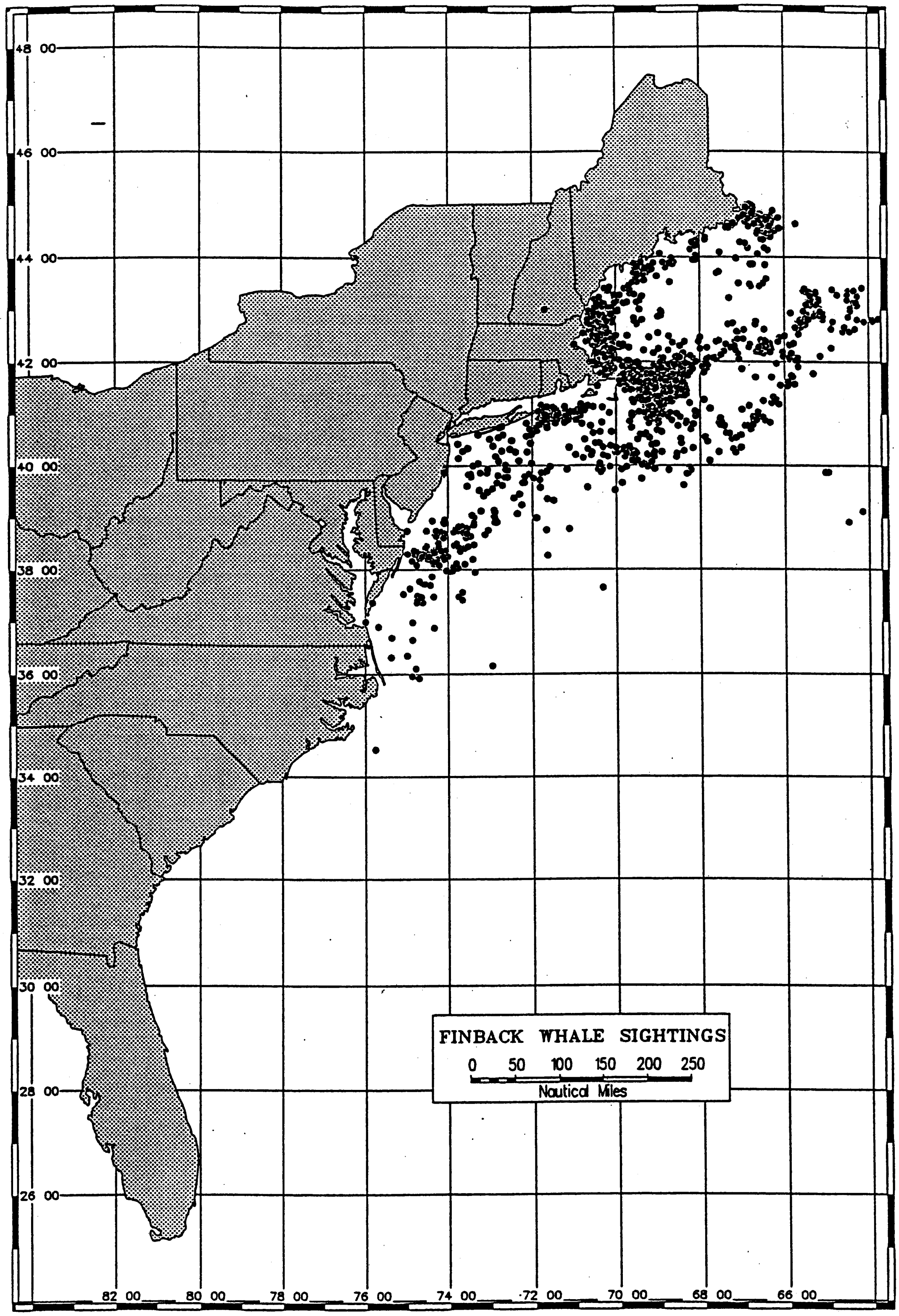

Figure 3-3. Cumulative sightings, 1960-1992, of Finback whales along the East Coast of the United States

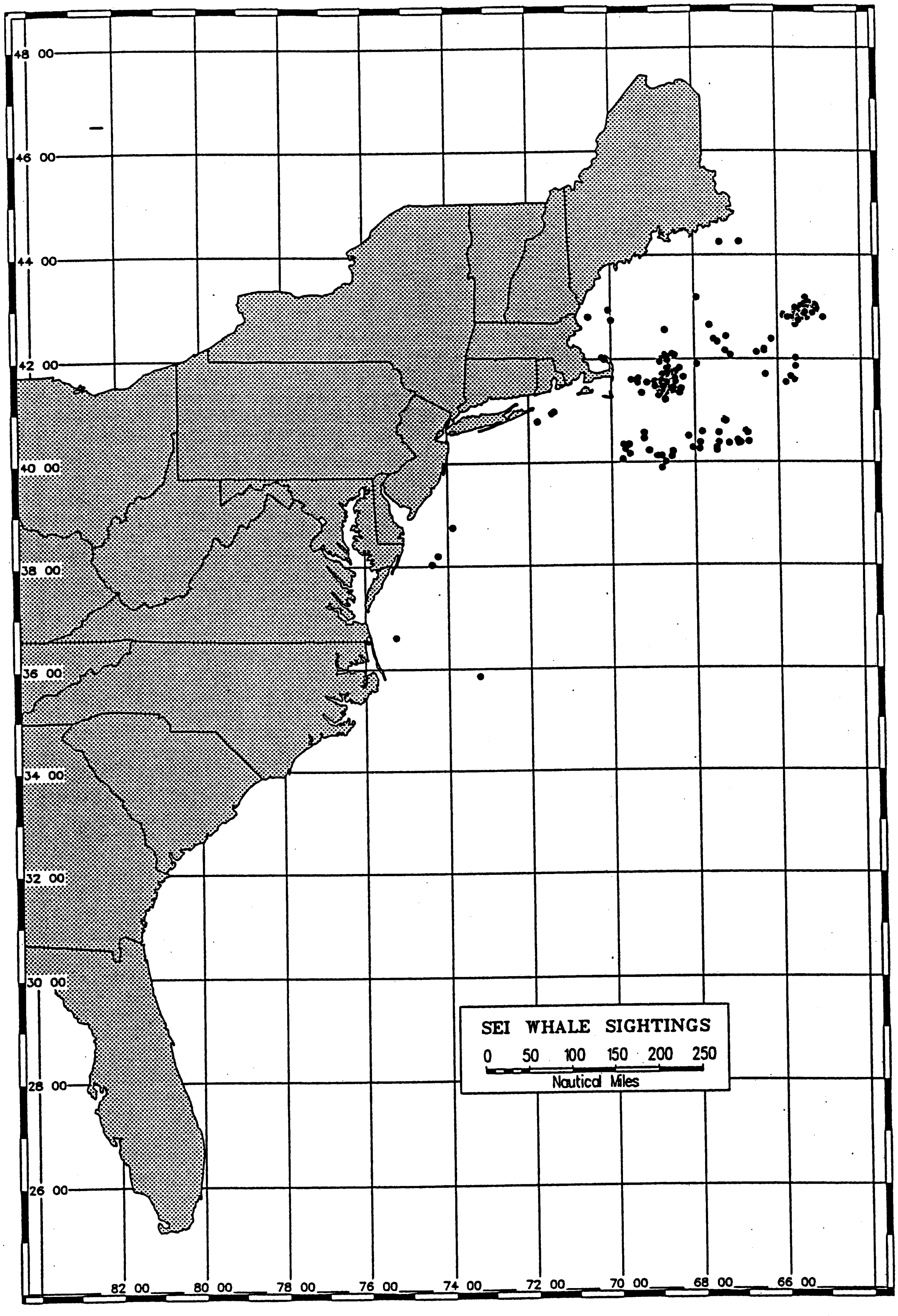

Figure 3-4. Cumulative sightings, 1960-1992, of Sei whales along the East Coast of the United States

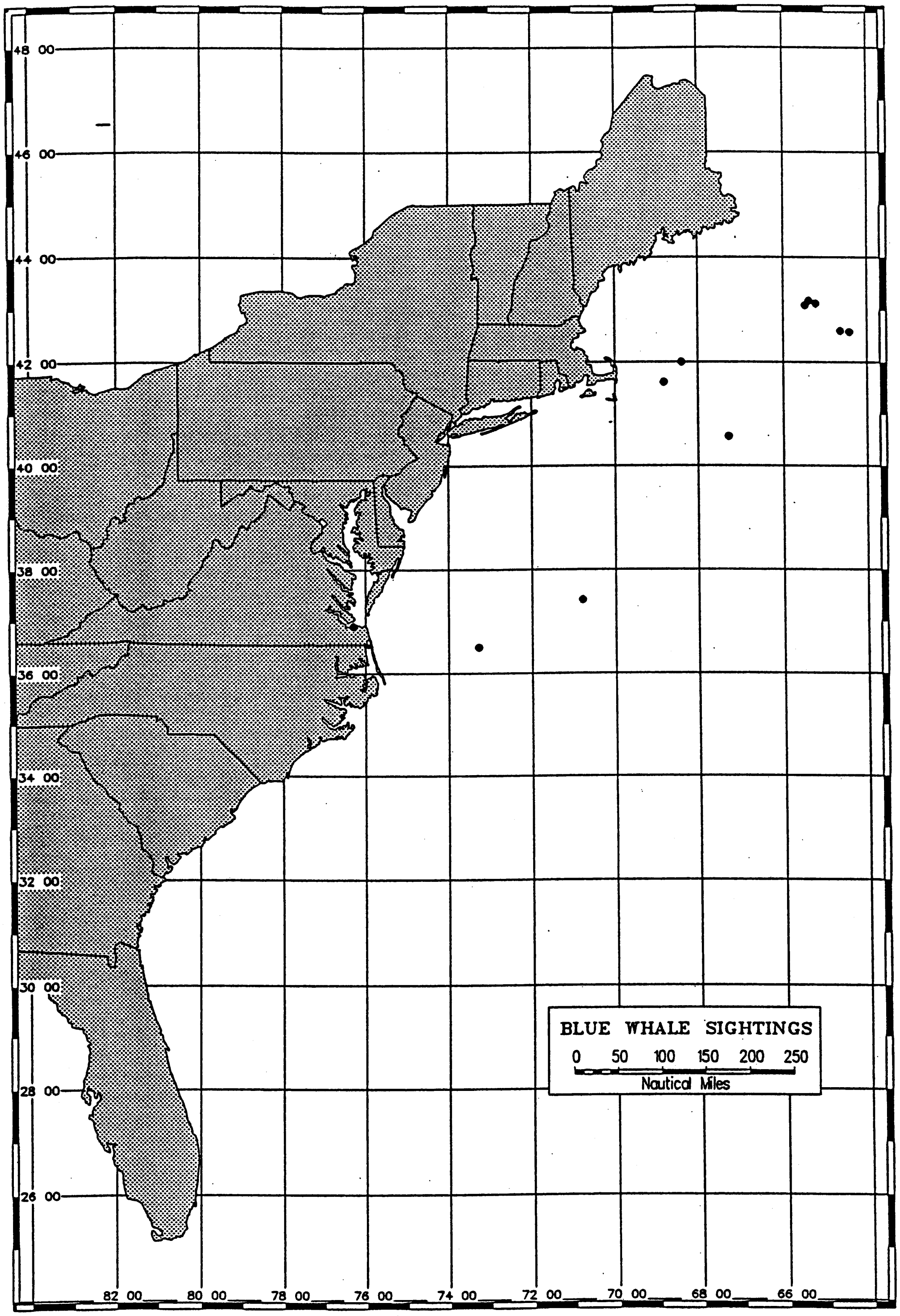

Figure 3-5. Cumulative sightings, 1960-1992, of Blue whales along the East Coast of the United States

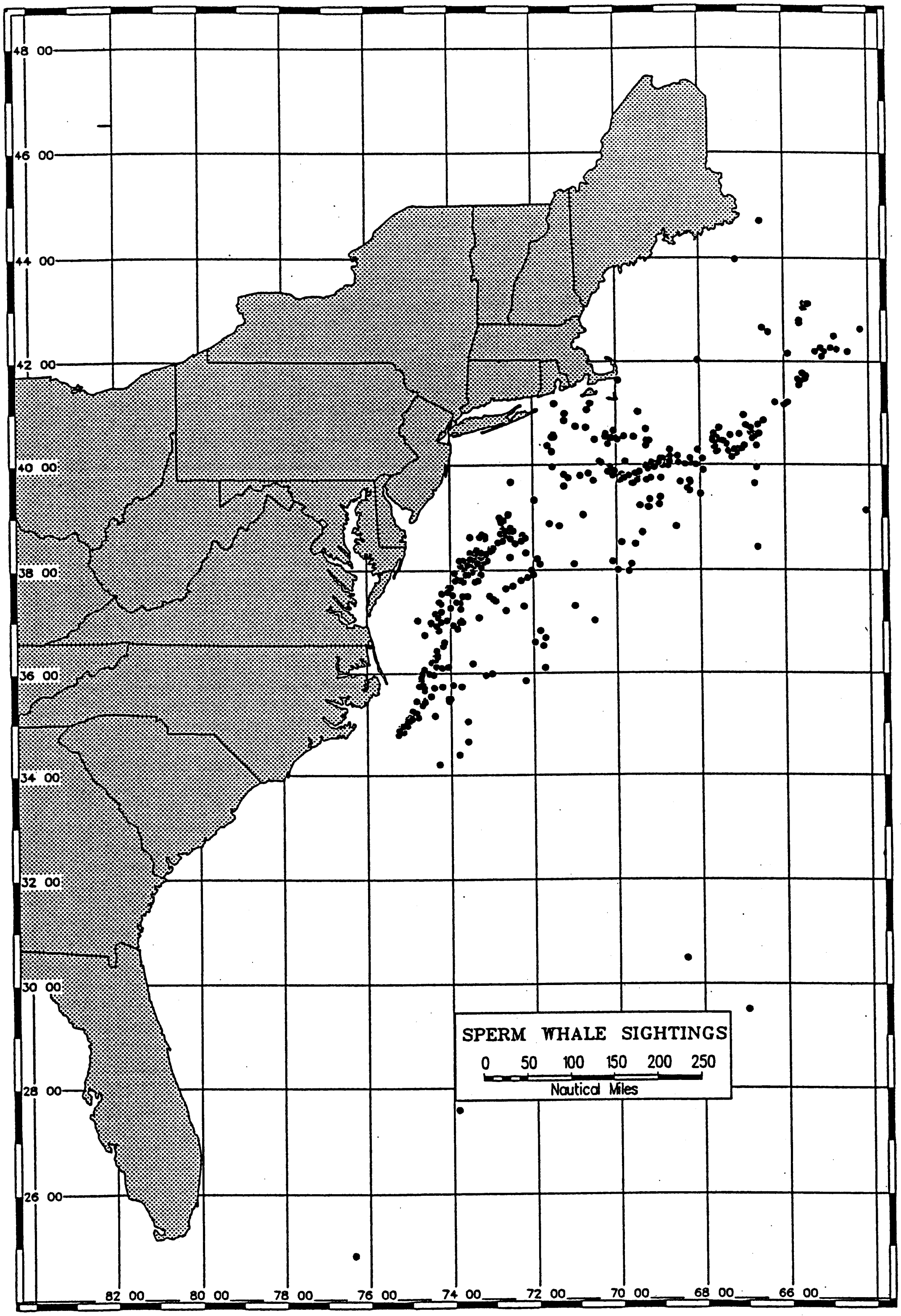

Figure 3-6. Cumulative sightings, 1960-1992, of Sperm whales along the East Coast of the United States

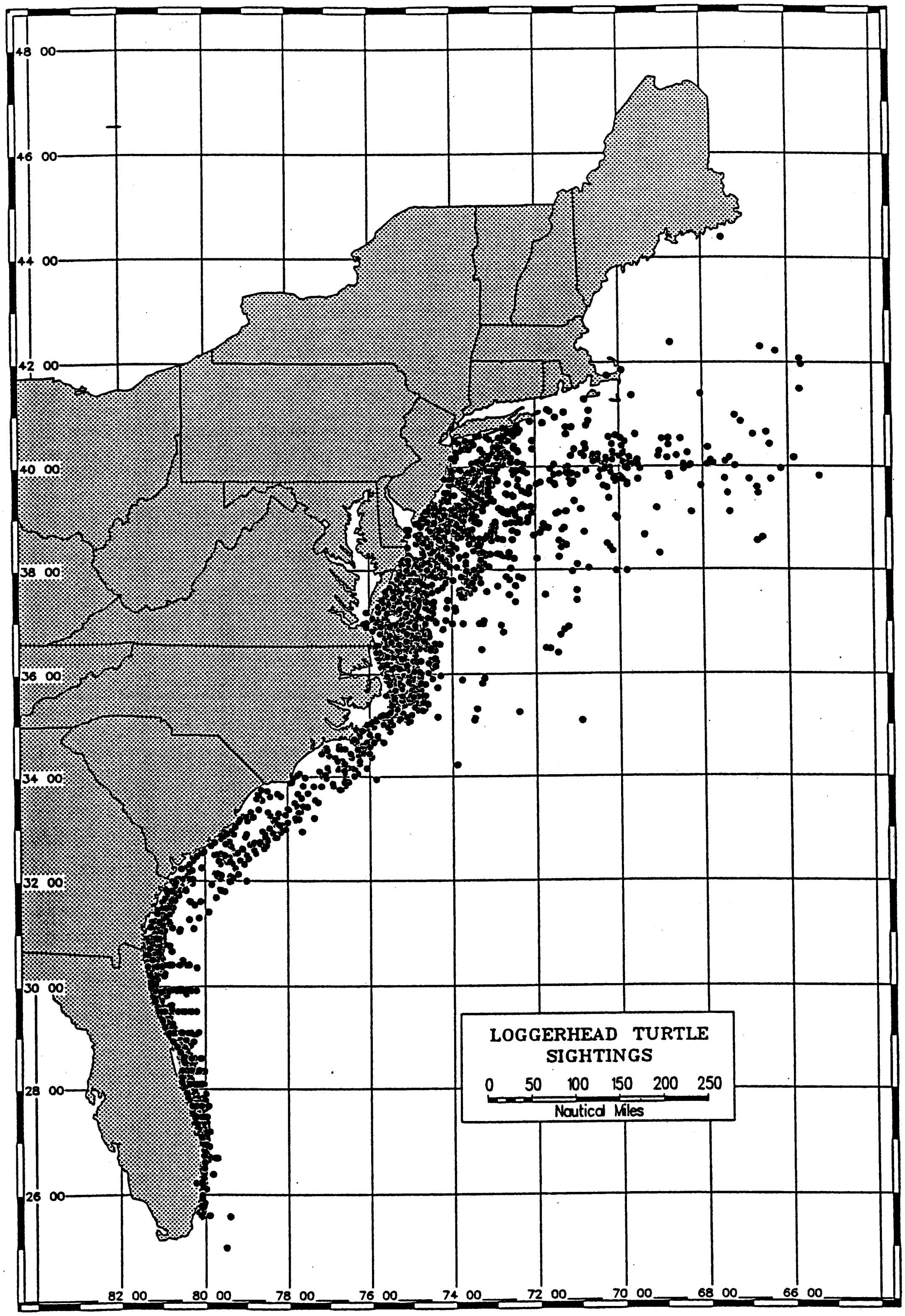

Figure 3-7. Cumulative sightings, 1960-1992, of Loggerhead turtles along the East Coast of the United States

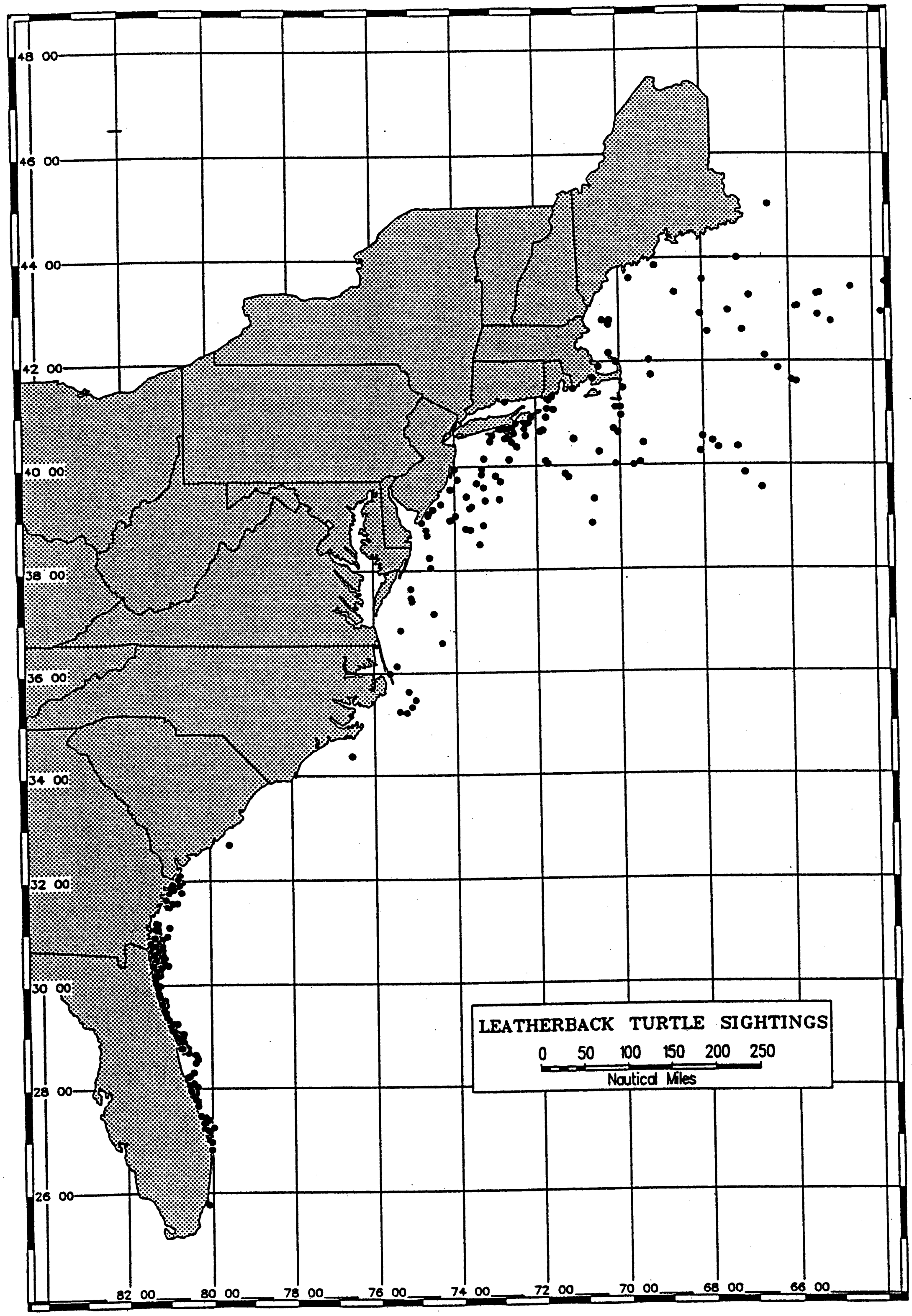

Figure 3-8. Cumulative sightings, 1960-1992, of Leatherback turtles along the East Coast of the United States

U.S. COAST GUARD MISSIONS

As one of America's five Armed Forces, the United States Coast Guard is a versatile military service tasked with the following missions:

- Enforce or assist in the enforcement of all applicable Federal laws on, under, and over the high seas and waters subject to the jurisdiction of the United States;
- Engage in maritime air surveillance or interdiction to enforce or assist in the enforcement of the laws of the United States;
- Administer laws and promulgate and enforce regulations for the promotion of safety of life and property on and under the high seas and waters subject to the jurisdiction of the United States, covering all matters not specifically delegated by law to some other executive department;
- Develop, establish, maintain, and operate, with due regard to the requirements of national defense, aids to maritime navigation, icebreaking facilities, and rescue facilities for the promotion of safety on, under and over the high seas and waters subject to the jurisdiction of the United States;
- Engage in oceanographic research of the high seas and in waters subject to the jurisdiction of the United States;
- Maintain a state of readiness to function as a specialized service in the Navy in time of war, including the fulfillment of Maritime Defense Zone command responsibilities;
- Establish and maintain a coordinated environmental program and a comprehensive ports and waterways system, including all aspects of marine transportation.

U.S. COAST GUARD ORGANIZATION

The basic organization pattern of the Coast Guard reflects an assignment of military command and control with both operational and administrative responsibility and authority among components in Coast Guard Headquarters, Areas, Districts Command, Maintenance and Logistics Commands, and individual units in the field. Duties of the Coast Guard are, in most instances, actually performed by individual operating units such as ships, groups, stations, air stations, and marine safety offices.

The field chain of command is from the Commandant to the Area Commanders, from the Area Commanders to the District Commanders to the Commanding Officer or Officer-in-Charge of an individual operating or logistics unit.

U.S. COAST GUARD ACTIVITIES POSSIBLY RESULTING IN INTERACTIONS WITH ENDANGERED WHALES AND SEA TURTLES

Performance of several of the routine USCG activities along the Atlantic coast of the United States may result in risk of a harmful interaction with one or more species of the endangered or threatened whales and sea turtles described in Chapter 3 of this BA. In addition, performance of some of these activities provides the USCG with an opportunity to aid in the protection and recovery of local populations of these endangered or threatened marine animals. A brief description of those activities most likely to result in positive or negative interactions between the USCG and whales or sea turtles is provided below. A more detailed description is provided in Appendix A. This description focuses on activities of three USCG Districts on the Atlantic coast of the United States. These Districts are:

- First District (Boston, MA) - Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, and New Jersey south to Toms River;
- Fifth District (Portsmouth, VA) - New Jersey from Toms River south, Delaware, Maryland, Virginia, North Carolina;
- Seventh District (Miami, FL and San Juan, PR) - South Carolina, Georgia, Florida (Atlantic and Gulf of Mexico coasts), Puerto Rico, U.S. Virgin Islands.

Coastal and near-shore engineering projects planned and implemented by the USCG may alter critical habitat for endangered whales or sea turtles, or may directly affect the behavior or survival of protected species. Under the National Environmental Policy Act of 1969 (NEPA), the USCG is required to perform an environmental assessment (EA) for all major construction, repair, and maintenance projects performed in areas important to endangered or threatened species, unless a waiver from such a requirement is obtained because of extenuating environmental circumstances. Some coastal states may also impose planning requirements on engineering projects in the coastal zone, including construction or repair permits that may include special requirements for protection of endangered species and their habitats.

Marine pollution response and marine safety activities along the Atlantic coast of the U.S., including Puerto Rico and the U.S. Virgin Islands, are performed primarily by USCG personnel at twelve Marine Safety Offices (MSO) and two Captain of the Port (COTP) Offices in the Atlantic coast states. The Atlantic coast offices are:

MSO Portland, ME
MSO Boston, MA
MSO Providence, RI
COTP Long Island Sound, NY
COTP New York, NY
MSO Philadelphia, PA
MSO Baltimore, MD
MSO Hampton Rhodes, VA
MSO Wilmington, NC
MSO Charleston, SC
MSO Savannah, GA
MSO Jacksonville, FL
MSO Miami, FL
MSO San Juan, PR

Each MSO and COTP has access to an inventory of several small boats, and emergency pollution equipment.

The marine environmental protection program includes: the MSOs, the National Strike Force (NSF), composed of three teams of experts that have been trained and equipped to respond to a wide variety of environmental emergencies; multi-mission Coast Guard cutters and aircraft that provide a variety of platforms for surveillance, detection, and response; and the National Response Center (NRC) which functions as a link between reports of pollution and the USCG or EPA federal on-scene coordinator (FOSC) who is responsible for evaluating and responding to pollution incidents. In 1993, the marine environmental protection program of the USCG responded to 2,541 oil spill incidents and 113 spills of hazardous chemicals along the Atlantic coast of the United States.

As required by the Oil Pollution Act of 1990 (OPA 90), the USCG prepares Area Contingency Plans (ACPs) for the coastal zone and all nearshore waters of the United States. The ACPs are prepared by Area Committees, chaired by the FOSC (USCG). In preparing the ACPs, the Area Committees, NOAA, USFWS, state fish and wildlife agencies in the USCG district, state natural resource trustees, and other agencies with responsibilities for coastal zone management and protection should actively collaborate in the Area Committee process.

The ACPs describe the methods and resources that will be used to combat spills of oil and hazardous materials in coastal waters and protect sensitive habitats from harm. They identify environmental sensitivities within each area and establish priorities and strategies for response based on those sensitivities. Each Area Committee identifies sensitive habitats of three types requiring protection:

- Fish and wildlife habitat areas;
- Sensitive habitats (e.g., habitats that may be slow to recover from a spill); and
- Human high-use areas.

The first two categories include habitats, including critical habitats, of endangered or threatened whales and marine turtles. Identification and siting of these habitats is requested from the responsible agencies during the Area Committee planning process.

Sensitive areas are mapped and natural collection sites, boom sites, and specific response strategies for different types of spilled materials in or near these areas are included on the maps. The maps also show all possible locations of endangered/threatened species (e.g., critical habitat for right whales, nesting beaches for loggerhead turtles, etc.) in as much detail as practical.

The USCG also is responsible for enforcing the resolutions of MARPOL 73/78 Annex V concerning dumping of garbage from vessels and platforms at sea. To promote compliance with this international treaty, the USCG has developed a strategy of progressive education and aggressive enforcement. Floating trash, particularly plastic debris, is a substantial contributor to injury and death of all five species of endangered/threatened sea turtles in the Atlantic. Strict enforcement of the MARPOL regulations will go a long way to aid in the recovery of these turtle populations.

The principal responsibilities of the USCG with respect to marine safety are to:

- Establish and enforce federal policies and standards for the design, construction, equipment, manning, operation, and maintenance of commercial vessels, and to qualify their crews;
- Develop standards for handling hazardous materials onboard vessels and marine facilities;
- Negotiate international maritime safety standards on behalf of the U.S.; and
- Assure compliance of U.S. vessels with domestic and international standards (flag-state responsibilities) and compliance by all vessels and regulated facilities in U.S. ports and waters (port-state responsibilities) through a combination of education, monitoring, and enforcement.

The compliance and response functions of the USCG along the U.S. Atlantic coast are performed by personnel stationed at the 12 MSOs and two COTPs on the east coast. Each year, in the Atlantic area, the USCG monitors:

- 140,000 U.S. commercial vessels (mostly uninspected fishing vessels)
- 8,100 foreign vessels calling at U.S. ports
- 3,500 waterfront facilities
- 3,800 offshore platforms (mostly oil/gas production platforms in the Gulf of Mexico)
- 200,000 licensed and documented merchant mariners
- 238,000 documented U.S. commercial and recreational vessels.

The four primary field activities performed by the USCG in the area of marine safety and security are:

- **Vessel Boardings**. Boardings are performed to verify and enforce compliance with a wide variety of statutes, regulations, and international requirements.
- **Anchorage Administration.** The USCG designates anchorages in ports and coastal waters for vessels of different types and for different designated uses and enforces anchorage regulations.
- **Harbor Patrols.** The USCG performs harbor patrols in vessels or on land for detection, deterrence, and prevention of marine casualties through enforcement of safety and pollution prevention regulations.
- **Marine Events**. The USCG issues permits for and monitors marine events, such as regattas and boat races, enforcing safety regulations and ensuring that these events do not have a significant adverse effect on endangered or threatened species in the area.

The USCG employs a wide variety of fixed-wing and rotary aircraft throughout its mission area. Long-range and medium-range surveillance missions are performed by HC-130 Hercules and HU-25 Guardian fixed-wing aircraft, respectively. Ordinarily, these aircraft operate at altitudes greater than 500 ft. However, they may perform reconnaissance missions in support of the FOSC in oil and hazardous materials spill response operations at altitudes below 500 ft. Fixed-wing aircraft may also operate at low altitude during drops of rescue or emergency equipment or to identify a vessel. Small, two-seater aircraft, the RG-8, are used for short-range patrols. The USCG operates 17 fixed-wing aircraft in the Atlantic area. Ninety-five percent of USCG air missions are within 20 miles from shore, but some may extend out to the edge of the exclusive economic zone (EEZ) or beyond..

Two helicopters, the HH-60J Jayhawk and the HH-65A Dolphin, perform medium- and short-range recovery missions. The USCG operates 32 helicopters in the Atlantic area. During search and rescue operations, the helicopters often must fly below 500 ft. Recovery of people from the water or delivery of rescue equipment often requires flying and hovering at even lower altitudes. These low-level operations are kept to a minimum because of safety concerns. Commanding officers are required to take necessary steps to prevent unnecessary flying over known habitats of wildlife, including endangered species. An altitude of at least 3,000 ft should be maintained while flying over such habitats, if it is not detrimental to the mission.

The 17 fixed-wing aircraft and 32 helicopters in the Atlantic area performed more than 21,000 sorties in 1993. Most sorties were flown out of the 7th USCG District (12,233), followed by the 1st District (5,303), and the 5th District (3,486).

The USCG is the nation's leading maritime law enforcement agency. In this role, it coordinates its activities with other federal, state and local law enforcement agencies, and with international law enforcement agencies. The Enforcement of Laws and Treaties (ELT) Program focuses primarily on protecting fisheries and other living marine resources, combating illicit drug trafficking, and interdicting illegal migrants at sea. In performance of its law enforcement mission, the USCG utilizes a wide variety of water craft ranging from small inflatable boats to 378-ft cutters. Fixed-wing aircraft and helicopters also are used. USCG resources are supplemented by U.S. naval ships and smaller vessels, various shore-based sensor systems, interagency communications systems, and support personnel.

In performing its law enforcement responsibilities, the USCG routinely:

- Patrols with cutters and aircraft to perform surveillance and identify potential violators of the law;
- Intercepts and boards suspected violators; and
- Performs random interceptions and boardings of boats and vessels to maintain an effective deterrent.

In the area of living marine resources, the role of the USCG is to provide law enforcement support that ensures compliance with laws and regulations intended to support the conservation and management of the living marine resources of the U.S. The USCG shares enforcement responsibility in this area with the National Marine Fisheries Service (NMFS). The USCG has authority to perform law enforcement activity on the high seas and waters subject to U.S. jurisdiction for the prevention, detection, and suppression of violations of U.S. law, as well as to provide support to NMFS to meet its management goals for protected marine mammals and sea turtles. The USCG and NMFS are equally responsible for enforcing legal requirements of the Endangered Species Act. Enforcement activities performed by the USCG include:

- Patrolling the perimeter of the U.S. EEZ to prevent encroachment and harvesting of U.S. marine resources, including endangered species and products made from them, by foreign commercial fishing vessels;
- Patrolling within the EEZ to ensure that U.S. fishing vessels comply with fishery resource management regulations, such as use of turtle exclusion devices (TEDs) in shrimp trawls;
- Protecting anadromous fish (e.g., salmon) originating in U.S. territory throughout their migratory range, including areas of the high seas outside the EEZ; and
- Patrolling areas of the high seas beyond the EEZ to monitor compliance of U.S. and foreign fishing vessels with international agreements (e.g., the UN moratorium on large-scale high-seas pelagic drift net fishing).

As part of its enforcement authority, the USCG is expected to participate in the enforcement of provisions of several federal statutes, including:

- The Marine Mammal Protection Act (16 USC 1361, et seq.);
- The Endangered Species Act (16 USC 1536, et seq.);
- The Whaling Convention Act (16 USC 916, et seq.); and
- The Magnuson Fishery Conservation and Management Act of 1986, as amended (16 USC 1801, et seq.)

as well as other federal and international regulations dealing with the protection of threatened or endangered species of marine animals and their critical habitats. Each USCG district has developed an ESA guide that describes methods that will be used to protect and aid in the recovery of endangered and threatened species in that district. Appendix B comprises these directives for U.S. Coast Guard Districts One, Five, and Seven (geographically these three districts cover all Coast Guard operations off the Atlantic coast).

Under the statutory authority of Title 14, Sections 2, 88, and 141 of the U.S. Code, the USCG develops, establishes, maintains, and operates search and rescue (SAR) facilities and may render aid to distressed persons and protect and save property on and under the high seas and waters subject to the jurisdiction of the U.S. The USCG may also use its SAR resources to assist other Federal and State entities.

Over 90% of all SAR cases involve a disabled or endangered vessel in a known position in need of assistance. The Coast Guard response vessel or aircraft proceeds to the appropriate position at "maximum safe speed" (defined with regards to personnel safety) and provides the appropriate assistance that usually involves towing the vessel back to port at the most economical speed. Most USCG search and rescue vessels have a maximum speed of 25 kts or higher, a towing speed of 8 to 10 kts, and a cruising speed of 15 to 20 kts.

SAR cases occur all along the east coast of the US, with 95% of these cases occurring within 20 miles of shore; 90% of SAR cases are non-emergent in nature, meaning that USCG resources need not respond at "maximum safe speed" or even directly to the incident.

The remaining 10% of SAR missions involve searching for a lost or unlocated vessel. In these cases, the SAR operation usually involves an area search. Vessels and aircraft are deployed to a specific area to "search" the area along specified search patterns. Strict adherence to the optimal search pattern is required to maximize finding the missing vessel or person(s); therefore, the USCG can not ordinarily divert from the designated search pattern to avoid a protected area.

USCG resources for SAR operations performed throughout the U.S. include:

- A network of 42 USCG Groups. Several are combinations of Group/Air Station or Group/MSO that are managed by the other program;
- A network of 163 USCG Stations. These units are multi-mission units, performing the SAR program mission in addition to many other USCG program missions;
- More than 1,700 standard and non-standard small boats (16 to 52 ft) used to provide immediate response to mariners in distress;
- An extensive VHF-FM, MF, and HF communications network for distress alerting and response coordination;
- A command and control system consisting of Area and District Rescue Coordination Centers, Section Rescue Sub-Centers, and Group operation centers;
- Personnel assigned to Groups/Stations and district staff functions supporting these activities; and
- Three operational computer systems to aid in implementing various aspects of the SAR program, including: a Computerized Assisted Search Planning (CASP) system; the automated Mutual Vessel Reporting (AMVER) system; and the COSPAS-SARSAT Emergency Position Indicating Radio Beacon (EPIRB) system.

The USCG operates 82 small boat units along the U.S. Atlantic coast (Table 4-1, Figure 4-1) Many of these vessels are shared with other USCG operational programs. There are 35 small boat units in the First District, 32 in the Fifth District, and 15 in the Seventh District. The USCG also has 100 Coast Guard cutter boats stationed at 38 home ports along the U.S. Atlantic coast (Table 4-2). Most of the patrol boats are stationed in the First District. The USCG Atlantic fleet includes about 244 vessels ranging in length from 21 feet to 378 feet (Table 4-3). Many of the vessels are under way on SAR sorties or other at-sea activities for more than 100 days per year. The total SAR sortie activity for the USCG in the Atlantic Ocean and adjacent coastal waters in 1993 amounted to 164,741.8 hours. Most SAR sorties in boats occurred in the Seventh District (83,140.6 hours), followed by the First District (42,462.7 hours), and the Fifth District (39,138.5 hours). Aircraft operations in support of SAR showed a similar distribution with 12,233 sorties in the Seventh District, 5,303 sorties in the First District, and 3,486 sorties in the Fifth District.

The Coast Guard maintains several thousand aids to navigation along the Atlantic coast. These aids include large, shore-based lighthouses with fog signals, deep water moored buoys, small single-pile structures, and unlighted buoys in shallow water. Aids to navigation provide the navigational signals needed by commercial and recreational vessels to navigate inshore and oceanic waterways safely (keeping vessels in designated channels and away from shoal areas, navigational hazards, and protected habitats).

Operation and servicing of aids to navigation along the U.S. Atlantic coast currently are performed from 25 sea-going, coastal, inland construction, and inland buoy tenders. Additional aids to navigation work is performed by 28 Aids to Navigation teams operating boats (21' to 55') from shore-based facilities. These operations are performed along the Intercoastal Waterway, and from the inner harbor of navigable ports out to the sea buoy which often is several miles off shore. The majority of work is conducted in water less than 50 feet deep. Maintenance of the aids to navigation includes a routine servicing visit of one to two hours once a year, or more often if the aid is compromised (extinguished light, off assigned position, buoy struck, etc.). Buoy tenders also assist with search and rescue, environmental cleanup, and other "multi-missions". Sea-going buoy tenders assist NOAA in servicing 19 weather buoys operated by the NDBC, some of which are located 100 miles off shore.

In consultation with the International Maritime Organization (IMO), the USCG is responsible for the vessel routing and traffic separation scheme (TSS) in U.S. waters. TSSs are used to improve the safety of navigation in converging areas and in areas where the density of traffic is great or where freedom of movement of shipping is inhibited by restricted searoom, by the existence of obstructions to navigation, by limited depths, or by unfavorable meteorological conditions. TSSs may also be used to prevent or reduce the risk of pollution, harm to endangered species, or other damage to the marine environment from ship collisions or groundings in coastal areas and critical marine habitats.

The Vessel Traffic Services (VTS), operated by the USCG are the eyes and ears of the port. VTS is usually is the first to hear about or detect anything out of the ordinary. It then uses its suite of communications equipment to report the incident to the responsible authority or to the mariner for trip planning. It also has the sensors to monitor or manage appropriate responses to the incident. The Vessel Traffic Program does not actively operate vessels of any type. It does, however, advise mariners on hazards to navigation. On the east coast of the U.S., the Coast Guard operates one VTS, located for vessel traffic in New York harbor and its approaches from the sea.

NAVTEX transmitters are located in Boston, MA, Portsmouth, VA, and Miami, FL.
The NAVTEX system is a maritime radio warning system consisting of a series of coastal stations transmitting radioteletype safety messages on the international-standard, medium-frequency (518 kHz). Each station has a range of 100 to 500 NM day and night. NAVTEX coverage is reasonably continuous to 200 NM offshore. Information included in NAVTEX transmissions includes distress, urgent, and safety messages, gale, storm, and hurricane warnings, and offshore marine weather forecasts. Recently, the NAVTEX system has been used during the calving season (winter) to broadcast sightings of all right whales, including mothers with calves, along the southeast U.S. coast. Routine messages normally are broadcast four to six times daily; urgent messages are broadcast upon receipt, unless an adjacent station is already transmitting.

Table 4-1. U.S. Atlantic Coast cities hosting USCG small boat units for search and rescue missions.

First District	Fifth District	Seventh District
Eastport, ME	Barnegat Light, NJ	Georgetown, SC
Jonesport, ME	Beach Haven, NJ	Charleston, SC
Southwest Harbor, ME	Atlantic City, NJ	Tybes, GA
Rockland, ME	Great Egg, NJ	St. Simon Island, GA
Boothbay Harbor, ME	Townsends Inlet, NJ	Mayport, FL
South Portland, ME	Cape May, NJ	Ponce de Leon Inlet, FL
Portsmouth Harbor, NH	Fortescue, NJ	Port Canaveral, FL
Merrimac River, MA	Salem, NJ	Fort Pierce, FL
Gloucester, MA	Philadelphia, PA	Lake Worth Inlet, FL
Boston, MA	Roosevelt Inlet, DE	Fort Lauderdale, FL
Point Allerton, MA	Indian River Inlet, DE	Miami Beach, FL
Scituate, MA	Ocean City, MD	Islamarada, FL
Cape Cod Canal, MA	Crisfield, MD	Marathon, FL
Provincetown, MA	Taylors Island, MD	Key West, FL
Chatham, MA	Stillpond, MD	San Juan, PR
Woods Hole, MA	Curtis Bay, MD	
Menemsha, MA	St. Inigoes, MD	
Castle Hill, RI	Chincoteague, VA	
Point Judith, RI	Parramore Beach, VA	
Fishers Island, CT	Cape Charles, VA	
New London, CT	Milford Haven, VA	
New Haven, CT	Portsmouth, VA	
Block Island, NY	Little Creek, VA	
Montauk, NY	Coinjack, NC	
Shinnecock, NY	Oregon Inlet, NC	
East Mariches, NY	Hatteras Inlet, NC	
Fire Island, NY	Ocracoke, NC	
Jones Beach, NY	Hobucken, NC	
Rockaway, NY	Fort Macon, NC	
Eatons Neck, NY	Swansboro, NC	
Fort Totten, NY	Wrightsville Beach, NC	
New York, NY	Oak Island, NC	
Sandy Hook, NJ		
Shark River, NJ		
Manasquan Inlet, NJ		

Table 4-2. Home ports on the Atlantic Coast for 82-ft and 110-ft USCG patrol boats. Number of patrol boats berthed at each home port is given in parentheses.

First District	Fifth District	Seventh District
West Johnsport, ME (1)	Cape May, NJ (3)	Charleston, SC (1)
South Portland, ME (2)	Chincoteague, VA (1)	Savannah, GA (1)
Gloucester, MA (1)	Portsmouth, VA (1)	Mayport, FL (1)
Woods Hole, MA (2)	Norfolk, VA (2)	Port Canaveral, FL (1)
Newport, RI (1)	Atlantic Beach, NC (2)	Fort Pierce, FL (2)
New London, CT (1)	Wrightsville Beach, NC (1)	Fort Lauderdale, FL (1)
Montauk, NY (1)		Miami, FL (6)
Sandy Hook, NJ (2)		Key West, FL (4)
		San Juan, PR (1)
		Roosevelt Roads, PR (3)
		St. Thomas, USVI (1)

Table 4-3. Number, size, and activity levels of USCG vessels stationed along the U.S. Atlantic Coast.

Size (Feet)	Designation.Name	Number	Under Way (d/y/vessel)
Workboats			
21 - 55	Small Boats	≈ 150	400 (hr/y/vessel)
75 - 160	WLIC Const. Tender	3	115
65	WLI, Intercoastal	2	80
133	WLM, Coastal	3	100
157	WLM, Coastal	2	110
180	WLB, Sea-Going	7	116
Patrol Boats			
82	WPB	14	1800 (hr/y/vessel)
110	WPB	29	1500 (hr/y/vessel)
Cutters			
210	WMEC	24	185
378	WHEC	2	185

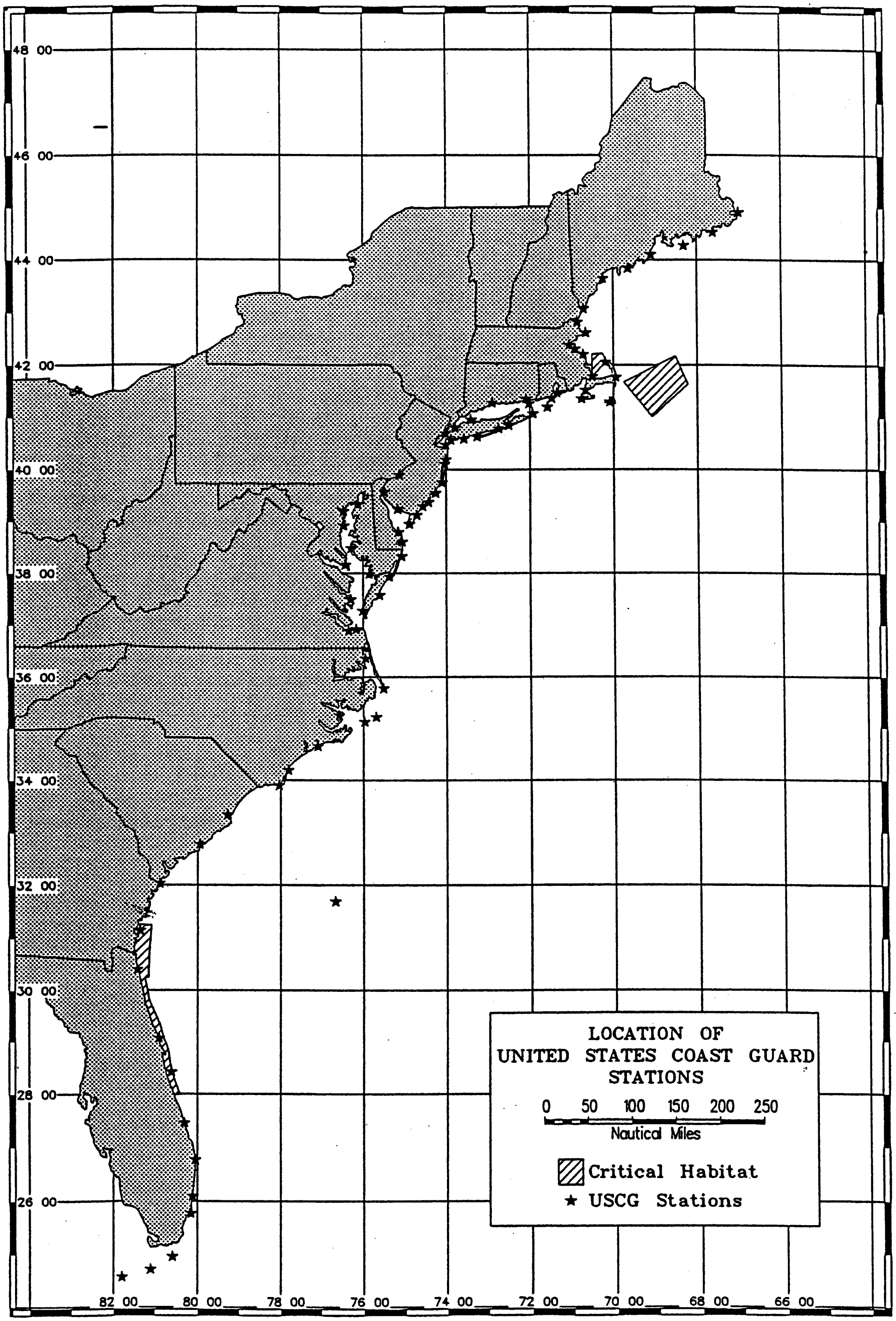

Figure 4-1. Locations of USCG stations along the East Coast of the United States (USCG Districts 1, 5, and 7).

INTRODUCTION

The purpose of the BA as stated in 50 CFR § 402.12 is to evaluate the potential effects of the USCG proposed action and cumulative effects of the proposed action on listed species. In this chapter, five possible events and results of USCG actions (which are discussed in Chapter 4) are identified. To compensate for these events, mitigating measures are presented. In addition, alternatives to the proposed action are presented. These alternatives represent a change in USCG operating procedures to reduce or eliminate the potential effects of the proposed action.

PROPOSED ACTION:

The USCG patrols the Atlantic waters of the United States using the nearly 300 east coast-based surface vessels and aircraft it has at its disposal. These patrols are in response to marine pollution events, port safety and security issues, law enforcement efforts, search and rescue missions, vessel traffic control, and maintenance of aids to navigation. The majority of Coast Guard operations occur in coastal waters (less than 20 miles from shore), although some missions are conducted up to 200 miles offshore.

The following text identifies five possible effects of this proposed action on endangered and threatened (i.e., listed) species and their (critical) habitat(s), and mitigating measures, such as reducing speed, posting additional lookouts, consulting with the Fish and Wildlife Service (USFWS) regional representative and inviting National Marine Fisheries Service (NMFS) representatives to speak at local Area Committee meetings on regional environmental concerns to reduce possible impact on endangered species:

1. **Possible event: Collision**
   Possible result: Injury or death of turtle or whale
   Mitigating measures: The majority of USCG activities are vessel based, and therefore it is possible that a collision with a whale or turtle could occur. Encounters with large vessels are particularly problematic for whales and turtles, because such encounters are often deadly. Minimizing collisions of any kind is a high priority for the USCG. Therefore, posting a lookout and identifying and avoiding objects in the water are standard operating procedure (SOP) aboard USCG vessels of all sizes. This ensures the safety of the crew, minimizes vessel damage and protects wildlife in the area. However, marine turtles and whales are often very difficult to spot, especially at night or if weather conditions are adverse (i.e. foggy or windy). Spotting whales and turtles and maneuvering around them is an acquired skill that comes with experience and education. The USCG is currently working in collaboration with the regional NMFS offices to determine the best means of training USCG personnel to improve sighting techniques.

   The July, 1991, and January, 1993, collisions between Coast Guard vessels and whales occurred with good visibility and calm wind and sea conditions. Both vessels had proper lookouts posted and the Commanding Officers were on the bridge at the time of the strikes. In the 1991 incident, two adult whales were seen to submerge as they crossed the intended course of the *CGC CHASE.* No one was aware of the third, young whale until it was struck by both propellers and caused the ship to vibrate. The vessel was well off shore at the time (38-21.5N, 73-065.5W) and not in an area later designated a critical habitat or identified as a high density area. The 1993 incident involved the smaller *CGC Pt. Francis.* Again, no one sighted the whale and only a "shudder" by the ship called attention to the whale, which by that time had been struck. In this case, the vessel was in an area later designated a critical habitat for the northern right whale, during the time of year when young whales are most likely to be present. The protective measures, such as additional training for lookouts, critical habitat designations and increased sighting programs will help preclude such incidents in the future. Although sighting and avoiding contact with objects in the water, including whales, is difficult at best, today, vessels would not generally make a routine transit through an area likely to contain whales if other alternatives were available.

In an effort to further mitigate contact with endangered species, critical habitat and marine sanctuary boundaries are plotted on all navigational and law enforcement working charts. During non-emergency operations, vessels transiting these areas are directed to use extreme caution, which consists of reducing vessel speed, when possible, to allow the lookout to see endangered or threatened species in a timely manner and alert all crewmen to the possibility of encountering such species (See Appendix B). If a whale is sighted, vessels are to 1) "give whales a wide berth, using speed appropriate to the mission to reduce the possibility of whale strikes" and 2) "notify vessels in the vicinity about the locations of whales via VHF radio, and direct them to proceed through the area with caution" (LEB 33-94). The vessels in the vicinity of sea turtle nesting beaches (Primarily District Seven) use extreme caution during April through October, the months when females are abundant just offshore.

The USCG is also responsible for issuing permits for marine events such as regattas and parades. In the Seventh District, permits are not issued for power boat races (where speeds exceed 10 knots) held during the months of April through October until a Section 7 consultation with NMFS is completed. This ensures that the impact of marine events on nesting turtles in the area is minimized.

In addition, the USCG is active in the enforcement of the Marine Mammal Protection Act and the Endangered Species Act. USCG units have been directed to target "significant violators," or those vessel operators that act in a manner that may result in injury or harassment of protected species. Educating the public regarding proper boat-handling techniques around whales and turtles is a fundamental part of these enforcement efforts.

Aircraft collisions with turtles and whales are highly unlikely and therefore will not be addressed in any detail.

2. **Possible event: Physical harassment**
Possible result: Alter "normal" behavior, stop feeding, abandon feeding area, stop breeding activities, decrease maternal care.
Mitigating measures: It is possible that harassment of whales and turtles due to the presence of a USCG vessel or aircraft could occur. However, if the guidelines for vessels outlined in the First Coast Guard District Law Enforcement Bulletin 33-94 are followed, the chance for harassment will be minimized. As per Commandant Instruction 3710.1.8, aircraft must maintain an altitude of at least 3000 feet when flying over wildlife habitat. At this altitude, harassment of whales and turtles will be negligible. However, during some operations, particularly SAR missions, a USCG mission will require that aircraft fly lower than 3000 feet, and often lower than 500 feet, to drop rescue equipment, to search for a missing persons in the water, or to recover persons from the water. Because this is also dangerous for the aircraft and crew, this altitude is maintained for the minimum time necessary to complete the objective of the mission.

There are no documented, long-term effects due to harassment by aircraft or vessels. This harassment will occur only under emergency conditions, and may be unavoidable in some instances.

One of the primary sources of anthropogenic mortality for marine turtles is disturbance or destruction of nesting habitat. The USCG has been working closely with the USFWS and NMFS to ensure that permits issued for marine events that include beachside activities will not adversely impact nesting turtles. (see 1994 NMFS revised guidelines for permitting powerboat/personal watercraft races in Florida).

3. **Possible event: Acoustic harassment**
Possible result: Short-term: change swimming direction, breathing patterns; long-term: unknown
Mitigating measures: The long-term effects of acoustic harassment are virtually unknown. There are conflicting reports of the short-term effects of engine noise on marine animals (i.e. some species of whales react to noise at great distances, some do not). There is some limited evidence that abrupt changes in vessel RPMs may disturb whales (Watkins 1986), however, it appears that they readily acclimate to the noise in their environment. The sensitivity of sea turtles to acoustic disturbance has not been well studied. Turtles may use acoustic signals within their environment for orientation to natal beaches (Lenhardt *et al.* 1983). In addition, loggerhead turtles swam towards the surface when exposed to low frequency sounds (20-80Hz, 175-180 dB) while underwater (Lenhardt 1994). This could expose turtles to collisions with boats. However, typical vessel sounds do not seem to disturb sea turtles, and the noise added to the marine environment by USCG vessels is likely to be negligible.

4. **Possible event: dispersal of prey**
Possible result: Increased feeding effort, possible decreased fitness?
Mitigating measures: It is possible that USCG vessels could disperse the prey of many whales and turtles. However, there has been very little research conducted on

this topic, and quantifying this indirect effect on endangered and threatened species is not possible.

5. **Possible event: increased pollution**
Possible results: Direct effects - threatened and endangered species and critical habitat; indirect effects (prey)
Mitigating measures: Routine Coast Guard activities are not expected to increase marine pollution. Many USCG activities, in fact, focus on pollution prevention or cleanup. If the USCG responds to a pollution event, Area Contingency Plans (ACPs) provide information on sensitive species (including endangered and threatened species) in the area, and methods to minimize the impact of the event on these species.

ALTERNATIVES TO THE PROPOSED ACTION

In this section, alternatives to the proposed action described previously are presented. As mentioned previously these alternatives represent a change in USCG operations to reduce or eliminate the potential for impacts.

Alternative 1. Avoid all high use areas, critical habitat and marine sanctuaries during all USCG patrols

This action is not possible in many areas. Due to the widespread coastal distribution of many of the aforementioned endangered and threatened species, the USCG would not be able to leave port if this action was implemented. In addition, many missions within critical habitat and marine sanctuaries are important for the protection and enhancement of endangered and threatened species. For instance, the USCG would not be able to educate mariners regarding approach guidelines, etc. or enforce provisions of the MMPA within these areas. Protected species may be harmed if the USCG was unable to respond to oil or chemical spills within critical habitat and marine sanctuary boundaries. Prohibiting Search and Rescue (SAR) missions, servicing aids to navigation, etc. within critical habitat or marine sanctuaries could result in loss of life and property. In particular, SAR missions often use the most efficient search pattern possible. Deviation from this pattern could result in missing a vessel during such a search. Overall, the cost of this alternative to the protection and enhancement of endangered species far outweighs the gain realized by avoiding high-use marine animal habitat.

Alternative 2. Decrease vessel speed (increase aircraft altitude) during all patrols, at all times, in all areas where turtles or whales may be located

On the east coast of the U.S., Search and Rescue operations result in about 18,500 sorties per year. Approximately 77% of these responses are non-emergent in nature, and vessels would be able to decrease speed and deviate from course. However, the remaining 3,800 responses require that vessels travel at high speeds in order to save human lives and property. Often, vessels must quickly respond to marine pollution events or law enforcement missions, and a decrease in speed could result in loss of life or property. District One vessels decrease speed when transiting high-use areas for right whales during non-emergency operations, and Districts Five and Seven have similar plans under development. It is likely that this alternative, strictly interpreted, would result in loss of life and property primarily during Search and Rescue operations (SAR).

Alternative 3. No action - Do not patrol U.S. waters

The USCG is the primary law enforcement and maritime search and rescue agency for U.S. waters, and therefore this alternative is not feasible. In addition, many of the missions, including oil spill response, law enforcement operations, vessel traffic control and air patrols actually promote and enhance the welfare of endangered and threatened species. Both surface and airborne platforms are used opportunistically by scientists to locate and aid entangled marine animals, transport marine animals to shore when necessary, relocate whale carcasses for necropsy, etc. This action would have profound economic and social effects, and would actually have a negative impact on recovery efforts.

INTRODUCTION

This chapter is a review of USCG initiatives to further the federally mandated protection and recovery objectives for marine turtles and whales. It is divided into two sections. The first section outlines the activities currently undertaken by the USCG to enhance the recovery of endangered and threatened species. This includes collaboration with private, state and federal organizations. In the second section, we suggest possible future collaborations with NMFS and other public and private agencies interested in promoting the recovery of endangered and threatened species.

The USCG is currently conducting the following to enhance the recovery of endangered species:

- As mentioned in Chapter 4 (page 4-5), one of the Coast Guard's primary missions is the enforcement of laws and treaties to support the conservation and management of living marine resources (LMR). Over 20 percent of all Coast Guard operations (cutter and aircraft patrols) are dedicated to LMR enforcement and to ensure the protection and recovery of endangered and threatened species. In addition, to general LMR enforcement activities, the Coast Guard conducts patrols to specifically monitor compliance with Turtle Excluder Devices (TEDs) regulation in the Gulf of Mexico and South Atlantic shrimp fisheries, monitors compliance with closed area regulations in the New England region (particularly in areas of known protected species habitat), and conducts regular patrols of protected areas along the Atlantic Coast. (See Appendix B)

- The USCG contributed $80,000 to SEUS Early Warning surveys in 1993/4 and 1994/5.
  In the last two years, the USCG has contributed $80,000 to (Southeastern United States) SEUS Early Warning Surveys. These daily aerial surveys are conducted by the New England Aquarium from December through March between Brunswick, Georgia and Jacksonville, Florida. The purpose of the surveys is to prevent ship collisions with right whales by relaying the location of whales to all user groups in the area. These groups include the USCG, the Navy, the Army Corps of Engineers, port authorities, and harbor pilots. When a whale is spotted, vessels in the vicinity are notified by VHF radio, or later by telephone or FAX machine. In the winter of 1993-1994, whales were sighted on 32 days, and 112 contacts with the above-mentioned user groups were made. On six occasions, vessels were diverted from courses which put them dangerously close to right whales. In addition, this program has been quite successful in raising the endangered species awareness of user groups in the area.

- Provides designated platforms for marine sanctuary and NMFS personnel.
  Helicopters fixed wing aircraft, and surface vessels are able to serve as observation platforms when requested, as long as other mission requirements can be met. The USCG will provide aircraft and vessel support for Stellwagen Bank National Marine Sanctuary staff and/or NMFS officials to conduct surveys to facilitate research within

sanctuary limits and other threatened or endangered species high-use areas. In the Gulf of Mexico, USCG helicopters airlift hatchling Kemp's Ridley sea turtles to safe rearing beaches. Helicopters, fixed wing aircraft, and surface vessels are able to serve as observation platforms when requested, as long as other mission requirements can be met. These dedicated air and surface patrols will provide resources often unavailable to these agencies, and will provide invaluable information on endangered and threatened species and their habitats.

- Continue participation in the New England Whale Recovery Implementation Team (First District rep.), the National Interagency Working Group for Recovery Planning in Washington, D.C. (USCG HQ rep.), and fund or otherwise work with environmentally concerned organizations and workshops. For example, the Coast Guard sponsored a workshop last April on Chemical countermeasures as tools in response to petroleum spills as a part of the National Contingency Plan area committee process.

- Provides platforms of opportunity (POP) for disentanglement efforts of regional stranding teams, and notifies regional stranding coordinators when an entangled turtle or whale is located.
  One of the primary sources of anthropogenic mortality for whales and turtles is entanglement in fishing gear or marine debris. Because the USCG provides extensive coverage of whale and turtle habitat, it is the perfect liaison for the volunteer stranding networks along the east coast. The USCG is authorized to remove nets or fishing gear to free entangle turtles only when an immediate response may save a turtle from injury or death. Otherwise, personnel contact the appropriate authorities through Operational Control (OPCON). If an entangled whale is located, the regional stranding network is notified immediately. Many times stranding units do not have vessels at their disposal, and the USCG provides a crew and vessel support, often on short notice, for disentanglement attempts. The USCG also provides crowd control for stranding teams when needed.

- Maintains active membership in the SEUS Right Whale Recovery Team.
  For the past two winters, a USCG officer has attended the scheduled meetings of the SEUS right whale recovery team. This provides the USCG with current information regarding recovery efforts in the only known calving area of the northern right whale. In addition, it promotes communication and coordination between the USCG and the numerous state and federal agencies working to enhance the recovery of right whales. It also alerts the USCG to areas where they can be of assistance to researchers in the area, and informs them of materials available for educational efforts.

- Publishes and broadcasts seasonal notice to mariners advising caution in critical habitat.
  The USCG, in cooperation with the Georgia Department of Natural Resources (DNR), publishes and broadcasts a local Notice to Mariners about right whale calving grounds in the SEUS from December through March. In New England waters, USCG Group Woods Hole and Group Boston broadcast a right whale safety notice

twice a day from 1 March through 31 September and when right whales are reported in the Group's area of operation. In these notices, vessel operators are reminded to use caution around right whales, and that intentional close approaches to right whales are prohibited and may result in a violation of state or federal law.

- Implements ESA plans for District 1; finish and implement ESA plans for District 5 and District 7.
  The USCG First District has developed a Marine Mammal and Endangered Species Law Enforcement Bulletin (LEB33-94) that outlines initiatives to further the federally mandated protection and recovery objectives for threatened and endangered marine mammals and turtles. This initiative includes a description of areas of special interest (including designated critical habitat and marine sanctuaries), and outlines enforcement procedures, recovery efforts, operational control (OPCON) responsibilities, and guidelines for the disposal of protected species. Standardized forms for reporting boat collisions with marine animals, or entangled turtles or whales are included in this bulletin, as are the names and phone numbers for stranding network personnel. Similar ESA guides are being prepared for Districts Five and Seven.

- Continues Navtex postings in SEUS; investigate expanding to other areas.
  The USCG is using the NAVTEX mariners alerting system to alert incoming vessels in the SEUS to the presence of right whales. The NAVTEX system broadcasts safety information four to six times each day, and provides continuous coverage up to 200 NM off the east coast of the U.S. Coverage for vessels approaching the coast of Georgia from the east is estimated to be complete only 50 percent of the time due to atmospheric interference. As a back-up, the Coast Guard also broadcasts "notice-to-mariners" information on VHF radio. By 1999 (mandatory-use date), existing NAVTEX broadcast towers will be capable of enhancement by 100% coverage offered through INMARSAT (International Marine Satellite). A study has been initiated of the feasibility of installing additional NAVTEX transmission devices. As of 1 August 1993, cargo vessels over 300 tons and passenger vessels on international voyages are required to carry NAVTEX receivers. Mariners are informed of existing critical habitat areas, and the location of right whales seen within the preceding twenty-four hours. Previously, the harbor pilot alerted vessels to the presence of whales via VHF radio. However, by the time this contact was made, the vessel had already travelled through a large portion of right whale critical habitat. Because of the extensive range of the NAVTEX system, the masters of incoming vessels can be notified of right whale locations well before they enter critical areas.

- Continues to revise area contingency plans (ACPs) as needed.
  The ACPs help to focus and integrate state and federal responses to pollution events. Because ACPs include an inventory of all endangered and threatened species and their habitats in an area, they provide an excellent reference for USCG response units in emergency situations. This ensures that threatened and endangered species are not adversely affected by clean-up activities.

- Educates mariners during boat safety inspections about the boundaries and importance of critical habitats.
  The USCG has many opportunities for contact with the public. During boat safety inspections, the USCG can inform the master and crew of a vessel of the presence of critical habit and marine sanctuary boundaries, explain the significance of this habitat, and describe safe boating-handling techniques when in the presence of endangered or threatened species. Public education is an essential part of the recovery plans for these protected whales and turtles.

- Supports the whale sighting program.
  In the First District, personnel have been directed to carry field guides and a 35-mm camera or video camera to record unusual marine mammal observations. If the crew of a USCG vessel receives a report or observes an entangled animal, dead whale, etc. they are to complete the appropriate entanglement, boat collision or sighting report form, and forward the information to the local stranding network contact or NMFS. In addition, all sightings of right whales will be reported (see LEB 33-94). This information is invaluable to NMFS, and could not be collected without the help of the USCG.

- Continue participation in ESA Interagency Working Group (Washington, D.C.)

Proposed USCG activities to recover protected species:

- Conduct an ESA workshop.
  The USCG will investigate the feasibility of a workshop with NMFS and other state and federal agencies to coordinate ESA efforts. Often efforts for different species are conflicting. For instance, shifting SEUS dredging schedules to the winter months to avoid turtle nesting season may increase the risk of vessel collisions in right whale calving habitat. In addition, requiring Section 7 consultation for permits issued for powerboat races in Florida waters only during the months of April to October ignores the potential impact on right whales when they are in the area from December through March. Such a workshop might promote communication and cooperation among the groups mandated to protect and enhance populations of threatened and endangered species. This would optimize the recovery efforts of all involved.

- Propose that a USCG officer attend turtle workshops or stranding network meetings.
  The USCG will investigate the feasibility of sending an officer to endangered/threatened sea turtle workshops or Sea Turtle Standing and Salvage Network meetings. USCG participation in the SEUS right whale recovery team meetings has been very productive. This participation will provide valuable opportunities for education and cooperation for all those involved.

- Develop and present endangered and threatened species awareness training to newly assigned personnel.
  Education is likely to be the most effective means of mitigating any possible adverse effects of USCG activities on endangered and threatened species. District offices are

currently collaborating with regional NMFS offices and other state, federal and private groups to develop materials for such efforts.

- Collaborate with the regional NMFS offices to determine the best means of training USCG personnel to improve sighting techniques.
  Spotting and identifying various species of whales and turtles requires training and practice. However, the information that could potentially be gathered by USCG personnel is important. Due to budgetary restrictions, cooperation among agencies is imperative. Many NMFS personnel have excellent spotting skills, but lack the time and resources to be in the field gathering information. The USCG could work cooperatively with NMFS so that data gathered by the USCG would be applicable to endangered and threatened species recovery efforts.

- Ensure that all OPCON have appropriate stranding contact procedures and phone numbers.
  In numerous instances, groups working with endangered and threatened species learn of an entangled whale or turtle when it too late to save the animal or gather valuable data. Often this is because the proper procedures were unclear or stranding contacts were outdated. Annually, the USCG will verify the appropriate steps to be taken when an entangled, injured or dead turtle or whale is located, and ensure that all OPCON personnel understand this information. District offices will contact regional NMFS offices at the beginning of "high probability seasons" (i.e. November - Cape Cod Bay - pilot whales; December-March - Georgia/Florida - right whale calving; April - August - Florida - sea turtles) to verify procedures and contacts.

- Incorporate whale and turtle conservation information in the USCG Sea Partners marine pollution prevention educational efforts. This effort will include cooperation with the programs of the Georgia DNR and the SEUS Right Whale Recovery Implementation Team.

- Develop working level relationships between USCG district offices and regional NMFS and FWS representatives to facilitate regular dialogue concerning USCG operations and possible impacts on endangered or threatened species. This will alert USCG crews to the possible presence of threatened or endangered species in the area (this often varies daily, seasonally, and yearly), current ways they can help (i.e. report right whale sightings in SEUS), and actions they can take to avoid adverse interactions.

- Support inclusion of critical habitat and marine sanctuary boundaries on NOAA nautical charts.
  The USCG will support NMFS efforts to include critical habitat and marine sanctuary boundaries on NOAA nautical charts. NMFS is working with NOAA to include these areas on the next printing of charts.

- Investigate lighting options for beachside USCG stations.
  Because strong lights along beaches can adversely affect nesting turtles, the USCG

will investigate lighting options for stations where this could potentially be a problem. If the available options are not feasible (due to cost, etc.), the USCG will work closely with NMFS to minimize the impact of existing lights.

- Investigate development of a field guide.
  As stated, identifying whales and turtles in the field can be difficult. If the data the USCG could potentially collect for NMFS are to be useful, species descriptions must be accurate. We will investigate the feasibility of developing a field guide (or participating in the development) that would be easy for USCG personnel to use in the field. It may be possible to develop a commercially available guide similar to the "Guide to Marine Mammals of Alaska" by Kate Wynne.

Appendix B provides examples of USCG cooperative activities.

APPENDIX A

Appendix A. DESCRIPTION OF DUTIES OF COAST GUARD OPERATIONAL UNITS (Where included, statistical information is from the most recent three years)

It is the intent in this section to give the reader (NMFS) a macro view of the variety and extent of operational demands placed upon the Coast Guard and the means by which we are currently meeting those demands.

A. Civil Engineering Division (G-ECV)

G-E Activities and Endangered Species

1. OPERATIONS

The Office of Engineering, Logistics, and Development provides support in aeronautical, civil, and naval engineering, logistics, and research and development for the Coast Guard. The Office's mission is to provide logistics that are of an engineering character; to provide engineering services including design, construction, maintenance, outfitting and alteration of vessels, aircraft, aids to navigation, shore establishments, machinery, and utilities; and to administer a program of research and development responsive to the needs of the CG for new or improved systems, equipment, methods and procedures.

2. AUTHORITIES

Authorities for the activities of the Office of Engineering, Logistics, and Development come primarily from the authorities given under Congressional appropriations and the authorities outlined by the Commandant in COMDTINST M5400.7D.

Other Environmental Laws and Requirements

The National Environmental Policy Act of 1969 (NEPA) requires all Federal agencies to give appropriate consideration to possible environmental impacts of proposed actions in their planning stages. CERCLA on-scene-coordinators are responsible for equivalency impact analyses. Agencies must prepare detailed environmental analyses regarding such planning considerations and report the resulting findings and recommendations for major Federal actions which significantly affect the quality of the human environment.

Under NEPA, all new CG projects (or major repair or maintenance projects) should be either categorically excluded (unless extenuating environmental circumstances are found), or an Environmental Assessment or Environmental Impact Statement must be prepared. Many states also impose planning requirements in the form of construction or repair permits. Often, state agencies restrict the seasons during which repairs can be made, in order to protect Federally- or State-listed species.

No master list or description of restrictions applicable to Coast Guard projects has been developed. Project coordinators contact the appropriate state and federal wildlife agencies for up-to-date information. Project coordinators may read a Coast Guard prepared list (either at the Civil Engineering Unit or at unit) as all-inclusive and erroneously conclude that no additional information is required - with potentially negative effects upon the environment. Furthermore, the dynamic and evolving nature of the threatened and endangered species lists would quickly out data any lists.

The Coast Guard contacts the appropriate state and/or federal wildlife management agencies prior to commencement of any major construction or repair projects on the Atlantic coast, or prior to any construction or repair projects which may be categorically excluded from detailed NEPA analysis, but are in the suspected habitat of state or federally protected species. This is done on a case-by-case basis. For example, in 1994, CEU Cleveland worked with Maryland's Department of Natural Resources (DNR) to plan the installation of new range markers on the Chesapeake Bay. As a result, the CEU was able to time its construction schedule around the annual migration of two anadromous fish species.

3. STATISTICAL INFORMATION

Attached is a list of selected G-ECV construction and repair projects for 1992-1994. Most other G-E activities (naval engineering, aeronautical engineering, logistics, research) will be included in reports by other offices.

Because each of these projects is a new initiative, the planning proposal package should have incorporated Enclosure 10 of COMDTINST M16475.1B, which is the environmental analysis checklist. This document reviews possible environmental impacts to endangered species, as well as other environmental effects. The document may also recommend mitigation measures.

The attached list of projects in the table below, and any future projects, should have already been analyzed for their impact on endangered or threatened species.

Selected G-ECV Construction and Repair Projects for 1992-1994

Project	Year	Location
Repair timber pier	1992	Group Long Island CT
Replace floating piers	1992	Sta New Haven CT
Dredging	1992	Base Miami Beach FL
Dredging	1992	Sta Ft Myers Bch FL
Repair boat landings, misc. lt.	1992	ANT S. Portland ME
Extend 110' WPB pier	1992	Base S. Portland ME
Dredge channel	1992	Sta Annapolis MD
Repair finger piers	1992	Sta Merrimac Rvr MA
Repair boat landing, Graves lt.	1992	ANT Boston MA
Repair pier 28	1992	SUPRTCEN Boston MA
Repair Whalers Pier 1	1992	SUPRTCEN Boston MA
Pier repair, Brandywine lt	1992	ANT Cape May NJ
Bulkhead/pavement rehab	1992	Sta Shark River NJ
WPB pier	1992	Sandy Hook NJ
Dredge boat basin	1992	Sta Barnegat Lt. NJ
Waterfront repair	1992	Sta Barnegat Lt. NJ
Erosion control	1992	Montauk Pt. NY
Dredge channel	1992	Sta Eatons Neck NY

Selected G-ECV Construction and Repair Projects for 1992-1994

Project	Year	Location
Dredge boat basin	1992	Group Moriches NY
Repair Lima pier	1992	SUPRTCEN NY
Dredge Shining Bay West Channel	1992	Sta Shinnecock NY
Repair boat house	1992	Sta Shinnecock NY
Basin stabilization	1992	Group Ft. Macon NC
Replace pier fender pile	1992	Sta Wrightsville NC
Replace ATON structure	1992	ANT Philadelphia
ATON tower, Beverly Shl lt.	1992	ANT Philadelphia
Maintenance dredging	1992	Group Philadelphia
Rehab pier	1992	RESTRACEN Yorktown
Maintenance dredging	1992	RESTRACEN Yorktown
Replace pier fender pile	1992	RESTRACEN Yorktown
Dredge boat basin	1992	RESTRACEN Yorktown
Dredge channel	1992	RESTRACEN Yorktown
Waterfront repair	1992	RESTRACEN Yorktown
Relocate minor ATON	1992	ANT Escanaba
Extend Luder pier 32 feet	1993	CG Academy
Waterfront spud replacement	1993	CG Academy
Replace rotted piers and foot	1993	CG Academy
Dredge piers and boat basin	1993	CG Academy
Redeck main piers	1993	CG Academy
Remove rocks in boat basin	1993	ANT Long lsl. So. CT
Dredge channel	1993	Group Long Island CT
Vessel support facility repair	1993	Key West FL
Replace floating pier	1993	Base S. Portland ME
Maintenance dredging	1993	Sta Boothbay Hbr ME
Replace damaged steam pier 2	1993	CG Yard
Replace waterfront facility	1993	Sta Scituate MA
Replace roof old boat house	1993	Sta Merrimac Rvr MA

Selected G-ECV Construction and Repair Projects for 1992-1994

Project	Year	Location
Cutter pier storm damage	1993	Sta Portsmouth HB NH
Rehab waterfront	1993	Sta Atlantic City NJ
Rehab pier #4	1993	TRACEN Cape May NJ
Replace floating pier	1993	Group Cape May NJ
Waterfront rehab	1993	Sta Eatons Neck NY
Reconst Pt. Bonita pier	1993	Sta Fire Island NY
Rehab of slips	1993	SUPRTCEN NY
Tango pier, repair piles	1993	SUPRTCEN NY
Install float @ 1 pier	1993	SUPRTCEN NY
Dredge Tuthill channel	1993	Group Moriches NY
Rebuild/repair ATON structure	1993	ANT Saugerties NY
Repair bulkhead	1993	Base Ft. Macon NC
Replace floating piers	1993	Group Philadelphia
Remove railway/repair pier	1993	Sta Point Judith RI
Dredge boat basin	1993	Sta Jones Beach
Dredging	1994	CG Academy
Redecking of Eagle pier	1994	CG Academy
Repair damaged finger piers	1994	Base Miami Beach FL
Pier repairs	1994	Sta Cortez FL
Repair and extend boat ramp	1994	Sta Boothbay Hbr ME
Repair boat ramp	1994	Sta St. Inigoes MD
Repair granite block pier	1994	Group Boston MA
Install wave breaks pier	1994	Sta Gloucester MA
Repair pier wave screen	1994	Sta Gloucester MA
Remove ATON batteries Cuttyhunk	1994	Group Woods Hole MA
Maintenance dredging	1994	Sta Brent Point MA
Replace floating pier	1994	Sta Portsmouth Hb NH
Misc. boat mooring	1994	TRACEN Cape May NJ
Breakwater extension	1994	Sandy Hook NJ

Selected G-ECV Construction and Repair Projects for 1992-1994

Project	Year	Location
Raise bulkhead elevation	1994	Sta Shark River NJ
Erosion control	1994	Sta Eatons Neck NY
Dredge basin/channel	1994	Sta Eatons Neck NY
Pier replacement	1994	Ft. Totten NY
Waterfront repairs	1994	Sta Fire Island NY
Repairs to pier 101	1994	SUPRTCEN NY
Maintenance dredging	1994	Sta Oak Island NC
Dredge moorings	1994	Sta Wrightsville NC
Repair conc pier	1994	Base Charleston SC
Repairs to main pier	1994	RESTRACEN Yorktown
Repair bulkhead	1994	RESTRACEN Yorktown
DDT testing below main pier	1994	RESTRACEN Yorktown
Dredge for USCG Point Highland	1994	Sta Chincoteague VA
Sandblast and paint bulkhead	1994	Sta Little Creek VA
Wharf/pier repairs	1994	SUPRTCEN Portsmouth
Moorings relocation	1994	Natchez
Recovery of ATON batteries	1994	1st district
Rebuild pier - Y2012	1994	Group Baltimore

B. Marine Environmental Protection (9-MEP)

1. OPERATIONS

Mission: Protect the public, the environment, and U.S. economic interests by the prevention and mitigation of marine pollution.

Responsibilities: The MEP program has involvement in two of the four primary roles of the U.S. Coast Guard: marine environmental protection, and maritime safety. The following inter-related responsibilities of the MEP program are grouped into four general areas for staffing purposes, response, prevention, preparedness and coordination:

* establishing federal policies and standards for the design, construction, equipment, manning, operations end maintenance of commercial vessels, and for the qualifications of their crew;

* developing standards for the handling of hazardous materials onboard vessels and marine facilities;

* negotiating international maritime safety and environmental protection standards on behalf of the U.S.;

* assuring U.S. vessel compliance with domestic and international standards (our flag-state responsibilities) and compliance by all vessels and regulated facilities in U.S. ports and waters (our port-state responsibilities), through a combination of education, monitoring, and enforcement;

* controlling vessel and facility operations to correct or reduce significant safety, security, or environmental threats;

* coordinating national protocols for preparedness planning, training, and exercising;
* directing response activities to mitigate the effects of maritime casualties and pollution.

National Need: Marine Environmental Protection program activities collectively contribute to the following broad national security interests: economic well-being, international stability, and physical protection from external threats.

Organization: Marine Environmental Protection program standards and functions are performed by Headquarters staff. Program compliance and response functions are carried out primarily by Coast Guard personnel at the 47 Marine Safety Offices (MSOs), Marine Inspection Off ices (MIO), and Captain of the Port (COTP) Offices nationwide. Fourteen are located in the area under review (East Coast of U.S.) in this assessment. MS0s and COTPs generally maintain small boats and "first aid" pollution response equipment.

Special Program Resources. The program has several unique resources available in support of our goals and activities:

a. The Coast Guard Marine Safety Center (MSC) performs vessel plan review and provides a core of technical expertise for vessel design and engineering systems.

b. The National Strike Force (NSF) is comprised of three expert teams that are trained and equipped to respond on short notice to a broad variety of environmental emergencies. Under provisions of the NCP, the strike teams are a national resource able to operate anywhere in the United States for both Coast Guard and EPA On Scene Coordinators.

c. The Marine Safety Laboratory (MSL) provides analyses for oil identification in support of field investigations and operations, for any OSC specified in the National Contingency Plan.

d. The Container Inspection Training and Assist Team provides a center of technical expertise for nationwide training/assistance in the inspection of intermodal containers.

e. Multi-mission Coast Guard Cutters and aircraft provide an array of platforms for surveillance/detection and response.

f. The National Response Center (NRC) functions as the communications link between reports of pollution and the Coast Guard (or EPA) Federal On-Scene Coordinators who evaluate and respond to those incidents. The NRC is part of the Coast Guard's Headquarters Command Center. Operating 24 hours a day, it is equipped with toll-free telephone numbers to receive reports, advanced computer systems to assist response personnel with hazard assessments, and access to organizations such as CHEMTREC for additional information.

g. The National Pollution Funds Center (NPFC) provides access to federal funds for pollution response and cleanup.

h. Coast Guard Reserve (CGR) forces provide a unique surge capability for major contingencies including mobilization emergencies and incidents of national significance.

i. Coast Guard Auxiliary (CGAUX) personnel provide a supplementary resource with unique status and waterfront presence, to assist with educational efforts and certain other operational activities.

Key External Resources.

a. The American Bureau of Shipping (ABS) is a privately operated classification society, with delegated authority to act on behalf of the U.S. Coast Guard in certain areas of vessel plan review and issuance of international safety certificates.

b. The National Cargo Bureau (NCB) is a non-profit membership organization, with delegated authority to act on behalf of the U.S. Coast Guard for certain inspections and issuance of certificates for cargo gear.

c. The National Response Team (NRT) is composed of 15 Federal agencies directly affected or involved in pollution response, and is responsible for national planning and coordination under the National Contingency Plan. The Chief of the Marine Environmental Protection Division is the vice chairman of the National Response Team. Regional Response Teams (RRTs) are multi-agency bodies providing similar coordination and incident-specific advice.

d. Advisory Committees (TSAC, MERPAC, FVSAC, NOSAC, CTAC) provide essential advice and feedback in the regulatory process.

e. The International Maritime Organization (IMO) provides a forum and mechanism for raising the level of safety and standard of care for foreign vessels visiting U.S. ports.

Capital resources include:

a. Field unit facilities (MS0/M10/COTP), small boats and vehicles provide our base capital plant for program execution.

b. Prepositioned pollution response equipment is staged at 19 sites nationwide, owned and maintained by the Coast Guard, for large scale containment and removal operations in pollution cases.

c. The Marine Safety Information system (MSIS), and centralized merchant mariner records provide broad data bases of safety and environmental information, serving as a basis for targeting operations, analyzing risk, and correlating exposure with activities and end results. MSIS also provides an administrative field tool in generating certificates, reports, and logs.

2. AUTHORITIES

Statutory Authorities: The principal laws which provide the basis for our programs include:

a. Title 46 Shipping Laws provide a broad basis for vessel and maritime personnel standards, federal regulations, inspection and examination, issuance of certificates and licenses, casualty investigations, and personnel actions, including subpoena authority.

b. The Ports and Waterways Safety Act (PWSA) of 1972, as amended, provides the basis for our port state actions, and general management of ports and waterways to minimize deaths, injuries, property damage, and environmental damage. PWSA authorizes the establishment of safety zones, Captain of the Port Orders, issuance of permits, and additional subpoena authority for investigations.

c. The Clean Water Act (CWA), as amended by the Oil Pollution Act of 1990, provides the basic statutory authority for our pollution prevention, contingency planning, and response activities within the 200 mile Exclusive Economic Zone, for oil and hazardous substances. Under the CWA, COTP's are designated as Federal On Scene Coordinators (OSCs), with authority to direct all public and private cleanup efforts in the coastal zone.

d. The Act to Prevent Pollution from ships implements the MARPOL Convention (Annexes I, II, and V) in U.S. law, and authorizes the development of implementing regulations. Annex I covers discharges of oil (petroleum); Annex II regulates discharges of noxious liquid substances; and Annex V prohibits dumping plastic trash anywhere in the ocean or navigable waters of the U.S. Additional prohibitions are directed against dumping other types of garbage in waters subject to U.S. jurisdiction.

e. The Nonindigenous Species Aquatic Nuisance Prevention and control Act of 1990 provides authority to control organic ballast water contaminants. The Coast Guard is tasked by the Act to develop a ballast water management program for the Great Lakes; develop a mariner education and assistance program for the region; and conduct a study to explore the extent to which shipping is a vector for introduction of aquatic nuisance species.

f. The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), also known as "Superfund," extends the response provisions of the CWA to a wide range of "hazardous substances, pollutants, and contaminants," and to releases which threaten not only coastal or navigable waters but also those which may threaten other environments (air, ground, etc.).

g. The Hazardous Materials Transportation Act provides authority for regulating the carriage and handling of hazardous materials in the marine transportation mode.

h. The Magnuson Act provides the basic authority for port security activities, including establishment of security zones and restricted areas.

i. The Intervention on the High Seas Act authorizes actions to prevent or eliminate danger to the U.S. coastline from pollution due to a casualty on the high seas, including authority to remove or destroy a vessel or its cargo.

j. The Marine Protection, Research, and Sanctuaries Act of 1972 regulates ocean dumping activities.

k. The Shore Protection Act- addresses the transportation and handling of municipal and commercial waste by vessels and shoreside facilities.

International Conventions:

The principal international agreements which underlie our port state control/enforcement activities, and many of our statutory authorities, include:

a. Safety of Life at Sea (SOLAS) - the first major treaty dealing with safety of international shipping. SOLAS, as with most international maritime treaties, is addressed through the International Maritime Organization (IMO).

b. International Convention for the Prevention of Pollution from Ships 73/78 (MARPOL) - covers various sources of ship generated waste in its five annexes.

c. Standards for Training, Certification, and Watchkeeping (STCW) - most IMO conventions deal with the construction and equipment of ships; the STCW convention deals with the people who operate them. It sets international standards for training and certification of crews.

d. International convention on Load Lines, 1966 (ICLL 66) - designed to prevent ships from being overloaded. Its best known requirement concerns displaying of load lines on the sides of ships to help prevent overloading.

e. Oil Pollution Preparedness and Response Cooperation (OPRC) - establishes a global framework for cooperation among nations. The sharing of resources, knowledge, and expertise pursuant to preparing for and combating oil spills is the key principle stressed.

3. STATISTICAL INFORMATION

The Marine Environmental Protection Division spill response (incident) totals for 1991-93 are detailed in the tables below. The "East Coast Total" category sums the spill incident totals for the following units: MSO Baltimore, MSO Boston, MSO Charleston, MSO Hampton Roads, MSO Jacksonville, COTP Long Island Sound, MSO Miami, COTP New York, MSO Philadelphia, MSO Portland MSO Providence, MSO Savannah, MSO Wilmington. Data from "MS0 Jacksonville" and "MSO Providence" has been detailed below to highlight spill response in critical habitat areas that are under review in this biological assessment. Neither spatial nor temporal (seasonal) variations can be expected from the existing database. Per the FWPCA mandate, all spill response incidents require investigative response.

Oil Spill Response Totals 1991-1993

CATEGORY	1991	1992	1993
MSO Jacksonville	373	161	100
MSO Providence	145	140	238
East Coast Total	2,807	2,514	2,541

Chemical Spill Response Totals 1991-1993

CATEGORY	1991	1992	1993
MSO Jacksonville	21	17	3
MSO Providence	7	9	6
East Coast Total	141	201	113

C. Marine Safety and Security

1. OPERATIONS

Objective.

The objective of the Marine Safety and Security (MSS) Program is to minimize threats posed by human activities in U.S. waters and the marine environment which may adversely affect the safety and security of U.S. citizens, vessels, port facilities, or national assets. This objective is met through the dual mission areas of marine safety and port security . The goal of the marine safety mission is to minimize the occurrence rate and magnitude of accidents and emergencies on vessels and waterfront facilities in U.S. ports that result in deaths, serious injuries, or significant property damage. The goals of the port security mission are to 1) ensure that each U.S. port area acquires, develops, and maintains its ability to perform essential functions by reducing each port's vulnerability to subversive activity or terrorist incidents during periods of heightened international tensions and mobilization contingencies, and 2) ensure the security of U.S. citizens when travelling as passengers on cruise ships.

Organization.

Program Standards and functions are performed by Coast Guard Headquarters and liaison staffs. Program compliance and response functions are carried out primarily by approximately 2,527 Coast Guard personnel at 47 Marine Safety Offices (MSO's), Marine Inspection Offices (MIO's), and Captain of the Port (COTP) offices nationwide. MSO's and COTP's generally maintain small boats and "first aid" pollution response equipment.

Responsibilities.

Principal responsibilities of the MSS program include:

a. establishing and enforcing federal policies and standards for the design, construction, equipment, manning, operations and maintenance of commercial vessels, and for the qualifications of their crew;

b. developing standards for the handling of hazardous materials onboard vessels and marine facilities;

c. negotiating international maritime safety standards on behalf of the U.S.;

d. assuring U.S. vessel compliance with domestic-and international standards (our flag-state responsibilities). and compliance by all ;vessels and regulated facilities in U.S. ports and waters (our port state responsibilities), through a combination of education, monitoring, and enforcement;

e. controlling vessel and facility operations to correct or reduce significant safety, security, or environmental threats;

Scope.

We regulate about 140,000 U.S. commercial vessels, including approximately:

250 tankships;
4,100 tankbarges;
1,000 freight vessels;

5,700 passenger vessels;
750 offshore supply vessels (OSVs);
150 mobile offshore drilling units (MODUs);
230 research, educational and other miscellaneous vessels;
121,000 uninspected fishing vessels;
7,700 uninspected towing vessels;
8,100 foreign vessels calling at U.S. ports annually;
3,500 waterfront facilities;
3,800 offshore platforms;
200,000 licensed and documented merchant mariners (active)
238,000 documented U.S. commercial and recreational vessels.

Primary Field Activities.

Vessel Boardings.

COTP's verify compliance with, and enforce the wide variety of statutes, regulations, and international requirements applying to commercial vessels by conducting boardings on these vessels. The majority of these boardings are conducted within the port areas when the vessel is moored to a pier or facility. In certain cases, vessels are denied entry to a port and are directed to an anchorage where they are boarded prior to allowing the vessel to enter port.

Anchorage Administration.

Certain areas within and outside of port areas are designated as anchorages where commercial vessels are held while awaiting pier space, or to conduct a compliance examination prior to the vessel entering the port. Certain areas are designated specifically for anchoring for special purposes such as U.S. navy anchorages, quarantine, lightering, or transferring explosives.

Harbor Patrols.

Harbor patrols are aimed at detection, deterrence, and prevention of marine casualties through the enforcement of safety regulations. The harbor patrol is a basic tool of the COTP covering a wide range of responsibilities and tasks. In addition to inspection and response functions, patrol members are a visible enforcement arm of the COTP. The need for harbor patrols (by foot, vehicle, bicycle, or boat) arises from the continuing potential for maritime casualties in our ports: vessel collisions or groundings, vessel or facility fires, accidental cargo discharges, discharges and releases of pollutants, any of which may cause property damage and personnel casualties, or other harm to the marine environment or other national interests.

Marine Events.

There are a wide variety of marine events held every year in port areas and in the near shore waters of the coastal zone. These can include marine parades, regattas, offshore boat races, and major international activities like the America's Cup and World Cup races. Regulations addressing regattas and marine parades are promulgated in 33 CFR 100 to provide an adequate level of safety for the boating public and the marine industry. Events of major importance are usually scheduled well in advance. Early conferences are held to permit public hearings, and to provide extensive notice to commercial interests regarding any special local regulations developed for the event. Other federal, state, or civil agencies are also kept informed of developments that might affect their plans or impinge upon their authority. In those ports or waterways serviced by a Vessel Traffic System (VTS), the VTS is also be included in the planning, coordination, and review of the event permit.

2. AUTHORITIES

The Coast Guard Captain of the Port (COTP) administers the multimission Marine Safety and Security (MSS) and Marine Environmental Protection (MEP) Programs by enforcing laws and regulations for the following activities:

Statutory Authorities.

a. Ports And Waterways Safety Act (PWSA) Of 1972. The purpose of the PWSA (33 U.S.C. 1221 et seq.) is to increase navigation and vessel safety, protection of the marine environment, and protection of life, property, and structures in, on, or immediately adjacent to the navigable water$ of the United States. The PWSA does not provide for personnel screening programs nor for emergency security powers, but does provide for the protection and "safe use" of the port and for protection against the degradation of the marine environment. It specifically provides for the establishment, operation, and maintenance of vessel traffic services (VTS), control of vessel movement, establishment of requirements for vessel operation, and other related port safety controls. The PWSA and 46 U.S.C. Chapter 37 also provide broad authority in the areas of safety and environmental protection in ports, harbors, waterfront areas and navigable waters. The Coast Guard is further charged with regulating the carriage of explosives or other dangerous articles on vessels (49 U.S.C. 1801 et seq.).

b. Port And Tanker Safety Act (PTSA) Of 1978. The Port and Tanker Safety Act of 1978 amended the PWSA, and provides the Coast Guard with broader, more extensive, and explicitly stated authority. The Act addresses improvements in the supervision and control over all types of vessels, foreign and domestic, operating in the U.S. navigable waters; and in the safety of all tank vessels, foreign and domestic, which transport and transfer oil or other hazardous cargoes in U.S. ports. Additionally, the Act addresses improvements in the control and monitoring of vessels operating in offshore waters near our coastline; and vessel manning and pilotage standards. The Act also includes regulatory authority over areas not previously covered, such as participation with neighboring nations in coordinated vessel traffic systems in boundary waters, lightering operations in offshore areas, and discouraging activities such as tank washing dumpings at sea in preparation for loading cargoes in U.S. ports. The Act now serves as the strongest authority for the PSS Program, and is the basis for the navigation safety regulations and the Marine Safety Information System (MSIS)

c. Oil Pollution Act of 1990 (OPA 90). The Oil Pollution Act of 1990 (OPA 90) amended the PWSA and imposes new requirements on the operation of oil tankers in the U.S.; addresses shortcomings in the navigation safety in Prince William Sound, Alaska; and enhances the Coast Guard's authority to effectively regulate the conduct of oil tankers and merchant marine personnel in the U.S. OPA 90, section 4107, amended the PWSA's vessel operating requirements broadening the Coast Guard's authority so that they "... may construct, operate, maintain, improve or expand vessel traffic services ...". In addition, section 4107 requires mandatory participation for "appropriate vessels" which operate in a VTS area.

d. The Act to Prevent Pollution from Ships (APPS) (33 U.S.C. 1901 et seq.) implements the Protocol of 1978 relating to the International Convention for the Prevention of Pollution from Ships, 1973 (MARPOL 73/78). This statute limits the operational discharges of oil from ships through equipment and operational requirements, and provides reception facilities to receive waste that cannot be discharged at sea. The Marine Plastic Pollution Research and Control Act of 1987 (P.L. 100-220) amended the APPS authorizing the Coast Guard to enforce Annex V of MARPOL which covers prevention of pollution from plastics and garbage. The Coast Guard is tasked with APPS enforcement.

e. The Espionage Act of 1917. The Espionage Act of 1917 provided the initial authority for a Coast Guard Port Security Program during periods of national emergency. Following World War I, the program was discontinued until the outbreak of World War II. The program was again terminated in 1947.

f. The Magnuson Act of 1950 (50 U.S.C. 191). With the commencement of hostilities in Korea and the continuing Cold War, it was determined that broader authority was required for control of vessels and waterfront facilities. The Magnuson Act of 1950 amended the Espionage Act of 1917. It authorized the President to institute such measures and issue such rules and regulations necessary to "... govern the anchorage and movement of any foreign-flag vessels in the territorial waters; inspect such vessels at any time; safeguard against destruction, loss or injury from sabotage or other subversive acts, accidents, or other causes of a similar nature, vessels, harbors, ports, and waterfront facilities subject to the jurisdiction of the United States..." whenever the President found the security of the U.S. endangered by "... war; invasion; potential subversive acts and or disturbances of international relations."

g. Executive Order (E.O.) 10173. President Truman, finding that the security of the U.S. was endangered, issued E.O. 10173 on 20 October 1950. This order directed implementation of the provisions of the Magnuson Act and prescribed certain port security regulations (33 CFR 6) to be enforced by the Coast Guard. This Order provided authority to prevent both intentional and accidental loss or destruction of vessels and waterfront facilities. It further directed all agencies and authorities of the United States Government and all state and local authorities to support, conform to, and assist in the enforcement of these regulations, This order was later amended by Executive Orders 10277, 10352, and 11249 and is pertinent today.

h. Title IX of Public Law 99-399, The International Maritime and Port Security Act as Codified in 33 U.S.C. 1226. This act amended the Ports and Waterways Safety Act, adding a new section - Section 7: Port, Harbor and Coastal Facility Security. This section authorizes the Secretary of Transportation to carry out measures to prevent or respond to an act of terrorism against an individual, vessel, or public or commercial structure that is subject to the jurisdiction of the U.S. and located within or adjacent to the marine environment, or a vessel of the U.S. or an individual on board that vessel.

Regulatory Authorities.

a. General authority for maritime enforcement of U.S. laws: 14 U.S.C. 89.

b. Rendering aid to distressed persons, vessels, and aircraft on the high seas and waters over which the United States has jurisdiction: 14 U.S.C. 88.

c. Cooperation with any federal agency, state, territory, possession, or political subdivision thereof, or the District of Columbia: 14 U.S.C. 141.

d. Prevention of damage to, or the destruction or loss of any vessel, bridge, or other structure on or in the navigable waters of the United States, or any land structure or shore area immediately adjacent to those waters; and protection of the navigable waters and the resources therein from environmental harm resulting from vessel or structure damage, destruction, or loss: 33 U.S.C. 1221 at seq.; 33 CFR 126, 127, 160, and 164.

e. Transportation of hazardous materials in vessels, including the carriage of explosives or other dangerous articles: 49 U.S.C. 1801 at seq.; 49 CFR 170-177.

f. Vessels carrying flammable or combustible liquids in bulk as cargo: 46 U.S.C. Chapter 37; 46 CFR 1-40.

g. Establishment of anchorage grounds and special anchorage areas for vessels in the harbors, rivers, bays, and other navigable waters of the United States: 33 U.S.C. 471, 474, 1221, and 2030; 33 CFR 110.

h. Prevention of pollution from ships and enforcement of waste reception facility requirements: 33 U.S.C. 1901 et seq.; 33 CFR 151, 155, 157, and 158; 46 CER 153.

i. Prevention of oil discharges into navigable waters from vessels a transportation-related facilities: 33 U.S.C. 1321; 33 CFR 154-15

j. Prevention of deposits of refuse in navigable waters of the United States: 33 U.S.C. 407, 421, and 441.

k. Handling of explosives or other dangerous cargoes within or contiguous to waterfront facilities: 33 U.S.C. 1221; 33 CFR 126.

l. Handling of Liquefied Hazardous Gases at waterfront facilities: 33 U.S.C. 1231; 33 CFR 127.

m. Establishment of regulated navigation areas (RNA's): 33 U.S.C. 1225 and 1231; 33 CFR 165.

n. Requirements to follow orders and directions of the COTP and district commander: 33 U.S.C. 1223; 33 CFR 160.

o. Procedures for vessel traffic management: 33 U.S.C. 1223; 33 CFR 161.

p. Navigation safety regulations: 33 U.S.C. 1223; 33 CFR 164.

q. Safety zones for protection of vessels, structures, water and shore areas, Outer Continental Shelf (OCS) facilities, and deepwater ports (DWP's): 33 U.S.C. 1223, 1225, and 1509(d); 43 U.S.C. 1333; 33 CFR 147 and 165.

r. Control of Deepwater Ports: 33 U.S.C. 1501; 33 CFR 148-150.

s. Enforcement of regatta regulations: 33 U.S.C. 1234-1235; 33 CFR 100;

t. Termination of unsafe operation of recreational vessels: 46 U.S.C. 4308;

u. Surveillance of ocean dumping activities: 33 U.S.C. 1401; 40 CFR 120-128.

v. Establishment of lightering zones: 46 U.S.C. 3715; 33 CFR 165.

w. Enforcement of Load Line violations: 46 U.S.C. 5101-5113; 46 CFR 42-47.

x. International Convention for the Safety of Life at Sea (SOLAS 74/78).

3. STATISTICAL INFORMATION

Vessel Boardings.

The table below shows the number of vessel arrivals for each of the COTP zones of responsibility listed. The figures include both U.S. and foreign flag tank vessels and freight vessels, barges, fishing vessels, and other marine traffic required to notify the COTP of their arrival under the regulations (Vessels over 1600 Gross Tons]. These figures are intended to represent the volume of marine traffic within the port area and do not include U.S. Navy vessels. Not all vessels arriving in the U.S. are boarded. Foreign vessels arriving at U.S. ports are targeted for boarding based on the last date of their arrival in the U.S., the vessels past violation history, the compliance history of the vessels flag state, and/or the compliance history of the vessels owner/operator. U.S. vessels are boarded in compliance with the schedules established by regulation.

	FY 91	FY 92	FY 93
Portland, ME	1049	1410	1654
Boston, MA	794	1745	1775
Providence, RI	1087	1859	2124
Long Island Sound, NY	1253	3510	3074
New York, NY	4590	4534	4470
Philadelphia, PA	2826	3518	3685
Baltimore, MD	1913	2547	2548
Hampton Roads, VA	3293	3697	3759
Wilmington, NC	927	1223	1336
Charleston, SC	1462	1750	1903
Savannah, GA	2006	2429	2550
Jacksonville, FL	1751	2324	2860
Miami, FL	5842	5124	7656
San Juan, PR	4741	3657	4646

Anchorage Administration.

The table below shows the number and types of anchorages within each COTP zone of responsibility listed.

	# Anchorages	General	Navy	Explosives	Quarantine
Portland, ME	8	8	0	0	0
Boston, MA	5	3	0	2	0
Providence, RI	26	25	0	1	0
Long Island Sound	7	6	1	0	0

	# Anchorages	General	Navy	Explosives	Quarantine
New York, NY	43	34	9	0	0
Philadelphia, PA	16	9	1	0	0
Baltimore, MD	10	8	2	0	0
Hampton Roads, VA	31	18	5	7	1
Wilmington, NC	1	1	0	0	0
Charleston, SC	4	4	0	0	0
Savannah, GA	1	1	0	0	0
Jacksonville, FL	8	6	0	1	1
Miami, FL	5	4	0	1	0

Harbor Patrols.

The table below shows the number of harbor patrols conducted in each COTP zone of responsibility. Harbor patrols are conducted by small boat, vehicle, bicycle, and on foot. The areas within each port that are targeted for patrolling are determined by the local COTP.

	FY 91	FY 92	FY93
Portland, ME	20	774	636
Boston, MA	79	334	317
Providence, RI	4	315	181
Long Island Sound	11	40	24
New York, NY	35	243	68
Philadelphia, PA	1	25	4
Baltimore, MD	0	99	213
Hampton Roads, VA	21	97	211
Wilmington, NC	0	28	96
Charleston, SC	17	102	183
Savannah, GA	1	119	270
Jacksonville, FL	12	70	167
Miami, FL	3	91	60
San Juan, PR	86	381	304

Marine Events.

Information on the actual number of marine events held annually is not readily available. The table below shows the approximate number of vessel patrols made by Coast Guard resources during regattas and marine events held on the navigable waters. As each event is usually patrolled by two or more patrol craft, the figures do not represent the actual number of events and are meant to indicate the level of activity within each area of responsibility.

	CY 92	CY 93	CY94
First - CCGD1	1006	317	294
(Maine, New Hampshire, Massachusetts Rhode Island, Connecticut, New Jersey, New York)			
Fifth - CCGD5	343	251	248
(New Jersey, Delaware, Maryland, Virginia, North Carolina)			
Seventh - CCGD7	357	303	306
(South Caroline, Georgia, Florida, Puerto Rico, Virgin Islands)			

D. Aviation (G-0AV)

1. OPERATIONS

Coast Guard Aviation does not have MISSIONS of its own. The mission of Coast Guard aviation is operational and logistics support of all Coast Guard programs. Official Coast Guard program mission requirements are listed in the Abstract of Operations Instruction (COMDTINST 3213.7). The appropriate program managers should have the direction or guidance on those missions (i.e. SAR, Law Enforcement, Ice Operations, ATON, etc.). We employ a variety of aircraft. The HC-130 and HU-25 are fixed wing aircraft (not helicopters) that fill Long Range and Medium Range surveillance roles, respectively. Routinely they are tasked with conducting searches of a law enforcement nature. Generally, the purpose of these patrols is to locate a specific vessel or concentration of vessels. Marine environmental protection and response to oil spills or other environmental disasters is yet another mission. Typically, these entail reconnaissance at altitudes well above 500 feet to provide the On Scene Commander or Operational Commander with an overview of the affected area. Normally, fixed wing aircraft do not operate below 500 feet over the water except to make an air drop of rescue equipment, such as a pump or a raft, or to identify a vessel. The two types of helicopters the Coast Guard operates fill the Medium Range and Short Range Recovery roles. Routine patrols and transits to and from search areas are normally above 500 feet, weather permitting. Searches for persons in the water must be conducted below 500 feet to be effective. The recovery of persons from the water and delivery of rescue equipment must be done while hovering below. Flying low over water is sufficiently dangerous that it is normally avoided unless required by the mission being flown. The HC-130 Hercules is a four engine turbo prop, high-wing aircraft. Maximum gross weight is 155,000 pounds. Maximum airspeed at sea level is approximately 250 knots. Primary missions are search, patrol, ice operations, and logistics. The HU-25 Guardian is a twin- engine, swept-wing aircraft. Maximum gross weight is 32,000 pounds. Maximum airspeed at sea level is 350 knots. Endurance is 5.5 hours. The **RG-8** is a single-engine, low-wing, two-seated reconnaissance aircraft. Maximum gross weight is 4100 pounds. Maximum airspeed at sea level is 100 knots. Endurance is three hours. Primary mission is patrol. The **HH-60J** Jayhawk is a twin- engine turboshaft helicopter. Maximum gross weight is 21,884 pounds. Maximum airspeed at sea level is 180 knots. Endurance is six hours. Primary missions are search, patrol and logistics. The **HH-65A** Dolphin is a twin-engine, turboshaft helicopter. Maximum gross weight is 8900 pounds. Maximum airspeed at sea level is 165 knots. Endurance is three hours. Primary missions include search, rescue and patrol. Operation of Coast Guard aircraft follows the Air Operations Manual (Commandant Instruction 3710.1 (series) which states in part: "7. Annoyance to Persons and Endangering Property. Flights of Coast Guard aircraft shall cause a minimum of annoyance to persons and activities on the ground. It is not sufficient that the pilot is satisfied that no person is actually endangered, the pilot must exercise enough caution to be assured that no person on the ground could reasonably believe that they or their property is endangered. Except for operational missions requiring otherwise, the following specific restrictions apply: a. Fur and poultry farms shall be avoided. Valuable broods and litters may be lost due to panic caused by aircraft. b. Resorts, including beaches, shall be avoided by fixed-wing aircraft by at least one mile when at an absolute altitude of less than 500 feet. However, this limitation is waived when these areas are overflown in normal enroute flights on airways, other point-to-point flights, or in compliance with an approved traffic or approach pattern. 8. Disturbance of Wildlife. Commanding Officers shall take necessary steps to prevent unnecessary flying over known haunts of wildlife. When it is necessary to fly over such areas, an absolute altitude of at least 3000 feet shall be maintained (if maintaining such an altitude is not detrimental to the mission). Hunting from any aircraft is prohibited."

2. AUTHORITIES

The basic authority for the Operation of Coast Guard aircraft is contained in Title 14 U.S. Code. This authority is further delegated through OMB Circular A-126, Improving the Management and Use of Government Aircraft; 41 CFR Part 101-137; DOT Order 6050.1 (series), Management and Use of Department of Transportation Aircraft; and CONDTINST 3710.1 (series).

3. STATISTICAL INFORMATION

E. Law Enforcement (O-OLE)

OPERATIONAL LAW ENFORCEMENT DIVISION

1. OPERATIONS

The Coast Guard is the nationals leading maritime law enforcement agency tasked with enforcing the full range of applicable federal laws on, under, and over the high seas and waters subject to the jurisdiction of the United States. The Enforcement of Laws and Treaties (ELT) Program focuses primarily on protecting fisheries and other living marine resources, combating illicit drug trafficking, and interdicting illegal migrants at sea. These mission areas account for over 98% of ELT resources expended.

To carry out ELT missions requires extensive coordination with other federal, state, and local law enforcement agencies . International cooperation is also needed to effectively execute a joint maritime operation or to solicit coordination in support of a mission.

A range of platforms, surface and air, are necessary to provide the proper asset (resource) types and mix day or night, in all kinds of weather to enforce the laws and treaties associated with the missions. These platforms range from small open boat RHIBs to 378' WHECs and from short range recovery helicopters to long range HC-130 fixed wing aircraft. Supplementing these assets are U.S. Naval ships, various shore-based sensor systems, interagency communications systems, and support personnel.

The strategic enforcement policies of the Coast Guard are consistent with both domestic and international law, and with priorities established by the Administration. They give the Coast Guard sufficient direction to efficiently employ its assets in proactive support of ELT missions, yet allow sufficient discretion to accommodate programmatic shifts in emphasis within the ELT program responsive to national prioritizing. To further ELT goals, relative to national policy, requires reciprocal law enforcement training and joint maritime operations, exchange of liaison officers, and coordinated assistance in law enforcement on both an interagency and an international scale, (e.g., enforcement of the high seas driftnet sanctions and drug interdiction operations).

Today's national priorities require the Coast Guard to maintain a dynamic balance among the primary missions: (a) living marine resources enforcement, (b) drug interdiction, and (c) alien migration interdiction operations.

1. A. Living Marine Resources Enforcement

Our oceans represent a significant source of renewable wealth, providing a livelihood for commercial fishermen, a source of recreation for over 17 million Americans, and a rich supply of seafood for the American public. Commercial and recreational fisheries annually contribute to the U.S. economy $50 billion and $17 billion, respectively. In addition, there are economic benefits from the recreational viewing industry (e.g., whale watching) and intangible ecosystem benefits from protection of marine mammals and endangered species. As the nation's primary Federal maritime enforcement agency, the Coast Guard has an integral role in maintaining this balance. Therefore, responsible harvesting must be balanced with appropriate management and conservation measures to ensure the renewability of these resources.

The Coast Guard's role is to provide law enforcement support that promotes a high rate of compliance with the laws and regulations which are designed to support the conservation and management of our Nation's living marine resources. The Secretary of Commerce is responsible for establishing these measures. While the Coast Guard shares enforcement responsibility with the National Marine Fisheries Service (NMFS), the Coast Guard is the only agency with the maritime infrastructure and authority to project a federal law enforcement presence into the U.S. Exclusive Economic Zone (EEZ) and upon the high seas. NMFS enforcement agents are primarily responsible for conducting complex investigations ashore. In addition, the Coast Guard holds a nonvoting seat on each of the eight regional fishery management councils to advise fishery managers on the enforcement and safety implications of resource management proposals. The Coast Guard's participation in the council process is focused on assisting resource managers develop management measures which are likely to attain the highest rate of compliance by resource users.

The Coast Guard carries out its enforcement responsibilities by: (a) patrolling the perimeter of the U.S. EEZ to prevent foreign encroachment and harvesting of our marine resources; (b) patrolling within the EEZ to ensure U.S. fishermen comply with domestic management measures; (c) protecting U.S.-origin anadromous fish (e.g., salmon) throughout their migratory range, including areas of the high seas beyond the EEZ; and (d) patrolling areas of the high seas beyond our EEZ to monitor compliance of U.S. and foreign fishing vessels with international agreements (e.g., the U.N. moratorium on large-scale pelagic driftnet fishing on the high seas, straddling stocks in the central Bering Sea, and other highly migratory species).

Since the enactment of the Magnuson Fishery Conservation and Management Act in 1976, U.S. management goals have shifted from the single objective of encouraging U.S. utilization to several interrelated objectives directed to conservation: (a) restoring depleted stocks and maintaining currently productive stocks, (b) protecting critical marine habitats, and (c) reducing the adverse impacts of incidental bycatch. Enforcement implications of these goals for the Coast Guard are that:

* fisheries management and enforcement is complex;

* the demand for the Coast Guard to monitor harvesting activities within the U.S. EEZ is increased; and

* there is an increased expectation, on the part of various external stakeholders, that Coast Guard personnel must possess expertise, skill, and knowledge in fisheries management issues.

1. B. Statutory Requirements

The following statutes direct the Coast Guard to enforce provisions and regulations promulgated to implement them.

* Magnuson Fishery Conservation and Management Act:
  - 39 fishery management plans promulgated under the MFCMA
  - 166 fishery management plan amendments (amendments add to versus replace the basic fishery management plans)
  - 20 more plan amendments scheduled for 1993
  - 21 plan amendments scheduled for 1994
  - Six more fishery management plans anticipated in near future.

* Lacey Act (16 USC 3371, et seq.)

* Fur Seal Act (16 USC 1151, et seq.)

* Atlantic Tunas Convention (16 USC 971, at seq.)

* Tunas Convention Act of 1950 (16 USC 951, et seq.)

* Atlantic Salmon Convention Act (16 USC 3601, at seq.)

* North Pacific Halibut Act (16 USC 773, et seq.)

* North Pacific Anadromous Stocks Convention Act (16 USC 5001, et seq.)

* Sockeye Salmon Act (16 USC 3631, at seq.)

* Antarctic Conservation Act (16 USC 2401, et seq.)

* Antarctic Marine Living Resources Convention (16 USC 2431, et seq.)

General statutory authority: The following statutes are enforced by the Coast Guard under its broad statutory authority to enforce all applicable Federal laws on U.S. waters (14 USC 2; 14 USC 89). Legislative history of these laws shows congressional intent that the Coast Guard should enforce them.

* Marine Mammal Protection Act (16 USC 1361, et seq.)

* Endangered Species Act (16 USC 1536 et seq.)

* Marine Protection, Research, and Sanctuaries Act (16 USC 1402, et seq.)

* Nigh Seas Driftnet Fisheries Enforcement Act (P.L. 102-582)

* Central Bering Sea Fisheries Enforcement Act (P.L. 102-582)

* Whaling Convention Act (16 USC 916, et seq.)

* Fish and Wildlife Conservation Act (16 USC 2901, et seq.)

* Atlantic Striped Bass Act (16 USC 1851, et seq.)

* Sponge Act (16 USC 781, et seq.)

* South Pacific Tuna Act of 1988 (16 USC 973, et seq.)

2. A. Drug Interdiction

The Coast Guard is the lead agency for maritime interdiction and shares the lead role with the U.S. Customs Service (USCS) for air interdiction. The ELT Program also provides support to international counterdrug initiatives and the intelligence community. Seizing all drugs in transit, i.e. sealing the borders, would be cost prohibitive and disruptive to legitimate commerce, and is unrealistic. **The ELT Program goal of interdiction therefore, is to deny the smuggler the use of particular air, land, and maritime routes; not to interdict all the contraband being transported.** Disrupting traffickers forces them to develop new, wore costly methods and routes. The process of establishing these new relationships can open smugglers to additional risk. The pressure of these operations reduces the flow of illicit drugs into the United States via maritime routes. Seizures and arrests are among the objectives of interdiction because they reduce the supply of drugs and deter the use of various trafficking routes.

Illicit drug trafficking is a national security threat because of the devastating effect drugs have on the health and well being of our population, the violence associated with the trade, the violence spawned by drug use, and the adverse impacts on our economic markets and institutions. The Administration has established a National Drug Control Strategy to coordinate action by Federal, State, and local governments, the private sector and individuals. The overall goal of the Strategy is to reduce drug use. This is to be accomplished by reducing both the supply and demand for drugs.

Presidential Review Directive 18 initiated a full review of the International Drug Control Strategy. Subsequently, Presidential Decision Directive 14 will rebalance the international drug control effort. The change in emphasis will gradually impact the focus of national resources. This ELT Program Description for drug interdiction is based on the significant role Coast Guard resources have in supply reduction. This proactive mission is based on long-standing authorities and unique maritime capabilities. While the national level of effort committed within the Strategy may change, the types of activities that the Coast Guard performs will probably not change.

Counterdrug operations are conducted throughout the geographic area of interest, which is divided into four generic zones; the source countries, and the departure, transit, and arrival zones.

In the source countries, and other nations, the Coast Guard supports the efforts led by the Departments of State and Justice in helping to build the political will and indigenous capability of the host nation to combat maritime smuggling. International Training Teams, such as the International Maritime Law Enforcement Team (IMLET), deploy to various nations to train indigenous military and police forces in law enforcement and other areas of USCG expertise. The U.S. Coast Guard is an excellent model for these nations' developing law enforcement programs because of its relatively small size, the nature of its missions, the dual military/law enforcement role, and the unique expertise of its people in small boat operations, at-sea boardings, and control of commerce. A successful strategy of international cooperation can be a force multiplier through the "sharing" of resources in combined operations. Additional activities of international cooperation include: ship visits, helicopter familiarization flights, training visits for SAR/LE, INCONUS training, shiprider agreements, and bilateral law enforcement operations.

Coast Guard maritime interdiction operations in the departure and transit zones rely primarily on our high seas boarding program. An aggressive high seas boarding program is essential in both deterring and interdicting drug shipments at sea. Tactics in the departure zone, generally out to about 100 miles of the coast of Central/South America, rely heavily on the presence of a joint squadron of USCG/USN ships in the deep Caribbean and eastern Pacific corridor.

Aboard USN ships involved in detection and monitoring, USCG Law Enforcement Detachments (LEDET's) provide a cost effective maritime interdiction force multiplier. Other nations, such as the United Kingdom, Netherlands and France station military vessels in the Caribbean. Through bilateral agreements, USCG LEDET's can be assigned to such vessels for maritime interdiction and international training. Such bilaterals foster international counter-drug cooperation in combatting the global threat.

The transit zone strategy attempts to make the most of the traffic constrictions at the geographic choke points such as the Windward and Yucatan Passes.

Arrival zone operations involve a diverse group of participants. Districts and Groups coordinate the forces of shore based local, state, and federal civil law enforcement agencies with the operations of our coastal patrol boats. Arrival zone operations generally extend from our shoreline out to about 50 nautical miles. Most of these operations also incorporate Coast Guard fixed wing aircraft, helicopters, vessels, and the assets provided by other agencies.

Airborne smuggling by general aviation aircraft constitutes a major means by which cocaine is transported from foreign countries toward the United States. Successful air interdiction requires an extraordinary amount of coordination among agencies. Of significant note is that while intense interagency coordination is required to maintain a constant surveillance and apprehension response to these events, international coordination is also required to coordinate an apprehension response in foreign countries.

Typically, a DOD asset detects a northbound aircraft which has departed from a clandestine airstrip somewhere in South America, typically Colombia. The target information is passed through DOD channels to Joint Task Force Four (JTF4), located in Key West, where the target data is initially sorted for national security purposes. JTF4 then notifies the joint U.S. Coast Guard/Customs Command, Control, Communications, and Intelligence Center East (C3IE) located in Miami. C3IE performs the law enforcement sorting function by checking with air traffic control and tactical intelligence databases maintained by the Drug Enforcement Administration (DEA), USCS, and other agencies. If the target is determined to be of interest, an interceptor aircraft (either USCG, USOS, or DOD) conducts an intercept to identify the aircraft. The interceptor aircraft obtains more target information, and passes this to the C3IE for further sorting. If the aircraft is sorted as suspect, based on known intelligence and other sorting criteria, constant monitoring continues using available assets, regardless of parent agency. As the suspect approaches its destination, apprehension forces are alerted. If the suspect aircraft conducts an airdrop and does not land, apprehension forces focus on interdicting the contraband and arresting suspects, while the aircraft is tracked throughout the return flight. - Apprehension forces in the destination (original source) country are alerted and, if able, respond to meet the aircraft upon arrival.

Statutory and other Authority:

* 14 USC Sections 2, 89 and 141 - CG Establishment, Duties, Organization. This is the basis of the Coast Guard's enforcement authority upon the high seas and waters over which the U.S. has jurisdiction for the prevention, detection, and suppression of violations of laws of the U.S.

* 46 USC App. 1901 et seq. - The Maritime Drug Law Enforcement Act. This Act defines vessels of U.S. or vessels subject to jurisdiction of the U.S. with respect to enforcing drug trafficking.

* Presidential Decision Directive 14. PDD-14 is the Administrations national policy statement for the conduct of drug interdiction operations in the western hemisphere beyond U.S. borders.

Alien Migrant Interdiction Operations (AMIO)

As the lead maritime federal law enforcement agency, the Coast Guard has the responsibility of enforcing U.S. Immigration Law and related international agreements at sea. Under U.S. and international law, a sovereign nation may control immigration . The Coast Guard enforces U.S. Immigration Law principally by interdicting undocumented migrants at sea before they reach U.S. ports. In the territorial sea and contiguous zone, the Coast Guard may interdict vessels with undocumented aliens bound for U.S. ports. On the high seas, the Coast Guard seeks permission from the flag state to take law enforcement action against foreign flag vessels.

In the last 25 years the U.S. has been besieged by illegal aliens crossing its borders. The Mariel Soatlift in 1980 was the first mass migration of illegal aliens that gained international notoriety. It also heightened the Coast Guard's involvement in at-sea interdiction on a continuous basis.

Today's focus is on at-sea interdiction of undocumented migrants, usually from Haiti, Cuba, Dominican Republic, and more recently from PEC (Peoples Republic of China). Interdiction of illegal aliens is an episodic, dynamic, labor and resource intensive operation, occasionally displacing the immediacy of other Coast Guard missions due to the added potential for catastrophic loss of life at sea. In consonance with international and domestic law and agreements, and in coordination with other Federal agencies, the Coast Guard has developed procedures for dealing with undocumented aliens interdicted at sea. However, the issues associated with immigration, such as asylum processes, economics, administration policies, and refugee status remain politically, socially, and legally sensitive.

While these activities don't generally occur in the areas of concern for this biological assessment, many of the assets supporting these operations transit to, from or through areas in Florida and may have an impact.

Statutory and Other Authority:

* 14 USC 89, 141

* Title 8 USC - Aliens and Nationality

* Presidential Decision Directive (FDD/NSC-9) - Identifies and tasks the Coast Guard with the at-sea interdiction of Asian criminal syndicate alien smuggling attempts.

* Executive Order 12807 dated 24 May 1992 - Specifically directs the Coast Guard to interdict undocumented migrants at sea by stopping and boarding defined vessels, making inquiries, and, if warranted, returning the vessel and passengers to the country from which it came, or another country.

General Law Enforcement

The Coast Guard is the Nation's leading maritime law enforcement agency and has broad, multi-faceted jurisdictional authority . The statutory basis for all law enforcement missions is contained in 14 USC 2, "The Coast Guard shall enforce or assist in the enforcement of all applicable-federal laws on, under, and over the high seas and waters subject to the jurisdiction of the United States." 14 USC 89 provides active duty Coast Guard petty officers, warrant officers and commissioned officers authority to board, search detain, arrest, and/or seize in appropriate circumstances.

Although the primary focus of the ELT Program is on living Marine resources enforcement, drug interdiction and alien migration interdiction operations, other program responsibilities include: preventing the smuggling of other contraband (such as firearms and cash), ensuring compliance with recreational and other vessel safety laws, responding to vessel incidents involving violent acts or other criminal activity, and providing support to other federal, state and local law enforcement agencies. While national priorities do not currently require the dedication of substantial Coast Guard resources to these areas, circumstances (e.g. arms to Cuba) could change at any time. The next major law enforcement mission emphasis may well derive from these other responsibilities.

Statutory and Other Authority;

* Title 14 USC - CG Establishment, Duties, Organization
* Title 19 USC - U.S. Customs Authority and Duties
* Title 21 USC - Food and Drug (Abuse)
* Title 26 USC - IRS Law and Enforcement
* Title 31 USC - Money and Finance
* Title 33 USC - Navigation and Navigable Waters
* Title 46 USC - Shipping (Maritime Safety, Inspection)

OPERATIONS

Boarding. The fundamental purpose of law enforcement boardings is to (1) enforce all applicable U.S. laws and regulations, particularly relating to marine safety, customs, fisheries and immigration, and (2) educate mariners on the proper and safe practices associated with operating vessels. Law enforcement activities may result in: education, warnings, citations, arrests, and/or seizures. Boardings take place on U.S. flag vessels and foreign flag vessels subject to appropriate jurisdiction and authority. Boardings are conducted under various conditions, day/night and all weather with due regard to the safety of personnel and property. Most law enforcement boardings take place at sea, however, there are many circumstances where dockside boardings are more appropriately conducted. Boarding parties must be properly staffed, trained, equipped, and supported. Boardings must be conducted with the highest levels of safety and professionalism. Vessel boardings range from relatively straight forward inspections to comprehensive searches for evidence of sophisticated criminal activity. Technology can significantly improve the effectiveness of Coast Guard boardings. Current RDT&E efforts in support of boardings are directed at: a data entry/decision support system (such as an electronic 4100 boarding form), space accountability technology and contraband detection systems. Devices must be non-destructive, portable, easy to use, and reliable in the marine environment.

Program Resources

The ELT Program is supported by a variety of multi-mission platforms and thousands of people. This section consists of a series of charts and tables that give the reader a "snapshot" of the assets and personnel that the program uses to accomplish its mission. The data was compiled from FY 9O-92 Abstract of Operations Reports to provide average utilization figures.

The value of this section is to show the depth and breadth of the operating program. ELT use of multi-mission assets has been remarkably constant over the years. However, the distribution of ELT hours across mission areas has changed with shifts in national priority. Additionally, mission priorities and resource allocation vary significantly by geographic area as shown in the East Coast/West Coast tables. According to the statistics contained within these charts, drug enforcement received the greatest amount of resource allocation followed by domestic fisheries and illegal aliens. Consistent with the Commandant's vision and strategic agenda, present trends indicate a shift in emphasis among the three ELT mission areas, tending toward a more balanced operational commitment. Caution is appropriate in using these charts as historical data should not drive future requirements.

Cutter Availability

Asset Type	Inventory	Crew size	Target Days/Hours
WHEC	12	173 note (1)	185 / 3916
WMEC (270')	13	100	185 / 3870
WMEC (210')	14	77	185 / 3794 note (2)
WMEC (Misc)	6	77	185 / 3918
WSES	3	18	158 / 2849
WPB (110')	48	16	150 / 2519
WPB (82')	43	10	126 / 1749

Notes:
(1) WHEC, VIMEC (270' & 210') includes six person AVDET.
(2) Hour conversion for WMEC (Misc) is an average for 230', 213', 205' and 180' cutters.
(3) The day to hour equivalents were calculated using the Cutter Requirements Document (1994-1998).

Average ELT Utilization of Cutters

Cutter Category	Percentage	ELT Hours
WMEC 378	61%	14,099
WMEC 270	82%	32,765
WMEC Other	79%	31,798

Average ELT Utilization of Cutters

Cutter Category	Percentage	ELT Hours
WFB 110	73%	58,314
WPB 82	64%	42,976

Coast Guard-Wide Distribution of Cutter Hours by ELT Mission Area

	Living Marine Resources	Drugs	Migrants	ELT Other
WHEC 378	65%	34%	1%	0%
WMEC 270	18%	66%	16%	0%
WMEC Other	30%	51%	19%	0%
WPB 110	29%	61%	5%	5%
WPB 82	37%	58%	1%	4%

East Coast Distribution of Cutter Hours by ELT Mission Area

	Living Marine Resources		Drugs		Migrants		Other	
	Hours	%	Hours	%	Hours	%	Hours	%
WHEC 378	0	0	2851	95	143	5	0	0
WMEC 270	5734	17	21639	66	5231	17	70	0
WMEC 210	4478	18	14221	58	5846	24	29	0
WMEC Other	4274	40	5487	52	828	8	0	0
WPB 110	11136	25	30258	69	2804	6	135	0
WSES 110	284	5	5169	86	533	9	2	0
WPB 82	12186	40	16987	55	210	1	1058	4

West Coast Distribution of Cutter Hours by ELT Mission Area

	Living Marine Resources		Drugs		Migrants		Other	
	Hours	%	Hours	%	Hours	%	Hours	%
WHEC 378	9249	85	1552	13	133	2	43	0
WMEC 210	7643	86	1216	13	30	0	90	1
WMEC Other	4939	83	921	15	31	1	50	1
WPB 110	5798	43	4930	36	133	1	2679	20
WPB 82	3313	26	8684	70	64	1	389	3

Aircraft Availability

Asset Type	Inventory	Crew Size	Target Hours
HC-130	26	25	800
HU-25A	21	13	800
HU-25B	3	13	800
HU-25C	8	13	700
HH-60J	10	20	700
HH-3F	20	20	700
HH-3F (OPBAT)	9	20	770
HH-65A	80	12	650
RG-8A	2	2	1250

Average ELT Utilization of Aircraft

Aircraft Type	Percentage	ELT Hours
HC-130	39%	9268
HU-25	58%	11671
MRR (H-60/H-3)	21%	4672
HH-65A	19%	8141
RG-8A	64%	666

Coast Guard-Wide Distribution of Aircraft Hours by ELT Mission Area

		Living Marine Resources		ELT Drugs		AMIO & ELT Other	
	Aircraft	Hours	%	Hours	%	Hours	%
HC-130	25	4414	48	4440	48	414	4
HU-25	27	1906	16	7643	65	2122	18
MRR (H-60/H3)	32	539	13	3989	85	94	2
HH-65A	72	2438	30	3889	48	1814	22
RG-8A	2	127	19	431	65	108	16

East Coast Distribution of Aircraft Hours by ELT Mission Area

	Aircraft	Living Marine Resources Hours	%	ELT Drugs Hours	%	AMIO & ELT Other Hours	%
HC-130	12	237	5	3849	86	386	9
HU-25	22	1171	13	6089	65	2106	22
MRR (H-60/H3)	22	203	5	3806	93	84	2
HH-65A	44	872	17	2508	49	1757	34
RG-8A	2	127	19	431	65	108	16

West Coast Distribution of Aircraft Hours by ELT Mission Area

	Aircraft	Living Marine Resources Hours	%	ELT Drugs Hours	%	AMIO & ELT Other Hours	%
HC-130	13	4177	87	591	12	28	1
HU-25	5	735	32	1554	67	16	1
MRR (H-60/H3)	10	386	67	183	32	10	2
HH-65A	28	1566	52	1381	46	57	2

Platforms - Small Boats

Platform	Inventory	Staffing note (1)
41' UTB	251	15
44' MLB	120	19
47' MLB	1	19
52' MLB	4	24
Non-Standard	1168 Note (2)	N/A

Notes:
(1) This simplified presentation shows the staffing required for a single boat immediate standby crew readiness.
(2) Typically, a station is staffed to use its standard boat at a given readiness level. Personnel have not been identified to avoid duplicative counting.

Average Small Boat Hours by ELT Mission Area

	Living Marine Resource Hours	ELT Drugs Hours	ELT Migrants Hours	ELT Other Hours
UTBs and MLBs note (1)	4373	13279	432	14260
ALL OTHER SMALL BOATS	3825	12850	449	8845

Notes: (1) Consists of 41' UTB, 44' MLB, 47' MLB, 52' data

Definitions

An understanding of the terms used to describe objectives and standards is critical to their accomplishment.

Respond: Appropriate law enforcement reaction to information. Typically, this would involve an assessment process leading to a decision to (1) take action, such as a sortie, or (2) take no action at this time, but monitor, and collect more information and reassess.

Presence: Coast Guard assets operating in a designated area making contact with maritime traffic. Contact is established when the targeted-vessel is aware of the Coast Guard's presence by any means. Coast Guard identification of any particular vessel need not take place to establish presence.

Surveillance: The employment ~ of sensors, live or electronic, to scan an area and detect targets.

Tracking: To maintain acquisition (position, course and speed) of a target detected.

Intercept: To direct the movement of a Coast Guard asset to the scene of an identified target. This action is undertaken when a target of interest has been detected to support the collection of additional information on the target and to position the Coast Guard asset to take further action directed at the target of interest, if appropriate.

Interdiction: A general term to describe the efforts focused on interrupting a specified activity. A completed interdiction consists of four phases:

Detection. The initial acquisition of a contact, which is not uniquely a law enforcement activity.

Monitoring. The tracking, and/or interception and identification of a target, which is not uniquely a law enforcement activity.

Sorting. The process by which a basis for suspicion of targeted activity is determined. Although some initial sorting may be done for national defense purposes, sorting for the purpose of determining illicit activity is a law enforcement process.

Apprehension. The detention, arrest, or seizure of suspects, contraband, and/or vehicles, issuance of notice of violations or civil penalties. This is a law enforcement process. This phase is also sufficiently broad to encompass those actions, such as jettisoning contraband, aborting efforts, etc., which cause the traffickers' missions to fail.

F. Search and Rescue (G-NRS)

1. OPERATIONS

SEARCH AND RESCUE PROGRAM

PROGRAM STATEMENT

The SAR Division is "double-hatted" as both a Program Manager (for Search and Rescue Policy.) and as a Facility Manager (for groups, stations and small boats) . It should be emphasized that due to the "multi-mission" concept adopted by the Coast Guard, SAR facility resources are routinely used by other programs in support of ALL major Coast Guard objectives and strategic goals . This is particularly true of the network of SAR boat stations and their associated 24 hour small boat immediate response capability. Likewise. virtually every other Coast Guard facility resource - from polar icebreakers to marine safety offices - will. on occasion, be called upon to actively respond to a SAR incident or to provide some type of indirect support.

STATUTORY AUTHORITY

The statutory authority for the SAR program is contained in Title 14, Sections 2, SS, and 141 of the U.S. Code. The code states that the Coast Guard shall develop, establish, maintain and operate SAR facilities and may render aid to distressed persons and protect and save property on and under the high seas and waters subject to the jurisdiction of the United States . It also states that the Coast Guard may utilize its resources to assist other Federal and State entities. Coast Guard involvement in SAR is permissive in nature . That is, Search and Rescue activity may be considered a mandated function, but no specific level of performance has been cited under the legislative authority. Coast Guard SAR responsibility is further defined by the National Search and Rescue Plan (Appendix A of the National SAR Manual; COMDTINST M16120.5), an inter-agency agreement originally signed in 1956 and most recently updated in 1991, which delineates three SAR regions: Inland, Maritime, and Overseas.

SAR PROGRAM RESPONSIBILITY

As the Maritime SAR Coordinator, the Coast Guard is responsible for organizing available SAR facilities in waters subject to the jurisdiction of the United States, international waters stretching far into the Atlantic and Pacific, and the Gulf of Mexico. During mobilization, the SAR Program's responsibilities will be an extension of its statutory peacetime mission, retaining as much of the peacetime organizational structure as possible. COMARDEZPAC and COMARDEZLANT have been tasked with overall coordinating responsibilities for wartime SAR operations for their respective CinCs . The will operate a Joint Rescue Coordination Center for each CinC. Additionally, the Coast Guard will be responsible for providing personnel, who, with DOD personnel, will staff deployable JRCCs which will operate outside the continental United States. Coast Guard cutters, boats and aircraft will not normally be assigned SAR standby (24-hour immediate response) in wartime. They will continue to operate primarily in a maritime environment which will be predominantly a low threat-environment.

SAR PROGRAM RESOURCES

A. As a facilities manager, the Search and Rescue Division manage the following resources:

1. A network of 42 Coast Guard Groups. Several are combination Group/Air Station or Group/MSO, which are managed in part by other programs.

2. A network of 163 Coast Guard Stations . These units are multi-mission units. performing the SAR program mission as well as many other Coast Guard program missions (LE, MER, ATON, RBS, etc.).

3. Over 1700 standard and nonstandard small boats (16 - 52 feet in length) used to provide immediate response to mariners in distress.

4. An extensive VHF-FM, MF, and HF communications network for distress alerting and response coordination.

5. A command and control system consisting of Area and District Rescue Coordination Centers, Section Rescue Sub-Centers. and Group operation centers.

6. Personnel assigned to Groups/Stations and District staff functions supporting these activities.

7. Three operational computer tools are vital to the success of the system: Computerized Assisted Search Planning (CASP) system; the Automated Mutual Vessel Reporting (AMVER) system; and the COSPAS-SARSAT Emergency Position Indicating Radio Beacon (EPIRB) system.

SAR PROGRAM CONCEPT OF OPERATIONS

The SAR Program concept of operations

PROGRAM OBJECTIVES AND PROGRAM STANDARDS

A. **General Program Objectives.** There are three general objectives which provide direction for the Search and Rescue Program:

1. To minimize loss of life, personnel injury, and property loss and damage in the maritime environment.

2. To minimize search duration and crew risk during Search and Rescue missions.

3. To regain a world leadership position in maritime search and rescue.

B. The SAR Program employs three broad strategies to meet these objectives and responsibilities:

1. Distress Prevention. The SAR Program supports and works with other Coast Guard programs to reduce the demand for Search and Rescue services. In addition to working within the Coast Guard, the SAR Program works closely with Federal and State Agencies, as well as foreign countries and the international organizations to develop standards and practices that will prevent SAR incidents from occurring. These same working relationships have led to standards and regulations that improve the chances for survival and detection should a distress situation actually occur.

2. SAR Execution. The SAR Program expends vast energy and resources in responding to actual distress cases. The SAR Program also sponsors and energetic R&D effort to provide search guidance and prediction improvements. To ensure Coast Guard personnel are able to perform search planning, search operations, and rescue evolutions, the SAR Program sponsors specialized training.

a. Use of Coast Guard Resources. The SAR Program uses not only dedicated SAR facilities, but Coast Guard Patrol Boats, Cutters, and Aircraft to provide immediate response and ongoing searches.

b. Use of Non-Coast Guard SAR Resources. The SAR Program uses ALL available SAR resources, not just Coast Guard facilities. The Coast Guard Auxiliary, state and local maritime and law enforcement agencies, Department of Defense resources, commercial providers, volunteer organizations, and Good Samaritan boaters are examples of the resources available for use. The Coast Guard communications network and command and control system mentioned above also are used to coordinate and dispatch these other SAR resources.

c. Research and Development (R&D). To reduce search time and minimize crew risk, R&D efforts are vital for understanding search theories; utilizing new search platforms and sensors effectively; applying quality environmental data to drift algorithms, and understanding the marine environment. Cooperative SAR R&D is conducted with several countries.

d. Specialized Training. The National SAR School provides standardized training for all Coast Guard RCC and search planning personnel, and search planners from DOD agencies and foreign countries. The Motor Life Boat School and the Utility Boat Systems Center provide specialized training in small boat handling and facilitate standardization and professionalism for boat crews and coxswains from the same constituencies.

3. SAR Program Liaison. The SAR Program liaises, both at the national and international level, to develop an effective global SAR system which will improve the U.S. SAR System, reduce reliance on U.S. resources by adjacent countries, promote/accomplish U.S. humanitarian and political objectives, and more effectively assist U.S. citizens when traveling beyond the reaches of the United States SAR system . The SAR program works closely with other countries to develop agreements for improving SAR effectiveness. Joint training. cooperation on SAR research and development projects, pooling of resources, better communications. and guidance to countries developing rescue capabilities enhance global SAR and promote humanitarianism . The results of these efforts include the development and implementation of AMVER, COSPAS-SARSAT, and the Global Marine Distress and Safety System (GMDSS). The strategy of national and international liaison directly supports and interfaces with the other strategies of the SAR Program.

C. **Program Goals:**

1. The effectiveness of the SAR Program must he measured in terms of how well it minimizes loss of life and property in the maritime environment . Two "macro" indicators, (which have been defined as **Program Goals**) describe how well the Coast Guard is doing.

a. After Coast Guard notification,

(1) Save 90% of those people at risk of death on waters over which the Coast Guard has SAR responsibility.

(2) Prevent the loss of 70% of the property that is at risk of destruction on the waters over which the Coast Guard has SAR responsibility.

b. The SAR Program feels that the above goals are reasonably obtainable. They were established based on analysis of expected survival times of people in the water and a reasonable response by rescue resources. They take into consideration new technologies on the horizon and their effect on the performance of the SAR system, the principle of diminishing returns, and the likelihood of a continuing austere budget environment.

2. These indicators directly relate effectiveness to the primary benefits to society of the SAR Program. It is important to note at this point that the goals consider all cases where the Coast Guard was notified, even if in remote areas of the world. And, "lives saved" (goal #1) is often a subjective determination, even though we have provided guidance to make the proper determination. We grant that these goals are somewhat arbitrary. If these goals were set higher, then we would have to expend greater effort (translated: need more boats, planes, and people) to meet them; the converse would be true if they were set lower.

3. In order to be 100% effective, the Coast Guard SAR Program. either through its own facilities or coordination of other activities, would have to prevent every death, injury, property loss, and all of the intangible losses. This is impossible. It is unrealistic to expect that 100% of all lives and property subject to a maritime distress situation can be saved. Environmental factors coupled with instantaneous deaths as the result of explosions, collisions, and other catastrophic disasters will always take their toll. Therefore, we must accept something less than 100% effectiveness.

4. The quantifiable and tangible benefits of meeting these goals are lives and property saved. Other benefits, not easily quantified or measured, include injuries and property damage prevented or minimized, relief of anxiety, and the expeditious return of the distressed person to a position of safety. These benefits are derived from the "preventative" nature of much of the SAR conducted and coordinated by the Coast Guard. Often people are not in imminent danger when Coast Guard assistance (operated or coordinated) arrives on scene. However, except for the rapid response and the effectiveness of the Coast Guard alerting and coordinating systems, their situation may have degraded to life threatening. The Coast Guard presence prevented an eventual loss of life, whereas the action of the Coast Guard is counted as "assistance" only.

5. The primary objective of the Coast Guard, and the SAR Program, is the saving of lives. The saving of property is always of secondary importance during the execution of a SAR case. Therefore, our lifesaving goal is ranked ahead of our property saving goal. It is therefore reasonable to set a goal for saving lives that is higher than the goal for saving property (90% vice 70%). Additionally, the Coast Guard is frequently not notified of a distress until the craft containing the lives to be saved has already sunk or is no longer salvable. Personnel who enter the water or embark into life rafts might be saved hours or possibly weeks after the property is lost.

D. **SAR Program Standards:**

1. In order to achieve the goals of the program, a set of standards has been developed. These standards provide guidance for performance in various stages of the SAR incident. Adherence to each of the standards directly supports achieving the program goals. There are eight primary SAR program standards:

a. **VHF-FM distress net** is the primary distress alerting and SAR controlling communications method for U.S. coastal waters. Standard of 100% VHF-FM continuous coverage to receive a one watt signal out to 20 nautical miles around the Continental U.S. Atlantic, Pacific, Gulf of Mexico and Great Lakes coasts: The coverage for Alaska and overseas areas is limited to centers of boating activity.

b. **406 MHz Emergency Position Indicating Radio Beacon (EPIRB).** Program endorses the 406 as the primary distress and position indicating device or offshore mariners. Carriage is mandatory for certain vessel categories and recommended for all.

c. **SAR Planner Training for SAR Mission Coordinators.** 100% attendance/completion of resident SAR planner training at the National SAR School for area, district, section, and group SAR planner watchstanders.

d. **Command and control.** Process and evaluate information about a SAR incident, determine appropriate action. Initiate action within five minutes of initial notification of a distress incident.

e. **SAR Response.** A two hour total response time which is further defined:

(1) Readiness. Search and rescue unit ready to proceed within 30 minutes of notification of a distress.

(2) Transit. Search and rescue unit on scene, at datum, or in the search area within 90 minutes of getting underway.

[Note: Readiness for a particular unit is not established by the SAR Program but has been explicitly assigned to the District Commander. In certain areas at certain times of the year a lower readiness than B-0 (greater than 30 minutes) is justified.]

f. **Computer Aided Search Planning (CASP) System.** Use of CASP for planning guidance for all cases involving incidents outside the 30 fathom mark when:

(1) The duration of an incident has or could have exceeded 24 hours, and

(2) There is uncertainty concerning the incident time, incident location, type of search object(s) involved.

g. **Automated Mutual Assistance Vessel Rescue (AMVER) System.** 100% use of AMVER for identification of rescue resources for all cases involving incidents on the high seas. AMVER Media Relations promotes an active Coast Guard effort to increase participation in this voluntary reporting system. This system information is readily shared with SAR efforts of other nations. We set the world standard.

h. **SAR Training and Professionalism.** 100% of controllers will be graduates of the National Search and Rescue School. The Search and Rescue Unit (SRU) and the embarked team must be able to operate all the equipment provided to aid a person or property in distress. Specialized training must be provided to a number of personnel either as aviation rescue swimmers or small boat station emergency medical technicians (EMTs). All must demonstrate an unquestionable level of professionalism and competent conduct.

PROGRAM PERFORMANCE MEASURES

All the phases of the SAR incident must be sensitive to accurate location and timeliness: The Alerting of the SAR System, the Transit of a suitable SRU, and the Locating and Rescue of those in distress. Personnel survival information in the National SAR Manual an SAR incidents involving a fatality indicate **two hours** is the response time within which the SAR system must react swiftly and effectively to a distress situation. The Response Standard of two hours is currently broken down into 30 minutes (B-0) for a search and rescue unit to be ready to proceed, and 90 minutes for it to arrive on scene or in the search area. The basic two hours of the SAR response standard has remained unchanged since its inception in the mid 1970s. It was established as a result of recommendations following a comprehensive study of the SAR program conducted from 1967 through 1971. The standard is based on the expected survival time of a person in the water without antiexposure suit. The temperature used, 600F, was based on the mean water temperature in the maritime region around the United States. It is realized that in warmer areas, expected survival time is greater. Likewise, in colder areas it is less.

Measures of Effectiveness: Since the primary objective of the SAR Program is to minimize loss of life and property in the maritime environment, the effectiveness of such a program must be measured in terms of how well the program accomplishes that task. The SAR Program has selected two measures of effectiveness, one to reflect our ability to save lives and one to reflect our ability to save property, as the most meaningful "Macro" indicators of how well we are doing our job.

Program Effectiveness for Preventing Loss of Life

$$\text{EFF(L)} = \frac{\text{LS}}{\text{LS} + \text{LLA}}$$

Program Effectiveness for Preventing Loss of Property.

$$\text{EFF(P)} = \frac{\text{PLP}}{\text{PLP} + \text{PL}}$$

Where: LS = Lives Saved.
LLA = Lives Lost After Coast Guard Notification.
PLP = Value Of Property Loss Prevented. Calculated estimate of the amount of property loss that would have occurred had the Coast Guard not rendered assistance. It is based upon value of property assisted in cases where severity of the incident was evaluated as severe or moderate in nature.
PL = Value of Property Lost.

For both measures, the denominator represents the "Total Pool" of lives or property available to be saved. The numerator represents the number of lives or amount of property actually saved. The ratios thus formed measure the lives and property actually saved to that available to be saved.

We assume that those lives lost before Coast Guard notification are not savable, and should therefore be excluded from the effectiveness measure relating to the saving of lives. Lives lost after notification reflect the potential number of additional lives to be saved.

There is one significant difference in the formulation of the two effectiveness measures. From the SARMIS database, we know with relative certainty the number of lives lost after Coast Guard notification. Due to limitations of this database, we do not know the value of property lost after Coast Guard notification. For a lack of better information, we must use the total value of property lost, both before and after notification.

3. **Measure of Efficiency.** The SAR Program has historically attempted to use a Benefit/Cost ratio as the measure of efficiency. Although attractive in theory, the difficulty experienced in determining the value of a "Life" has rendered this approach unworkable. [The most recent memo from the DOT IG assigns a value of at least $1.5 million to a life for economic analyses.] The current approach taken by the SAR Program is to relate the measure of effectiveness for saving lives, to total direct SAR Program costs for a given fiscal year.

$$\text{Measure of Efficiency} = \frac{\text{Lives saved} \times \$1{,}500{,}000}{\text{Direct SAR Program Costs}}$$

This measure of efficiency directly relates program effectiveness to direct total SAR Program cost (OE, AC&I, and RDT&E expenses), and moves up or down in the expected manner. The dollar value is used as a scaling factor only to eliminate excessively small numbers. The effectiveness measure for saving lives was selected in preference to the measure for saving property (both individually or in combination) because saving lives is the primary objective of the SAR Program. The saving of property can be considered a secondary or side benefit. As a measure of return on investment (ROI), this illustrates how well we are putting our resources to use. **For example, in FY93:**

$$\text{Measure of Efficiency} = \frac{4{,}689 \text{ Lives saved} \times \$1{,}500{,}000}{\$421\text{ M Direct SAR Program Costs}}$$

= 16.7 (ROI = $16.70 saved for every $1.00 invested

Or in terms of the total CG budget:

$$\text{Measure of Efficiency} = \frac{4{,}689 \text{ Lives saved} \times \$1.5\text{M}}{\$3.649\text{B CG Budget}}$$

= 1.93 (i.e.: $1.93 saved by SAR program for every $1.00 in the TOTAL CG budget

By any measure, the taxpayer is receiving a significant quality return on their 'investment.'

ADDITIONAL INFORMATION

SAR response is both a system and a team effort. The "Search" team begins with the initial notification to the RCC or command center. This initial notification may or may not come via a Coast Guard communications system. Regardless, the controllers are responsible for obtaining information necessary to prosecute the incident, analyzing all the information, and using tools provided to plan an effective search. They are responsible for the search action plan and coordinating the search and rescue units (SRU's). The search team continues with the SRU's and the communications facilities. The SRU's must be able to properly execute the search instructions, operate specialized search sensors, and adjust as conditions warrant, while the communications facilities are relaying information between the search planner and the SRU. The "Rescue" team normally consists of an SRU and the embarked personnel. They must be able to operate all the equipment provided to aid a person or property in distress.

SAR PROGRAM CONCEPT OF OPERATIONS

The SAR Program concept of operations is based on Coast Guard vessel and aircraft vectored intercept operations. Over 90% of all SAR cases involve a disabled or endangered vessel in a known position in need of assistance. Coast Guard resources respond to the position and provide appropriate assistance which most often involves towing a vessel back to port. In such cases, the Coast Guard response vessel or aircraft proceeds at maximum safe speed (defined with regards to personnel safety) to the distress position and returns to port at the most economical speed. SAR cases occur all along the east coast of the US, with over 90% of these cases occurring within 20 miles of shore. Only 10% of all Search and Rescue Cases are actual distress situations; 90% of SAR cases are non-emergent in nature, which means that Coast Guard resources need not respond a "maximum safe speed" or even directly to the incident if at the outset or en route it can be determined that an emergency does not exist or appear likely to occur. In such circumstances, Coast Guard vessels and aircraft could proceed at "safe" (defined with regard to the environment) speeds and divert from their base track as necessary. Enclosure (1) depicts emergent cases for fiscal year 1993.

The remaining 10% of SAR cases involve searching for a lost or unlocated vessel. In these cases, the concept of operations reflects an area search. Vessels and aircraft are deployed to an area to "search" along specified search patterns. Vessels and aircraft will not normally deviate from specified search patterns since these are "optimal search patterns" and the risk of "missing" would be increased by doing so and detection opportunity would be decreased. In such cases, the risk of not finding a person would outweigh the gain realized by diverting around a "protected" area.

G. Aids to Navigation (G-NSR)

1. OPERATIONS

Description: The Coast Guard maintains several thousand aids to navigation along the Atlantic coast. These aids range from large shore based lighthouses, fog signals, and deep water moored buoys to small single pile structures and unlighted buoys in shallow water. They assist the mariner by acting as "road signs" on the waterway, i.e. keeping vessels in the designated channel, or marking the location of an isolated danger.

The buoys are moored to the bottom with steel chain and concrete blocks called "sinkers". In protected areas if conditions permit, a "minor light" is often established on a foundation of wood pilings, steel or rock. As with buoys, some of these structures have lights and others are unlighted and display only a "day board" acting as a landmark. A routine servicing visit is scheduled once a year for these aids. They may be visited more frequently to correct discrepancies (extinguished light, off assigned position, buoy struck, etc.)

To service this system of aids, the CC has a variety of vessels and shore based units that operate along the Intercoastal Waterway, and from the inner harbor of navigable ports out to the "sea buoy" which is often several miles of f shore. The farther off shore buoys generally require a larger vessel to perform the maintenance. This servicing takes about one to two hours and requires the chain and sinker to be visually inspected, plus buoy painting, batteries, and hardware replaced as needed.

There are 16 "Sea-Going" and "Coastal" buoy tenders in the Atlantic at this time. They are old vessels and are to be replaced with 12 newer vessels starting in 1996. Besides working buoys these tenders also assist with search and rescue, environmental cleanup, and other "multi-missions". The Sea-Going buoy tenders also assist NOAA by servicing NDBC's 19 weather buoys, some of which are located about 100 miles off shore.

2. AUTHORITIES - Statutory Authority: 14 USC 81, the Ports and Waterways Safety Act of 1972 as amended by the Port and Tanker Safety Act of 1978.

H. Vessel Traffic Control (G-NVT)

1. OPERATIONS. VTS is active waterways management utilizing surveillance sensors, displays, data relay and voice radio. It involves persons external to the vessel that receive, process,

and communicate information related to the safe navigation of a waterway. When necessary, this information output can be in the form of advisories or directions.

VTS is the eyes and oars of a port. They are usually the first to hear about or detect anything out of the ordinary, They then have the communications suite to report the incident to the responsible authority, to the mariner for trip planning and the sensors to monitor or manage appropriate responses.

The Coast Guard currently operates one VTS on the East Coast of the United States. The VTS in New York is operated under statutory authority and its area of responsibility and regulations are defined in 33 CFR Part 161.

a. VTS Missions. The primary mission of a VTS is to facilitate the safe and efficient movement of vessel traffic to prevent collisions, groundings, and the human, property, environmental or economic losses or consequences associated with these accidents. A properly equipped and operated VTS is also capable of integrating other Coast Guard missions, including search and rescue, maritime law enforcement, aids to navigation, merchant marine safety, port security and maritime defense.

b. Routine Responsibilities. The VTS Program is responsible for enhancing the safe and efficient use of our nation's waterways by effectively managing a system of Vessel Traffic Services (VTS). This entails all aspects of establishing, operating, maintaining, improving, and expanding VTS in selected U.S. ports and waterways.

c. Vessel Activity. The VTS Program does not actively operate vessels of any type. It does, however, advise mariners on hazards to navigation or situations that require the mariners attention. When circumstances dictate, VTS, in conjunction with the Captain of the Port may direct or restrict the movement of vessels in a particular area.

d. Information. The VTS has an extensive and reliable communications network. This is used to gather and disseminate information that is considered to be important to the mariner. It is used to relay information regarding hazards to navigation and other situations that may arise from time to time that will assist mariners in the safe operation of their vessels, thereby lowering the risk to life, property and the environment as a whole.

2. STATUTORY AUTHORITY. The concept of VTS is internationally accepted by governments and maritime industries as a means of enhancing safety, efficiency and environmental protection in ports, waterways, and coastal zones. In the United States, Title 14 USC requires the Coast Guard to "..,safeguard the nation's ports, waterways, port facilities, vessels, persons, and property in the vicinity of the port, from accidental or intentional destruction, damage, loss, or injury." To accomplish these objectives, the Coast Guard has established a Port Safety and Security Program, a Marine Environmental Protection Program, and a Waterways Management Program. In administering these operating programs, the Coast Guard is responsible for vessel traffic management and navigation safety. To meet this responsibility, and in the furtherance of national transportation policy, the Coast Guard has established vessel traffic services to conduct active vessel traffic management in selected major ports and waterways.

Statutory authority for the VTS Program is derived from the Ports and Waterways Safety Act (PWSA) of 1972, as amended by the Port and Tanker Safety Act of 1978 and the Oil Pollution Act of 1990 (OPA 90). Each of these laws arose from independent determinations that increased supervision of vessel movements and port operations were needed in the interest of protection of life, property, and the environment. VTS is seen as a means of meeting this objective.

The Ports and Waterways Safety Act of 1972 authorizes the Coast Guard to "... establish, operate and maintain vessel Traffic Services in ports and waterways subject to congestion." It also authorizes the Coast Guard to require the carriage of electronic devices necessary for participation in the VTS system. The purpose of the Act was to establish good order and predictability on our nation's waterways by implementing fundamental waterways management practices.

The Oil Pollution Act of 1990 amended the PWSA and enhances the Coast Guard's authority so that they "... may construct, operate, maintain, improve or expand vessel traffic services..." and requires mandatory participation for "appropriate vessels" which operate in a VTS area.

APPENDIX B

INTRODUCTION TO APPENDIX B

This Appendix portion is comprised of the Marine Mammal Protection Programs of Coast Guard Districts 1, 5, and 7, which together account for the entire Atlantic coast of the United States. District 1, incorporating three earlier guidelines, set the tone for development of this directive. District 5 and District 7, using District 1's directive as a guide developed similar guidelines for their geographic areas allowing for those area-specific unique characteristics of each district.

The Law Enforcement Bulletins are subject to revisions periodically as field applications dictate.

FIRST COAST GUARD DISTRICT
LAW ENFORCEMENT BULLETIN (LEB)
33-94

Subj: **MARINE MAMMAL AND ENDANGERED SPECIES PROTECTION PROGRAM**

Ref: (a) D1 LEB 30-91 (Marine Mammals)
(b) My 262112Z JUL 94 (Marine Mammal Sighting Program)
(c) My 131734Z JUL 94 (Marine Mammal Protection/Support to Marine Mammal Conservation Program)

1. This LEB outlines First Coast Guard District initiatives to further the federally mandated protection and recovery objectives for marine mammals and endangered marine species. References (a) through (c) are cancelled.

2. The National Marine Fisheries Service (NMFS) is the primary federal agency responsible for the conservation and management of living marine resources. The Coast Guard has authority to perform law enforcement activity upon the high seas and waters subject to U.S. jurisdiction for the prevention, detection, and suppression of violations of U.S. law, as well as to provide support to NMFS to meet management goals for protected marine mammals. The Coast Guard and NMFS are equally responsible for enforcing violations of the Endangered Species Act (ESA).

3. POC is D1 (ole) Fisheries Section, (617) 223-8423/8101.

P. J. HOWARD
By direction

Encl: (1) Marine Mammal and Endangered Species Protection Program
(2) Entanglement and Boat Collision Reporting Form
(3) NMFS Approved Local Stranding Networks
(4) Unit Checklist for D1 Sighting Program
(5) Standard Sighting Form

FIRST COAST GUARD DISTRICT
LAW ENFORCEMENT BULLETIN (LEB)
33-94

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MARINE MAMMAL AND ENDANGERED SPECIES PROTECTION PROGRAM

Ref: (a) 50 CFR PART 226 - Designated Critical Habitat
(b) NMFS Recovery Plan for the Northern Right Whale dtd DEC 91
(c) COMDTINST M16247.1 (series) (Maritime Law Enforcement Manual)
(d) 50 CFR PART 227 - Threatened Fish and Wildlife Jonathan Pub
(e) 15 CFR PART 940 - Stellwagen Bank National Marine Sanctuary

1. **AREAS OF SPECIAL INTEREST.** The First District Marine Mammal and Endangered Species Protection Program applies to littoral and offshore waters. However, the following areas are of special importance.

A. STELLWAGEN BANK NATIONAL MARINE SANCTUARY (SBNMS). This sanctuary was designated by Congress on 4 November 1992 and encompasses an area of water over and surrounding Stellwagen Bank. Activities in this area are regulated to protect the recreational, ecological, historical, research, educational, and aesthetic resources and qualities of the SBNMS.

B. DESIGNATED CRITICAL HABITATS. Units should review reference (a) to become familiar with those habitats designated as critical to endangered and threatened species under section 7 of the Endangered Species Act (ESA). Within the First District, specific areas of concern include the Great South Channel and Cape Cod Bay, Massachusetts.

2. **ENDANGERED SPECIES PROTECTION EFFORT.**

A. DEDICATED SURFACE/AIR PATROLS.

(1) TASKING - CTU 44.1.1. and Groups Boston and Woods Hole will be routinely tasked to conduct enforcement boardings, disseminate information packets, and make broadcasts to mariners in the vicinity of the SBNMS and other areas of interest.

(2) AREA SURVEYS - Air Station Cape Cod and designated surface assets will periodically be directed to embark National Marine Sanctuary (NMS) and/or NMFS officials to conduct surveys to facilitate research of the SBNMS and other areas of interest.

(3) DOCUMENTING PATROL EFFORTS - Units shall document marine mammal protection efforts in their Living Marine Resource Weekly Feeder or Daily Situation Report (SITREP) Feeder. Units patrolling SBNMS shall Document their activities in Abstract of Operations reports.

B. SAFETY BROADCAST FOR RIGHT WHALES. Groups Boston and Woods Hole shall make the following safety broadcast on right whales twice a day from 1 March to 31 September and when right whales are reported in the Group's AOR:

"The severely endangered right whale is a regular visitor to Massachusetts coastal waters. The National Oceanic and Atmospheric Administration has designated Cape Cod Bay and the region east of Cape Cod as critical habitat for this species, and has identified the Stellwagen Bank National Marine Sanctuary as an additional area if importance to the right whale. Vessel operators are reminded to use caution around right whales. Intentional close approach to right whales is prohibited and may result in a violation of Federal or state law."

C. CUTTER TRANSITS. During the course of normal, non-emergency operations, First District units transiting the SBNMS, northern right whale critical habitat areas, or other areas frequently used by right whales (see paragraphs 1 and 2) shall use caution and be alert for whales, using speed proportional to the mission to reduce the possibility of whale strikes.

D. SURFACE UNIT NAVIGATION. Units shall plot and maintain the coordinates of the SBNMS and northern right whale critical habitat areas on all navigational and law enforcement working charts.

E. UNIT RESPONSIBILITIES. If a First District unit sights a whale(s), that unit shall:

(1) Give whales a wide berth, using speed proportional to the mission to reduce the possibility of whale strikes.

(2) Maintain a lookout to best avoid contact with the whales.

(3) Notify vessels in the vicinity about the locations of the whales via VHF radio, and direct those vessels to proceed through the area with caution.

(4) Inform OPCON immediately of any sightings of right whales or any other whale that is entangled, injured or dead. Also notify OPCON of any sightings of pilot whales in the vicinity of Cape Cod.

(5) Secure the area to keep onlookers from interfering with personnel authorized to respond to an injured, dead, entangled or stranded protected species. "Authorized" personnel should possess a federal or state permit.

(6) Complete and forward the sighting report per paragraph 5.E. below.

3. **OPCON RESPONSIBILITIES.**

A. NOTIFICATIONS.

(1) SAFETY VOICE BROADCAST - Upon receiving sighting reports of right whales or any other entangled or injured whale, OPCON shall initiate a Safety Voice Broadcast (update/reissue after each sighting) as appropriate. The broadcast should advise mariners to exercise caution when navigating the area by adjusting course and speed as necessary to minimize disturbing or striking a right whale. For purposes of Safety Voice Broadcasts, dead whales will be treated as hazards to navigation.

(2) ENTANGLEMENTS, BOAT COLLISIONS, AND STRANDINGS - Complete enclosure (2) and relay the information to OPCON. OPCON shall notify appropriate authorities as outlined below:

(a) Entangled whales. OPCON shall immediately notify the Center for Coastal Studies. (See enclosure (3).) Coast Guard units shall not attempt to remove debris from entangled whales. Only the Center for Coastal Studies is authorized to have direct contact with the animals.

(b) Stranded whale. OPCON will immediately notify the local stranding network to facilitate rescue of the stranded animal. (See enclosure (3).)

(c) Stranded/entangled turtles. The Green, Loggerhead, Leatherback, and Kemp's Ridley sea turtles are presently listed as either threatened or endangered reptiles. Coast Guard personnel can cut nets or fishing gear to free entangled turtles only when immediate response may save the turtle(s) from further injury or death. OPCON shall immediately notify the Center for Coastal Studies which will provide advice or initiate action to rescue the animal(s).

(3) PILOT WHALES - Immediately relay any sightings of pilot whales in the vicinity of Cape Cod to the Center for Coastal Studies, as it may be an indication of mass stranding.

B. LOGISTICAL SUPPORT. As requested in reference (b), units are authorized and may be tasked by OPCON to provide logistical support for NMFS-approved disentanglement and stranding teams and their equipment.

C. SITREP. All cases involving protection of endangered species will be documented via SITREP.

D. LETTER REPORT. Units which assist in the salvage, rescue or disposal of a marine mammal shall submit a letter report to the U.S. Fish and Wildlife Service in accordance with chapter 8 of reference (c), with an information copy to CCGDONE (ole).

4. **DISPOSAL OF PROTECTED SPECIES.** There is no specific U.S. Coast Guard responsibility for the salvage or disposal of dead whales. Only situations that pose a safety, health, or navigation hazard, or involve significant public affairs interest, should be pursued. Units shall not tow or attempt to sink dead marine mammals without OPCON concurrence. If there is no interest by appropriate organizations after having been notified about the location of a dead whale or other protected species, abandon the carcass and continue with normal operations.

5. **D1 WHALE SIGHTING PROGRAM.** Per reference (b), the northern right whale is the most endangered large whale in the world. Only the western North Atlantic has a significant number of northern right whales (300-350), with the eastern North Atlantic population virtually extinct. The whale sighting program will provide NMFS experts with critical data. The highest sighting priority for D1 units involves right whale.

A. UNIT PREPARATIONS. Units under CCGDONE OPCON shall review references (a), (c), (d), and (e), and follow guidelines outlined in enclosure (3) in establishing an effective unit sighting program.

B. IDENTIFICATION GUIDE BOOKS. Units shall obtain and use marine mammal identification references. One good resource is "A Field Guide to Whales, Porpoises, and Seals from Cape Cod to Newfoundland." The latest edition of the book was published in 1993 by the Smithsonian Institute Press.

C. SIGHTING PRIORITIES. Whale sightings of specific interest are the northern right, humpback, fin, sei, and blue whales. The specific priorities of the D1 sighting program are:

(1) Entangled or injured right whales;

(2) "Floaters" - Dead right whales;

(3) Live sightings - Right whales;

(4) Live sightings - Pilot whales (only in the vicinity of Cape Cod);

(5) Entangled or dead whales of any other kind;

(6) "Floaters" - Dead whales of any other kind; and

(7) Large groups of whales.

D. PROBABLE LOCATIONS OF RIGHT WHALES. Historical sighting data from aerial and shipboard surveys indicates right whales are normally found in the vicinities of:

(1) BROWNS/BACCARO BANKS - Between these banks on the Nova Scotian shelf from July through November. This area appears to be significant to the whales socially; courtship activities at the surface are frequently observed.

(2) BAY OF FUNDY - Late July through mid-November, with a peak in population in September. This area appears to be the primary summer nursery.

(3) CAPE COD BAY - March through early May. This is the traditional and historical habitat. It has also been designated a critical habitat. U.S. Coast Guard presence is needed to control certain whale watching problems. Units should work directly with the Massachusetts Environmental Police (MEP) to enforce both state and federal right whale protection regulations.

(4) STELLWAGEN BANK NMS AND JEFFREYS LEDGE - July through September. This is the period of the greatest whale watch effort. U.S. Coast Guard presence should curtail reckless vessel operations especially on weekends and major holidays.

(5) GREAT SOUTH CHANNEL - Mid-April through July. This is the southern passage to and from the Gulf of Maine. The most important task is to know where concentrations of whales are located in order to inform mariners (especially large ships).

(6) SOUTHEASTERN U.S. {CHARLESTON, SC TO MIAMI, FL) - September through April. This primary calving ground is occupied by females before, during and after calving.

E. FORWARDING OF SIGHTING REPORTS. Whale sighting information shall be forwarded per enclosure (4) using the standard format provided in enclosure (5) with supporting 35 mm photographs and VHS video. Units have direct liaison authority with the NOAA Northeast Fisheries Science Center (see enclosure (4)) to discuss pre/post-deployment issues.

6. **ENFORCEMENT OF MMPA AND ESA VIOLATIONS.**

A. PHILOSOPHY. Enforcement of Marine Mammal Protection Act (MMPA) and ESA regulations will target significant violators, i.e., those vessel operators that act in a manner that may result in injury or harassment of protected species. Education is recognized as being a fundamental part of enforcement efforts.

B. HARASSMENT DEFINITION. The term "harassment" is an element of "taking" under the MMPA and includes two levels:

(1) LEVEL A - An act of pursuit, torment, or annoyance that has the potential to injure a marine mammal or marine mammal stock in the wild.

(2) LEVEL B - An act of pursuit, torment, or annoyance that has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding or sheltering.

C. EXAMPLES OF HARASSMENT.

(1) HUMAN INTERACTIONS - Diving or swimming, throwing objects, human feeding (disrupts natural eating habits), high speed approaches by a vessel, and deliberately maneuvering a vessel close to a whale are clear examples of harassment.

(2) MORE SUBTLE VIOLATIONS - Units should also be aware of more subtle violations. Persistent engagement of a vessel in a manner that results in a recognizable and articulable disturbance of the marine mammal or endangered marine species is also a violation. Detailed narratives, videotapes, and/or photographs are essential in thoroughly documenting these cases.

D. STANDARD FOR DOCUMENTING A VIOLATION. All of the following elements of a violation must be present to justify a violation of the MMPA or ESA.

(1) Personal knowledge of guidelines (can be assumed of whale watching boat operators).

(2) Refusal to observe guidelines once advised/reminded.

(3) Documented behavior (observed, photographed, videotaped, etc.) fitting harassment definition above.

(4) Distances between the violator and whale before, during, and after the incident. Massachusetts also has regulations to protect the right whale. The following management measures under 322 CMR 12.00 apply for boats in Massachusetts state waters:

(a) Buffer Zone. There is a buffer zone surrounding a right whale which consists of an area outward from the right whale a distance of 500 yards in all directions.

(b) Departures. Vessels are required to depart immediately from any buffer zone created by the surfacing of a right whale.

(c) Approaches. Vessels may not approach a right whale or turn in any manner to intercept a right whale within a buffer zone.

(d) Interference. No vessel may disrupt the behavior of a right whale within a buffer zone.

(e) Exceptions. Any person issued a federal or state permit may conduct scientific research, observation or management of the right whale as authorized under the permit.

(f) Commercial Fishing. Commercial fishing vessels hauling back towing gear or fishing at anchor within a buffer zone created by the surfacing of a right whale may complete the haul, tow or fishing operation, provided it does so with minimum disruption to the right whale, does so in a direction away from the right whale, and departs the buffer zone immediately after the haul, tow or fishing operation.

E. ISSUING A VIOLATION.

(1) STANDARDS PRESENT - If elements listed in paragraph 6.D. alone are observed, board the vessel (if weather/operations permit) and attempt to educate the boater, issuing a written warning for minor infractions.

(2) PERSISTENCE - If the master of the vessel persists in harassment, or the actions of the vessel are plainly dangerous or involve a significant act of harassment, issue a violation to the master.

(3) DOCUMENTATION - In documenting a violation, it is critical to identify distances as well as marine mammal behavior before, during, and after the incident. Submit the Enforcement Action Report (EAR) and entire case package in the same manner as MFCMA violations to CCGDONE (ole). A list of all witnesses to the incident is also very important. Identify individuals from other vessels who are potential witnesses in your Offense Investigation Report (OIR) statements.

Note: To document violation of the Massachusetts 500 yard buffer regulation, the case is position-critical and requires additional evidence. These cases can be turned over to the Massachusetts Environmental Police (MEP) (if also on scene) for prosecution, with a copy to CCGDONE (ole).

F. SPECIAL CIRCUMSTANCES INVOLVING WHALE WATCHING BOATS. Do not board commercial whale watching boats. Warn and document suspected violators (obtain necessary information via radio) and forward completed case package (if appropriate) to CCGDONE (ole) for further review.

ENTANGLEMENT AND BOAT COLLISION REPORTING FORM

I. REPORTING SOURCE

Time/Date: ________________ Rptg source: ___________

Vsl name: ________________ Doc/Reg #: ___________

Radio call: ________________ Cell phone #: ___________

1st or 2nd hand report: ________________ How long R/S can remain O/S? _________

II. DETAILS OF INCIDENT

Posit: ________________ Geographic desc: _________

O/S WX: Winds: ____T/__._kts, Swell: ____T/___ft, Seas: ____T/___ft, Vis: ___nm, Temp: ___F, Baro: ___.___(R/F/S)

Species: ________________ No of animals: __________

Dorsal fin: ________________ Color: __________

Size: ________________ Dead/alive: __________

Distinguishing marks: ________________ Photo/video taken: __________

Type of entanglement: ________________ Nature of injury: __________

Animal traveling or anchored by gear: ________ Cse/Spd: ___T___kts

Persons already notified: ______________________________

ENTANGLEMENT

Desc (type) of gear & identifying features (buoy color, reg #, etc.): ______________________________

Type of line (dia, color, matl): ______________________________

Mesh visible? ______________ Floats/other gear trailing? __________

Part of body entangled? ______________ #wraps around tail/body: __________

Life threatening? Describe: ______________________________

Enclosure (2)

ANIMAL'S APPEARANCE

First impression of condition: ____________________

Skin condition (peeling, color, whale lice present): ____________________

Obvious bleeding/wounds: ____________________

Are marks fresh or healing? ____________________

Weight (robust, emaciated, ribs or vertebrae showing?): ____________________

ANIMAL'S BEHAVIOR

General description: ____________________

Breathing (pattern, sound, smell?): ____________________

Lifting head/flukes above water? ____________________

Struggling to breathe? ____________

Dive duration: ____________________

Effects on movement (flexibility, buoyancy, surfacing angle, ability to dive, appendage movement?)

____

____

COLLISION

Type of wound (prop wound, part cut off, etc?): ____________________

Location: ____________________

Severity: ____________

Vessel involved: ____________________

Doc/Reg #: ____________

Operator: ____________________

Homeport: ____________

NMFS APPROVED LOCAL STRANDING NETWORKS

I. ENTANGLEMENT REPORTS

(Contact the Center for Coastal Studies first, then the local stranding network)

CENTER FOR COASTAL STUDIES

P.O. Box 1036
59 Commercial St.
Provincetown, MA 02657
(508) 487-3622
Fax (508) 487-4495

II. LOCAL STRANDING NETWORKS

NORTHERN (DOWN EAST) MAINE

Steve Katona, Tom Fernald
College of the Atlantic
Bar Harbor, ME 04609
(207) 288-5015
Fax: (207) 288-5395

SOUTHERN MAINE TO MASS

Greg Early
New England Aquarium
Central Wharf, Boston, MA 02110
(617) 973-5246/6551 (9-5)
Beeper: (617) 973-5247.

RHODE ISLAND AND CONNECTICUT

Neal Overstrom, Rob Nawojchik
Mystic Aquarium
55 Coogan Blvd.
Mystic, CT 06355-1997
(203) 536-9631, ext 107
Fax: (203) 572-5969

NEW YORK

Sam Sadove, Kim Durham,
Caren Carminati
Okeanos Ocean Research Foundation
P.O. Box 776
278 E. Montauk Highway
Hampton Bays, NY 11946
(516) 728-4522/8105
Beeper: (516) 436-8013
Fax: (516) 728-5557

NEW JERSEY

Bob Schoelkopf,
Edna Selzer
Marine Mammal Stranding Center
P.O. Box 773
Brigantine, NJ 08203
(609) 266-0538
Fax: (609) 266-6300

Enclosure: (3)

UNIT CHECKLIST FOR D1 SIGHTING PROGRAM

1. COLLATERAL DUTY ASSIGNMENT. Identify person on board with primary responsibility for photographing, videotaping, and completing sighting forms of endangered marine mammals.

2. QUICK RESPONSE/REACTION. Train watchstanders in marine mammal identification and accurate completion of sighting form.

3. MATERIALS.

   A. Field Guide. Recommend units purchase "A Field Guide to Whales, Porpoises, and Seals from Cape Cod to Newfoundland." The book was written by Steven K. Katona, Valerie Rough, and David T. Richardson and published in 1993 (or latest edition) by the Smithsonian Institute Press (available/can be purchased through local book stores).
   B. Standard Sighting Forms
   C. Camera(s): 35mm, 200-400mm lens, video camera(s)
   D. Film, video tape

4. PRE-PATROL AND POST-PATROL CONTACT.

   DR. JIM HAIN
   C/O NOAA NORTHEAST FISHERIES SCIENCE CENTER
   166 WATER STREET
   WOODS HOLE, MA 02543
   (508) 548-5123
   FAX: (508) 548-5124

5. OBSERVATIONAL ABILITIES AND RECORD KEEPING.

   A. Develop habits of observation, notation, and discussion of information with others.
   B. Be alert for smaller scale oceanographic features...band slicks and "edges" represent areas of mixing...often productive for fish, birds, whales, etc.
   C. Be alert for sighting cues...birds working...
   D. Keep good notes and photographs/video. DO NOT SKIMP ON PHOTOGRAPHS.
   E. When you have made a sighting...KEEP SPOT IN VIEW!

Enclosure (4)

STANDARD SIGHTING FORM

Name of Reporter: ____________________

Vessel Name or Aircraft Number: ____________________

Date and Time of Sighting: ____________________

Position (Latitude & Longitude): ____________________

Species Observed: ____________________

Number Identified: ____________________

Distinguishing Characteristics:
[Key features - size, body shape, color, blow, natural markings (spots, blazes), dorsal fin and flippers (size and shape)].

Comments:
[calf present, injuries/wounds, behavior, other species present]

Photos Taken:
[roll & frame numbers, tape number]

Enclosure (5)

FIFTH COAST GUARD DISTRICT
LAW ENFORCEMENT BULLETIN (LEB)
05-95

Subj: MARINE MAMMAL AND ENDANGERED SPECIES PROGRAM

1. The National Marine Fisheries Service (NMFS) and the Fish and Wildlife Service (FWS} are the primary federal agencies responsible for the conservation and management of living marine resources. The Coast Guard, by virtue of its authority to conduct at sea boardings, enforces applicable U.S. law and supports NMFS in their efforts to meet management goals for protected marine mammals. Additionally, as a service, we must also comply with the requirements of the Endangered Species Act (ESA). Of particular concern is the population of the northern right whale and its habitat. This habitat includes whale migration through D5 waters.

2. This LEB publishes guidance on operations and enforcement within the Fifth District with respect to endangered species. The Fifth District point of contact is the Fisheries Officer, who can be reached at (804) 398-6266.

R. J. LOSEA
By direction

Encl: (1) Marine Mammal and Endangered species Protection Program
(2) Entanglement and Boat Collision Reporting form
(3) NMFS Approved Local Stranding Networks
(4) Unit Checklist for D5 Sighting Program
(5) Standard Sighting Form

MARINE MAMMAL AND ENDANGERED SPECIES PROTECTION PROGRAM

FIFTH COAST GUARD DISTRICT
LAW ENFORCEMENT BULLETIN (LED)
05-95

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MARINE MAMMAL AND ENDANGERED SPECIES PROTECTION PROGRAM

Ref: (a) 16 USC 1361; 50 CFR 18, Marine Mammal Protection Act (MMPA)
(b) COMDTINST M16247.1 (series) (Maritime Law Enforcement Manual)
(c) 50 CFR PART 226 Designated Critical Habitat
(d) 50 CFR PART 227 Threatened Fish and wildlife

1. **<u>OVERVIEW</u>:** Reference (a) has designated areas in Dl and D7 as critical habitat for the severely endangered northern right whale. Right whales generally migrate south in the fall and north in the spring and transit D5 waters during their migration. Since little is known about specific migration patterns and areas, sightings are very rare but possible and very important. The other species of whales present in D5 waters during late fall to early spring are the humpback, finback, sperm, and pilot whales wit sightings occurring both inshore and offshore. Turtles may be encountered year round within the district; however most turtle strandings occur from the spring through the fall.

2. **<u>DEDICATED SURFACE/AIR PATROLS</u>:**

a. TASKING - CTU 44.5.1 and Groups Cape May, Eastern Shore, Hampton Roads, Cape Hatteras, and Fort Macon will be routinely tasked to conduct enforcement boardings, disseminate information packets, and make broadcasts to mariners during late fall to early spring when whales can be expected to be transiting through D5 waters.

b. AREA SURVEYS - Air Stations Elizabeth City, Cape May and designated surface assets may be directed to provide other agencies with platforms to conduct surveys of areas where high concentrations of whales have been sighted or during stranding and recovery operations. Aircraft sighting high concentrations of whales or entangled marine mammals during normal operations or training flights will complete as much of the information as possible in enclosure (5) and notify OPCON via landline upon completion of the flight. Enclosure (5) is then mailed to the reporting address listed on the enclosure.

c. DOCUMENTING PATROL EFFORTS - Units shall document marine mammal and endangered species protection efforts in the after action report of planned pulsed operations. If conducting an independent operation contained within the Group, submit a SITREP explaining the situation to OPCON info CCGDFIVE//ole// upon conclusion of the operation.

3. **<u>SAFETY BROADCAST FOR RIGHT WHALES</u>:** Groups Cape May, Eastern Shore, Hampton Roads, Cape Hatteras, and Fort Macon shall make the following safety broadcast on whales twice a day from 1 October to 1 May and when whales are reported in the group's AOR.

"During this time of year various species of whales, including the severely endangered right whale, may be encountered in the local offshore and inshore waters. Vessel operators are reminded to use caution around whales. Intentional close approach to whales is prohibited and may result in a violation of federal or state law.

4. **<u>CUTTER TRANSITS</u>:** whales can be expected to be encountered in inshore and offshore waters of D5 from late fall to early spring. During the course of normal operations, units in D5 waters shall use caution and be alert for whales, using speed proportional to the Mission to reduce the possibility of whale strikes.

5. UNIT RESPONSIBILITIES:

a. If a Fifth District unit sights a whale(s), that unit shall:

(1) Give whales a wide berth, using speed proportional to the mission to reduce the possibility of whale strikes.

(3) Maintain a lookout to best avoid contact with the whales.

(3) Notify vessels in the vicinity about the locations of the whales via VHF radio, and direct those vessels to proceed through the area with caution.

(4) Inform OPCON immediately of any sightings of right whales or any other whale that is entangled. stranded, injured, or dead.

(5) Secure the area to keep onlookers from interfering with personnel authorized to respond to an injured, dead, entangled or stranded protected species. "Authorized" personnel should possess a federal or state permit.

(6) Complete the sighting report (enclosure (5)) for situations listed in paragraph 7.c. Forward the report to the appropriate address listed on the bottom of enclosure (5) with a copy to Fifth district (ole).

6. OPCON RESPONSIBILITIES:

a. NOTIFICATIONS:

(1) SAFETY VOICE BROADCAST - Upon receiving sighting reports of right whales or any other entangled or injured whale, OPCON shall initiate a Safety Voice Broadcast (update/reissue after each sighting) as appropriate. The broadcast should advise mariners to exercise caution when navigating the area by adjusting course and speed as necessary to minimize disturbing or striking a right whale or any other entangled or injured whale. For purposes of Safety Voice Broadcasts, dead whales will be treated as hazards to navigation. The following is a sample voice broadcast:

"A right whale/large pod of humpback whales/entangled whale has been sighted in approximate position XX-XXN XXX-XXE. Mariners should avoid close approach and transit this area with caution. Intentional close approach or harassment to whales is prohibited and may result in a violation of federal or state law."

(2) ENTANGLEMENTS, BOAT COLLISIONS, AND STRANDINGS - For entanglements and collisions, complete enclosure (3), call and brief the D5 Command Center and make notifications as outlined below. For strandings, call and brief the D5 Command Center and make notifications as outlined below. A copy of enclosure (2) should be sent in accordance with the directions listed in enclosure (5). The original should be retained onboard.

(a) Entangled whales. From New Jersey through Virginia OPCON shall call the appropriate member of the marine mammal stranding network, as outline in enclosure (3), with a follow up call to the Center for Coastal Studies. In North Carolina, OPCON shall call the appropriate member of the marine mammal stranding network as outlined in enclosure (3) with a follow up call to the NMFS laboratory in Beaufort, NC. Coast Guard units shall not attempt to remove debris from entangled whales.

(b) Stranded whales. OPCON will immediately notify the local stranding network to facilitate rescue of the stranded animal. After notification of the local stranding network, brief the D5 Command Center. (See enclosure (3).)

(c) Stranded/entangled turtles. The Green, Loggerhead, Leatherback, and Kemp's Ridley sea turtles are presently listed as either threatened or endangered reptiles. Coast Guard personnel can cut nets or fishing gear to free entangled turtles only when immediate response may save the turtle(s) from further injury or death. Units shall notify OPCON by immediate means when a stranded/entangled turtle is sighted. OPCON shall call the appropriate stranding network contained in enclosure (3).

(d) Disposal of protected species. There is no specific U.S. Coast Guard responsibility for the salvage or disposal of dead whales. Only situations that pose a safety, health, or navigation hazard, or involve significant public affairs interest, should be pursued. If towing out to sea or sinking a dead animal for disposal is recommended by OPCON with concurrence from the local stranding network, refer to reference (b) chapter 8 for guidance. Units shall not tow or attempt to sink dead marine mammals without OPCON concurrence.

b. LOGISTICAL SUPPORT: Units are authorized and may be tasked by OPCON to provide logistical support for NMFS approved salvage, rescue, or disposal teams and their equipment.

c. SITREP: All cases involving protection of endangered marine mammals or sea turtles will be documented via SITREP as outlined in para 2.C. above.

d. LETTER REPORT: Units which assist in the salvage, rescue or disposal of a marine mammal shall submit a letter report to the U.S. Fish and Wildlife Service in accordance with chapter 8 of reference (b), with an information copy to CCGDFIVE (ole).

7. **D5 WHALE SIGHTING PROGRAM:** The northern right whale is the most endangered large whale in the world. Although the right whale is believed to transit north and south through D5 waters, sightings are very rare. If right whales are sighted in D5 waters the information will provide NMFS experts with critical data. Sitings of other species of whales in D5 waters will also provide NMFS scientists with valuable information.

a. UNIT PREPARATIONS: Units shall review references (a) through (d) and follow the guidelines outlined in enclosure (4) in establishing an effective unit sighting program.

b. IDENTIFICATION GUIDE BOOKS: Units shall obtain and use marine mammal identification references. One good resource is "A Field Guide to Whales, Porpoises, and Seals from Cape Cod to Newfoundland", which is available from the Smithsonian Institute Press. This publication contains identification information for whales that transit through D5 waters.

c. SIGHTING PRIORITIES: Units shall complete sighting reports and commence notification procedures outlined paragraphs 5 and 6 above for all of the marine mammal situations listed below.

(1) Entangled or injured whales

(2) "Floaters" - Dead whales

(3) Live sightings - Right whales

(4) Stranded whales of any species

(5) Large groups of whales.

d. FORWARDING OF SIGHTING REPORTS: Whale sighting information shall be forwarded per enclosure (4) using the standard format provided in enclosure (5) with supporting 35-mm photographs and VHS video. Units have direct liaison authority with the NOAA Northeast Fisheries Science Center (see enclosure (4)) to discuss pre/post-deployment issues.

8. **ENFORCEMENT OF MMPA AND ESA VIOLATIONS:**

a. PHILOSOPHY: The Marine Mammal Protection Act (MMPA) and the Endangered Species Act (ESA) are discussed in detail in chapter 8 of reference (b). Enforcement of these Acts will target significant violators, (i.e. those vessel operators that act in a manner that may result in injury or harassment of protected species.) Education is recognized as being a fundamental part of enforcement efforts.

b. HARASSMENT DEFINITION: The term "harassment" is an element of "taking" under the MMPA and includes two levels:

(1) LEVEL A - An act of pursuit, torment, or annoyance that has the potential to injure a marine mammal or marine mammal stock in the wild.

(2) LEVEL B - An act of pursuit, torment, or annoyance that has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption or behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding or sheltering.

c. EXAMPLES OF HARASSMENT:

(1) HUMAN INTERACTIONS - Diving or swimming, throwing objects, human feeding (disrupts natural eating habits), high speed approaches by a vessel, and deliberately maneuvering a vessel close to a whale are clear examples of harassment.

(2) MORE SUBTLE VIOLATIONS - Units should also be aware of more subtle violations. Persistent engagement of a vessel in a manner that results in a recognizable and articulate disturbance of the marine mammal or endangered marine species is also a violation. Detailed narratives, videotapes, and/or photographs are essential in thoroughly documenting these cases.

d. ELEMENTS OF A VIOLATION.

(1) Jurisdiction - See reference (b), chapter 8.c.1 for a discussion of persons and vessels subject to the Jurisdiction of the U.S. for the purposes of enforcing the ESA and MMPA.

(2) A "taking" of an endangered species (ESA) or a marine mammal (MMPA) - Taking includes among other things, killing, wounding, harming, or harassing a protected species. For an expanded discussion of the substantive prohibitions of either Act, see reference (b), chapter 8.

e. ENFORCEMENT POLICY. There are no absolute standards for determining whether particular behavior constitutes harassment. The following guidance is designed to assist D5 units in determining whether or not either of the Acts has been violated.

(1) PROXIMITY TO PROTECTED SPECIES - The following guidelines, promulgated by NMFS and utilized by NOAA in evaluating potential violations, are to be used by D5 units in determining whether a vessel's proximity to marine mammals constitutes harassment:

(a) When in sight of whales (less than 1500ft away):
(1) Avoid excessive speed or sudden changes in direction or speed.

(b) Close approach procedure (less than 600ft away):
(1) Approach stationary whales no more than idle or "no wake" speed.
(2) Parallel the course and speed of moving whales.
(3) Do not attempt a head-on approach to moving or resting whales.

(c) Multi-vessel approach (less than 300ft away):
(1) All vessels in close approach stay to the side or behind the whales so they do not box in the whales or cut off their path.
(2) When one vessel is within 300ft, other vessels stand off at least 300ft from the whale.
(3) The vessel within 300ft of the whale should limit its time to 15 minutes in close approach to whales.

(d) No intentional approach (less than 100ft away):
(1) Do not approach within 100ft of whales.
(2) If whales approach within 100ft of your vessel, put engines in neutral and do not re-engage props until whales are observed on the surface and clear of the vessel.

(2) KNOWLEDGE - An action does not have to be intentional or knowing to violate either Act. However, approaches or other interactions by an individual or vessel presumed to have knowledge of the above guidelines or other statutory prohibitions (e.g. whale watching boats) will more readily be found to constitute harassment than similar behavior by an individual or vessel without such knowledge.

(3) Refusal to observe guidelines once advised or reminded will more likely result in a finding of harassment.

f. <u>ISSUING A VIOLATION</u>.

(1) STANDARDS PRESENT - If any of the situations discussed in paragraph 8.e are observed, board the vessel (if weather/operations permit) and attempt to educate the boater, issuing a written warning (Enforcement Action Report - E.A.R. citing 50 CFR 18) for minor infractions.

(2) PERSISTENCE - If the master of the vessel persists in harassment or the actions of the vessel are plainly dangerous or involve harassment, issue a violation to the master citing 50 CFR 18.

(3) DOCUMENTATION - In documenting a violation, it is critical to identity distances as well as marine mammal behavior before, during, and after the incident. Submit the Enforcement Action Report (EAR) and entire case package in the sane manner as MFCMA violations to CCGDFIVE (ole). 50 CFR 18 and 16 USC 1361- 1407 are the applicable cites for the MMPA. A list of all witnesses to the incident is also very important. Identify individuals or other vessels who are potential witnesses in your Offense Investigation Report (OIR) statements.

g. SPECIAL CIRCUMSTANCES INVOLVING WHALE WATCHING BOATS. Do not board commercial whale watching boats. Warn and document suspected violators (obtain necessary information via radio) and forward completed case package (if appropriate) to CCGDFIVE (ole) for farther review.

ENTANGLEMENT AND BOAT COLLISION REPORTING FORM

I. REPORTING SOURCE

Time/Date: ________________ Rptg source: ___________

Vsl name: ________________ Doc/Reg #: ___________

Radio call: ________________ Cell phone #: ___________

1st or 2nd hand report: ________________ How long R/S can remain O/S? _________

II. DETAILS OF INCIDENT

Posit: ________________ Geographic desc: _________

O/S WX: Winds: ____T/__._kts, Swell: ____T/___ft, Seas: ____T/___ft, Vis: ___nm, Temp: ___F, Baro: ___.___(R/F/S)

Species: ________________ No of animals: ___________

Dorsal fin: ________________ Color: ___________

Size: ________________ Dead/alive: ___________

Distinguishing marks: ________________ Photo/video taken: ___________

Type of entanglement: ________________ Nature of injury: ___________

Animal traveling or anchored by gear: ________ Cse/Spd: ___T___kts

Persons already notified: ______________________________

ENTANGLEMENT

Desc (type) of gear & identifying features (buoy color, reg #, etc.): ______________________________

Type of line (dia, color, matl): ______________________________

Mesh visible? ________________ Floats/other gear trailing? ___________

Part of body entangled? ________________ #wraps around tail/body: ___________

Life threatening? Describe: ______________________________

Enclosure (2)

ANIMAL'S APPEARANCE

First impression of condition: ____________________

Skin condition (peeling, color, whale lice present): ____________________

Obvious bleeding/wounds: ____________________

Are marks fresh or healing? ____________________

Weight (robust, emaciated, ribs or vertebrae showing?): ____________________

ANIMAL'S BEHAVIOR

General description: ____________________

Breathing (pattern, sound, smell?): ____________________

Lifting head/flukes above water? ____________________ Struggling to breathe? __________

Dive duration: ____________________

Effects on movement (flexibility, buoyancy, surfacing angle, ability to dive, appendage movement?)

____

____

COLLISION

Type of wound (prop wound, part cut off, etc?): ____________________

Location: ____________________ Severity: __________

Vessel involved: ____________________ Doc/Reg #: __________

Operator: ____________________ Homeport: __________

NMFS APPROVED LOCAL STRANDING NETWORKS

NEW JERSEY THROUGH VIRGINIA

CENTER FOR COASTAL STUDIES

P.O. Box 1036
59 Commercial St.
Provincetown, MA 02657
(508) 487-3622
Fax (508) 487-4495

NEW JERSEY

Bob Schoelkopf,
Edna Selzer
Marine Mammal Stranding Center
P.O. Box 773
Brigantine, NJ 08203
(609) 266-0538
FAX: (609) 266-6300

DELAWARE

Leon Spence/Elaine Logothetis
Delaware Division of Fish and Wildlife
P.O. Box 1401
Dover, DE 19903
(302) 739-4782
FAX: (302) 653-3431

MARYLAND

Frances Cresswell
Maryland DNR
Oxford Cooperative Lab
904 S. Morris St
Oxford, MD 21654
(410) 226-0078
(800) 628-9944
FAX: (410) 226-5925

Dave Schofield
Christine Steinert
Dr Brent Whitaker
National Aquarium in Baltimore
Pier 3 501 E Pratt St
Baltimore, MD 21202
(410) 576-3853
Beepers: (410) 450-3852
(410) 408-6633
(410) 408-4284
FAX: (410) 576-1080

VIRGINIA

Jack Musick/John Keith
V.I.M.S. School of Marine Science
College of William and Mary
Gloucester Point, VA 23062
(804) 642-7313
FAX: (804) 642-7097

Mark Swingle
Virginia Marine Science Museum
717 General Booth Blvd
Virginia Beach, VA 23451
(804) 437-4949
FAX: (804) 437-4976

WASHINGTON D.C. (and surrounding states)

Jim Mead/Charley Porter
Smithsonian Institute
Natl. Museum of Nat. History
Division of Mammals
Washington, D.C 20560
(202) 357-1923/786-2497
FAX: (202) 357-1896

Enclosure: (3)

NMFS APPROVED LOCAL STRANDING NETWORKS

NORTH CAROLINA

Vicki Thayer
NOAA, National Marine Fisheries Service
101 Pivers Island Road
Beaufort, NC 28516
(919) 728-8762
Pager: (919) 444 8064
Home: (919) 728-7464

Rhett B. White
Frank Huggins
NC Aquarium/Roanoke Island
P.O. Box 976
Manteo, NC 27954
(919) 473-3494

James T. Barnes/Director
Stuart May
Gayle Piner
NC Aquarium, Pine Knoll Shores
P.O. Box 580
Atlantic Beach, NC 28512
(919) 247-4004

Dr W. David Webster
University of NC/Wilmington
Dept of Biological Science
601 S. College Rd
Wilmington, NC 28402
(919) 395-3756

Dr Dwight Shumway, DVM
Outerbanks Animal Hospital
Outerbanks Mall
Nags Head, NC 27959
(919) 441-6066

Felix Revello
Dr Mike Rikker
Cape Lookout NSS
P.O. Box 593
Harkers Island, NC 28531
(919) 728-2250

Park Superintendent
Hammocks Beach State Park
Rt. 2, Box 295
Swansboro, NC 28584
(919) 326-4881

Dr James Lanier/Director
Paul Barrington
Andy Wood
Richard Roberts
NC Aquarium, Ft Fisher
P.O. Box 130
Kure Beach, NC 28449
(919) 458-8258

Reis Collier
Cape Hatteras NSS
Rt. 1, Box 675
Manteo, NC 27954
(919) 473-2111

Keith Rittmaster
c/o NC Maritime Museum
Beaufort, NC 28516
(919) 728-7317

Dr Claire Hoenwarter, DVM
11 Barnard Dr
Wilmington, NC 28405
(919) 251-0081 791-1446
HOME: (919) 762-0338

Dr Joseph Bonaventura
Gail Cannon
Duke University
Marine Laboratory
Marine Biomedical Center
Beaufort, NC 28516
(919) 728-2111

Park Superintendent
Fort Macon State Park
P.O. Box 127
Atlantic Beach, NC 28512
(919) 726-3775

UNIT CHECKLIST FOR D5 SIGHTING PROGRAM

1. COLLATERAL DUTY ASSIGNMENT. Identify person on board with primary responsibility for photographing, videotaping, and completing sighting forms of endangered marine mammals.

2. QUICK RESPONSE/REACTION. Train watchstanders in marine mammal identification and accurate completion of sighting form.

3. MATERIALS.

A. Field Guide. Recommend units purchase "A Field Guide to Whales, Porpoises, and Seals from Cape Cod to Newfoundland." The book was written by Steven K. Katona, Valerie Rough, and David T. Richardson and published in 1993 (or latest edition) by the Smithsonian Institute Press (available/can be purchased through local book stores).
B. Standard Sighting Forms (enclosure 5).
C. Camera(s): 35mm, 200-400mm lens, video camera(s)
D. Film, video tape

4. PRE-PATROL AND POST-PATROL CONTACT/SIGHTING REPORT ADDRESS.

A. New Jersey through Virginia
DR. JIM HAIN
C/O NOAA NORTHEAST FISHERIES SCIENCE CENTER
166 WATER STREET
WOODS HOLE, MA 02543
(508) 548-5123
FAX: (508) 548-5124

B. North Carolina
VICKI THAYER
NOAA, NATIONAL MARINE FISHERIES SERVICE
101 PIVERS ROAD
BEAUFORT, NC 28516
(919) 728-8762

5. OBSERVATION ABILITIES AND RECORD KEEPING.

A. Develop habits of observation, notation, and discussion of information with others.
B. Be alert for smaller scale oceanographic features...band slicks and "edges" represent areas of mixing...often productive for fish, birds, whales, etc.
C. Be alert for sighting cues...birds working...
D. Keep good notes and photographs/video. DO NOT SKIMP ON PHOTOGRAPHS.
E. When you have made a sighting...KEEP SPOT IN VIEW!

Enclosure (4)

NORTH CAROLINA (cont)

Dr Stephen C. Jaffe, DVM
102 South Branch Road
Wilmington, NC 28405
(919) 458-9088

George Roundtree
138 S. Colony Circle
Wilmington, NC 28405
(919) 799-8154

Dr James Smallwood
Dr Michael K. Stroskopf
Dr Mark Cline
William (Bill) Wise
NC State Univ.
College of Veterinary Medicine
Raleigh, NC 27606
(919) 829-4200

NC State Office of Marine Affairs
417 N Blount St
Raleigh, NC 27601
(919) 733-2290

NC Museum of Natural Sciences
102 N Salisbury St
Attn: David Lee
Raleigh, NC 27601
(919) 733-7450

Dr R. Guy Jaconis, DVM
1210 W. Beaufort Road
Beaufort, NC 28516
(919) 728-7600

Dr Suzanne Botts, DVM
Experimental Pathology
Laboratories, Inc.
P.O. Box 12766
Research Triangle Park,
NC 27709
(919) 544-8061

Environmental Mgmt Dept
MCB, Bldg 1103
Attn: Charles Peterson
Camp Lejeune, NC 28542
(919) 451-2195

North Carolina Marine
Fisheries
341 Arendell St
Morehead City, NC 28557
(919) 726-7021

STANDARD SIGHTING FORM

Name of Reporter: ______________________

Vessel Name or Aircraft Number: ______________________

Date and Time of Sighting: ______________________

Position (Latitude & Longitude): ______________________

Species Observed: ______________________

Number Identified: ______________________

Distinguishing Characteristics:
[Key features - size, body shape, color, blow, natural markings (spots, blazes), dorsal fin and flippers (size and shape)]

Comments:
[calf present, injuries/wounds, behavior, other species present]

Photos Taken:
[roll & frame numbers, tape number]

AFTER COMPLETING FORM, MAIL TO:

NEW JERSEY THROUGH VIRGINIA
DR. JIM HAIN
C/O NOAA NORTHEAST FISHERIES SCIENCE CENTER
166 WATER STREET
WOODS HOLE, MA 02543
(508) 548-5123
FAX: (508) 548-5124

NORTH CAROLINA
VICKI THAYER
NOAA, NATIONAL MARINE FISHERIES SERVICE
101 PIVERS ROAD
BEAUFORT, NC 28516
(919) 728-8762

Enclosure (5)

U.S. Department of Transportation

United States Coast Guard

Commander
Seventh Coast Guard District

909 S.E. First Avenue
Miami, FL 33131-3050
Staff Symbol: ole
Phone: 305-536-5623

16214
APR 14 1995

SEVENTH DISTRICT INSTRUCTION 16214.5

Subj: MARINE MAMMAL AND ENDANGERED SPECIES PROTECTION PROGRAM

Ref: (a) 50 CFR PART 226 - Designated Critical Habitat (Jonathan Pub)
(b) 50 CFR PART 227 - threatened Fish & Wildlife (Jonathan Pub)
(c) 50 CFR PART 638 - Coral & Coral Reefs of the Gulf and South Atlantic (Jonathan pub)
(d) NMFA Recovery Plan for the Northern Right Whale dtd DEC 91

1. PURPOSE. This instruction establishes procedures for Coast Guard units within Seventh District waters to further the federally mandated protection and recovery objectives for marine mammals and endangered marine species. It is intended to minimize the impact of Coast Guard operations on such species and to prevent, or detect and initiate enforcement action on, violations of U.S. law.

2. DIRECTIVES AFFECTED. None.

3. DISCUSSION. The National Marine Fisheries Service (NMFS) is the primary federal agency responsible for the conservation and management of Living Marine Resources. The Coast Guard has authority to perform law enforcement activity upon the high seas and waters subject to U.S. Jurisdiction for the prevention, detection, and suppression of violations of U.S. Law, as well as to provide support to NMFS to meet management goals for protected marine mammals. The Coast Guard and NMFS are both responsible for enforcing violations of the Endangered Species Act (ESA).

4. ACTION. All Seventh District units, cutters, and aircraft operating within the Seventh District shall comply with the provisions of references (a) through (d) and enclosure (1) of this instruction.

W. P. LEAHY

Encl. (1) Marine Mammal & Endangered Species Protection Program
(2) Selected extracts from reference (d)

MARINE MAMMAL AND ENDANGERED SPECIES PROTECTION PROGRAM

1. **AREAS OF SPECIAL INTEREST.** The Seventh District Marine Mammal and Endangered Species Protection Program applies to lateral and offshore waters. However, the following areas are of special importance:

A. **DESIGNATED CRITICAL HABITATS.** Units should review reference (a} to become familiar with those habitats designated as critical to endangered and threatened species under section 7 of the Endangered Species Act (ESA}. Within the Seventh District, specific areas of concern include the waters adjacent to Sandy Point, St. Croix, U.S. Virgin Islands (for Leatherback Sea Turtles); and the coastal waters between 31-l5N and 30-15N from the coast out to 15 NM and the coastal waters between 30-l5N and 28-00N from the coast out to 5 NM (for Northern Right Whales).

B. **HABITAT AREAS OF PARTICULAR CONCERN.** Units should review reference (c) to become familiar with those habitats designated as Habitat Areas of Particular Concern (HAPC). Within the Seventh District, specific areas of concern include the Oculina Bank which is bounded on the north by 27-53N, on the south by 27-30N, on the east by 79-56W and on the west by 80-00W. Within the HAPC, fishing with bottom longlines, traps, pots, dredges, or bottom trawls is **prohibited.** Although technically located within Eighth District waters, the Florida Middle Grounds are routinely patrolled by Group St. Petersburg assets. Reference (c) contains the specific coordinates of the Middle Grounds in which fishing with bottom longlines, traps, pots, dredges or bottom trawls is **prohibited.** Additional prohibitions concerning possession of coral and allowable octocorals also apply.

2. **ENDANGERED SPECIES PROTECTION EFFORT.**

A. DEDICATED SURFACE/AIR PATROLS.

(1) TASKING - GANTSEC, CTU 44.7.7 and Groups Miami, Mayport and Charleston will be routinely tasked to conduct enforcement boardings, disseminate information packets, and make broadcasts to mariners in the vicinity of these areas of interest.

(2) AREA SURVEYS - Air Stations Miami & Clearwater and designated surface assets will periodically be directed to embark National Marine Sanctuary (NMS) and/or NMFS officials to conduct surveys to facilitate research of the areas of interest.

(3) DOCUMENTING PATROL EFFORTS - Units shall document marine mammal protection efforts in their weekly MIPRs or Daily Situation Report (SITREP) Feeder. Additionally, units patrolling either the Florida Keys or Grays Reef Marine sanctuaries shall document their activities in Abstract of Operations reports in addition to the MIPRs/SITREPs.

B. SAFETY BROADCAST FOR RIGHT WHALES. Groups Charleston and Mayport shall make the following safety broadcast on right whales twice a day from 1 December to 1 April and when right whales are reported in the Group's AOR:

"The severely endangered Northern Right Whale is a regular visitor to North Florida/South Georgia coastal waters. The National Oceanic and Atmospheric Administration has designated the coastal waters between 31-l5N and 30-15N from the coast to 15 NM offshore, and the coastal waters between 30-l5N and 28-00N from the coast to 5 NM offshore, as critical habitat for this species.

Vessel operators are reminded to use caution around and remain clear of right whales. Intentional close approach to right whales is prohibited and may result in a violation of Federal or state law."

C. CUTTER TRANSITS. During the course of normal, non-emergency Operations, Seventh District units transiting the Northern Right Whale critical habitat areas shall use caution and be alert for whales, using speed proportional to the mission to reduce the possibility of whale strikes.

D. SURFACE UNIT NAVIGATION. Units should plot and maintain the coordinates of the Northern Right Whale critical habitat areas on navigational and law enforcement working charts.

E. UNIT RESPONSIBILITIES. If a Seventh District unit sights a whale(s), that unit should:

(1) Floating units should give whales a wide berth, using speed proportional to the mission to reduce the possibility of whale strikes, and maintain a diligent lookout in the area to best avoid contact with that whale or other whales in the area.

(2) Notify vessels in the vicinity about the locations of the whales via VHF radio, and advise those vessels to proceed through the area with caution.

(3) Inform OPCON immediately of any sightings of right whales or any other whale that is entangled, injured or dead.

(4) When authorized personnel are responding to an injured, dead, entangled or stranded protected species, Coast Guard units in the vicinity should assist as operations permit by securing the area to keep onlookers from interfering. "Authorized" personnel should possess a federal or state permit.

(5) Complete and forward the sighting report per paragraph 5.e. below.

3. **OPCON RESPONSIBILITIES.**

A. NOTIFICATIONS

(1) SAFETY VOICE BROADCAST - Upon receiving sighting reports of right whales or any other entangled or injured whale, OPCON should initiate a Safety Voice Broadcast (update/reissue after each sighting) as appropriate. The broadcast should advise mariners to exercise caution when navigating the area by adjusting course and speed as necessary to minimize disturbing or striking a right whale. For purposes of Safety Voice Broadcasts, dead whales will be treated as hazards to navigation.

(2) ENTANGLEMENTS, BOAT COLLISIONS, AND STRANDINGS - Units shall complete the Entanglement & Boat Collision Reporting Form and relay the information to OPCON. OPCON shall notify appropriate authorities as outlined below:

(a) Entangled whales. OPCON shall immediately notify the agencies listed on page 11 of this instruction. Coast Guard units should not attempt to remove debris from entangled whales. Only the Center for Coastal Studies is authorized to have direct contact with the animals.

(b) Stranded whales. OPCON will immediately notify the local stranding network to facilitate rescue of the stranded animal.

(c) Stranded/entangled turtles. The Green, Loggerhead, Leatherback, and Kemp's Ridley sea turtles are presently listed as either threatened or endangered reptiles. Coast Guard personnel can cut nets or fishing gear to free entangled turtles only when immediate response may save the turtle(s) from further injury or death. OPCON should immediately notify the Center for Coastal Studies which will provide advice or initiate action to rescue the animal(s).

B. LOGISTICAL SUPPORT. Units are authorized and may be tasked by OPCON to provide logistical support for NMFS-approved disentanglement and stranding teams and their equipment.

C. SITREP. All cases involving protection of endangered species will be documented via SITREP.

D. LETTER REPORT. Units which assist in the salvage, rescue or disposal of a marine mammals shall submit a letter report to the U.S. Fish and Wildlife Service in accordance with chapter 8 of the Maritime Law Enforcement Manual, with an information copy to CCGD7 (ole).

4. **DISPOSAL OF PROTECTED SPECIES.** There is no specific U.S. Coast Guard responsibility for the salvage or disposal of dead whales. Only situations that pose a safety, health, or navigation hazard, or involve significant public affairs interest, should be pursued. Units shall not tow or attempt to sink dead marine mammals without OPCON concurrence. If there is no interest by appropriate organizations after having been notified about the location of a dead whale or other protected species, abandon the carcass and continue with normal operations.

5. **D7 WHALE SIGHTING PROGRAM.** Per reference (d), the Northern Right Whale is the most endangered large whale in the world. Only the western North Atlantic has a significant number of northern right whales (300-350), with the eastern North Atlantic population virtually extinct. The whale sighting program will provide NMFS experts with critical data. The highest sighting priority for D7 units involves right whales.

A. UNIT PREPARATIONS. CCGD7 units should review references (a) through (d), and follow guidelines outlined in this instruction in establishing an effective unit sighting program.

B. IDENTIFICATION GUIDE BOOKS. Units should ensure that appropriate personnel are able to identify Right Whales and other protected species. The Sierra Club Handbook on Marine Mammals is available from the Sierra Club for $15.00. Marine Mammals Ashore - A Field Guide for Strandings is available for $25.00 front Texas A&M University. This publication has waxed pages which are water resistant in a spiral bound format. "A Field Guide to Whales, Porpoises, and Seals from Cape Cod to Newfoundland" was written by Steven K. Katona, Valerie Rough, and David T. Richardson and published in 1993 by the Smithsonian Institute Press.

C. SIGHTING PRIORITIES. The specific priorities of the D7 sighting program are:

(1) Entangled or injured right whales;

(2) "Floaters" - Dead right whales;

(3) Live sightings - Right whales;

(4) Entangled or dead whales of any other kind;

(5) "Floaters" - Dead whales of any other kind; and

(6) Large groups of whales.

D. PROBABLE LOCATIONS OF RIGHT WHALES. Historical sighting data from aerial and shipboard surveys indicates right whales are normally found in the vicinities of:

(1) BROWNS/BACCARO BANKS - Between these banks on the Nova Scotian shelf from July through November. This area appears to be significant to the whales socially; courtship activities at the surface are frequently observed.

(2) BAY OF FUNDY - Late July through mid-November, with a peak in population in September. This area appears to be the primary summer nursery.

(3) CAPE COD BAY - March through early May. This is the traditional and historical habitat. It has also been designated a critical habitat. U.S. Coast Guard presence is needed to control certain whale watching problems. Units should work directly with the Massachusetts Environmental Police (MEP) to enforce both state and federal right whale protection regulations.

(4) STELLWAGEN BANK NMS AND JEFFREYS LEDGE - July through September. This is the period of the greatest whale watch effort. U.S. Coast Guard presence would curtail reckless vessel operations especially on weekends and major holidays.

(5) GREAT SOUTH CHANNEL - Mid-April through July. This is the southern passage to and from the Gulf of Maine. The most important task is to know where concentrations of whales are located in order to inform mariners (especially large ships).

(6) SOUTHEASTERN U.S. {CHARLESTON, SC TO MIAMI, FL) - September through April. This primary calving ground is occupied by females before, during and after calving.

E. FORWARDING OF SIGHTING REPORTS. Whale sighting information shall be forwarded to the SEUS Team for Recovery of the Right Whale (see paragraph.3). The use of 35-mm photographs and VHS video to supplement the reports is encouraged. Direct liaison with the NOAA (are outlined on p. 11) to discuss pro/post-deployment issues is also encouraged.

6. **ENFORCEMENT OF MMPA AND ESA VIOLATIONS**

A. PHILOSOPHY. Enforcement of Marine Mammal Protection Act (MMPA) and ESA regulations will target significant violators, i.e., those vessel operators that act in a manner that may result in injury or harassment of protected species. Education is recognized as being a fundamental part of enforcement efforts.

B. HARASSMENT DEFINITION. The term "harassment" is an element of taking under the MMPA and includes two levels:

(1) LEVEL A - An act of pursuit, torment, or annoyance that has the potential to injure a marine mammal or marine mammal stock in the wild.

(2) LEVEL B - An act of pursuit, torment, or annoyance that has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns. including, but not limited to, migration, breathing, nursing, breeding, feeding or sheltering.

C. EXAMPLES OF HARASSMENT.

(1) HUMAN INTERACTIONS - Diving or swimming, throwing objects, human feeding (disrupts natural eating habits), high speed approaches By a vessel, and deliberately maneuvering a vessel close to a whale are clear examples of harassment.

(2) MORE SUBTLE VIOLATIONS - Units should also be aware of more subtle violations persistent engagement of a vessel in a manner that results in a recognizable and articulable disturbance of the marine mammal or endangered marine species is also a violation. Detailed narratives, videotapes, and/or photographs are essential in thoroughly documenting these cases.

D. STANDARD FOR DOCUMENTING VIOLATIONS. Evidence of the following elements of a violation should be obtained to establish a violation of the MMPA or ESA.

(1) Personal knowledge of guidelines in references (a) through (c) (can be assumed of whale watching boat operators).

(2) Refusal to observe guidelines in references (a) through (c) once advised/reminded.

(3) Documented behavior (observed, photographed, videotaped, etc.) fitting harassment definition above.

(4) Distances between the violator and whale before, during, and after the incident.

(a) Buffer Zone. There is a buffer zone surrounding a right whale which consists of an area outward from the right whale a distance of 500 yards in all directions.

(b) Departures. Vessels are required to depart immediately from any buffer zone created by the surfacing of a right whale.

(c) Approaches. Vessels may not approach a right whale or turn in any manner to intercept a right whale within a buffer tone.

(d) Interference. No vessel may disrupt the behavior of a right whale within a buffer zone.

(e) Exceptions. Any person issued a federal or state permit may conduct scientific research, observation or management at the right whale as authorized under the permit.

(f) Commercial Fishing. Commercial fishing vessels hauling back, towing gear or fishing at anchor within a buffer zone created by the surfacing of a right whale may complete the haul, tow or fishing operation, provided it does so with minimum disruption to the right whale, does so in a direction away from the right whale and departs the buffer zone immediately after the haul, tow or fishing operation.

E. ISSUING A VIOLATION.

(1) STANDARDS PRESENT - If "harassment" as discussed in paragraph 6.0. is observed, board the vessel (if weather/operations permit) and attempt to educate the vessel operator. Issuing a written warning for minor infractions is authorized at the boarding officers discretion if it is deemed that the mariner's actions were unintended or due to ignorance of the law, and will be corrected.

(2) PERSISTENCE - If the master of the vessel persists in harassment, or the actions of the vessel are plainly dangerous or involve a significant act of harassment, issue a violation to tho master.

(3) DOCUMENTATION - In documenting a violation, it is critical to identity distances as well as marine mammal behavior before, during, and after the incident. Submit the Enforcement Action Report (EAR) and documentation in the same manner as MFCMA violations to the local NMFS agent. A list of all witnesses to the incident with phone numbers and/or addresses is also very important. Identity individuals or other vessels who are potential witness in your Offense Investigation Report (OIR) statements.

F. SPECIAL CIRCUMSTANCES INVOLVING WHALE WATCHING BOATS. Commercial whale watching boats need not be boarded for all perceived violations. If apparent violations are observed, warn and document suspected violators (obtain necessary information via radio) and forward completed case package (if appropriate) to NMFS for further review.

ENTANGLEMENT AND BOAT COLLISION REPORTING FORM

I. REPORTING SOURCE

Time/Date: ______________ Rptg Source: ______________

Vsl Name: ______________ Doc/Reg #: ______________

Radio Call: ______________ Cell Phone: ______________

1st or 2nd hand report: ______________ How long R/S can remain O/S? ______________

II. DETAILS OF INCIDENT

Posit: ______________ Geographic Desc: ______________

O/S Wx: Winds ____T/______KTS, Swell _____T/_____FT

Seas _____T/____FT, Vis ____NM, Temp ____F, Baro ___.___(R/F/S)

Specie: ______________ # of Animals: ______________

Dorsal Fin: ______________ Color: ______________

Size: ______________ Deal/Alive: ______________

Distinguishing Marks: ______________ Photo/Video Taken: ______________

Type of Entanglement: ______________ Nature of Injury: ______________

Animal traveling or Anchored by Gear: ________ Cse/Spd: ______________

III. ENTANGLEMENT

Desc (type) of gear & identifying Features (buoy color, reg #, etc) ______________________________

____

Type of Line (dia, color, matl): ______________________________

Mesh Visible? ______________ Floats/other gear trailing? ______________

ENTANGLEMENT AND BOAT COLLISION REPORTING FORM (Page 2)

Part of Body Entangled? ________________ # Wraps around tail/body: ________________

Life Threatening? Describe: ____

I. NMFS APPROVED LOCAL STRANDING NETWORKS
(Report to in the order listed)

MR. MIKE HARRIS
SOUTHEASTERN U.S. IMPLEMENTATION TEAM FOR RECOVERY OF THE NORTHERN RIGHT WHALE
1-800-272-8363ext 229
(912) 262-3336

NMFS ENFORCEMENT, SOUTHEAST REGION
ENDANGERED SPECIES BRANCH
(813) 570-5344

FLORIDA DEPARTMENT OF ENVIRONMENTAL RESOURCE MANAGEMENT (DERM)
1-800-342-5367

UNIT CHECKLIST FOR D7 SIGHTING PROGRAM

1. COLLATERAL DUTY ASSIGNMENT. Identify positions on board with primary responsibility for photographing, videotaping, and completing sighting forms for endangered marine mammals.

2. QUICK RESPONSE/REACTION. Train watchstanders in marine mammal identification and accurate completion of sighting form.

3. MATERIALS.

   a. Field Guide. It is recommended that units have a field guide to aid in the identification of endangered marine mammals. A list of books that have been found useful for this purpose is on p.4 of this Instruction.
   b. Standard Sighting Forms
   c. Camera(s): 35mm, 200-400mm lens, video camera(s)
   d. Film, video tape

4. PRE-PATROL AND POST-PATROL CONTACT.

   Mr. Bill Brooks
   C/O NOAA NORTHEAST FISHERIES SCIENCE CENTER
   JACKSONVILLE, FLORIDA
   (904) 448-4300

5. OBSERVATIONAL ABILITIES AND RECORD KEEPING.

   a. Develop habits of observation, notation, and discussion of information with others.
   b. Be alert for smaller scale oceanographic features...band slicks and "edges" represent areas of mixing...often productive for fish, birds, whales, etc.
   c. Be alert for sighting cues...birds working..
   d. Keep good notes and photographs/video. DO NOT SKIMP ON PHOTOGRAPHS.
   e. When you have made a sighting...KEEP SPOT IN VIEW!

RECOVERY PLAN

for the

NORTHERN RIGHT WHALE

(Eubalaena glacialis)

Prepared by the

RIGHT WHALE RECOVERY TEAM

for the

OFFICE OF PROTECTED RESOURCES
NATIONAL MARINE FISHERIES SERVICE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
SILVER SPRING, MARYLAND

December 1991

Approved: [signature]
Michael F. Tillman
Deputy Assistant Administrator for Fisheries

EXECUTIVE SUMMARY

The northern right whale, *Eubalaena glacialis*, is the world's most endangered large whale. Current estimates place the total number of remaining animals at no more than 600. About 350 occupy the waters of the western North Atlantic and between 100 and 300 occur in the North Pacific Ocean. The northern right whale was initially placed in this precarious position because of hunting, which started over 800 years ago and continued until the 1930's. While protected by international agreement for over 50 years, there is no evidence that the number of northern right whales has increased substantially although other large whale species, similarly protected, have shown various population increases. Both natural and human-induced factors have been suggested as responsible for this absence of measurable recovery.

This recovery plan identifies known and potential factors affecting the northern right whale and recommends actions to reduce or eliminate impacts to the northern right whale. The impacts and recommended recovery actions are presented separately for the North Atlantic and North Pacific populations.

The major threats to the North Atlantic population were identified as collisions with ships, entrapment or entanglement in fishing gear, habitat degradation and disturbance by vessels. Risks to the North Pacific population(s) are poorly known, but are presumed to be similar to those in the North Atlantic. Hunting, while not presently a problem, could reemerge as a significant problem should international prohibitions become ineffective.

While certain measures designed to assist the northern right whale are already in place, additional actions, as discussed in detail in the plan, need to be accomplished. Recovery will not be quick. It is estimated that even under the best of conditions, it will take more than 100 years for the northern right whale population to reach pre-exploitation levels in both oceans.

The plan presents an action strategy to guide a coordinated effort to allow the northern right whale the best chance of recovery based on the present state of knowledge and information. Recommended recovery actions include, but are not limited to: (1) an aggressive program of education and enforcement to reduce the risks of ship collisions and entanglement in fishing gear that entrap northern right whales, (2) the consideration of designation of three areas in the waters of the United States as "critical habitat" which are deemed to be necessary to the survival of the species, and (3) the restriction of recreational whale watching activities directed at the northern right whale. In addition to cooperation with Canadian authorities to ensure the fullest protection possible for this highly migratory species, research on many aspects of northern right whale ecology and vulnerability is needed.

Many of the recommended actions require funds; this plan recommends that priority in the allocation of these funds be given to the Western North Atlantic population. As more information is learned about the North Pacific population, a separate recovery effort is recommended for those animals. In addition, steps should be taken to coordinate and, as appropriate, combine efforts benefitting the northern right whale with other species, especially the humpback whale.

II. THE NORTHERN RIGHT WHALE

A. Species Description and Taxonomy

The northern right whale, *Eubalaena glacialis* (Müller, 1776), is a robust, medium-sized baleen whale. Adults generally range in length between 45 and 55 feet and can weigh up to 70 tons. Females grow larger than males. The northern right whale's distinctive features include the absence of a dorsal fin, a large head (more than 1/4 of the body length), a narrow upper jaw and strongly bowed lower jaw. Tough cornified skin patches on the head, called callosities, are used with other marks to identify individuals. Two rows of dark baleen plates descend from the upper jaw. The plates are long (up to nine or more feet) and numerous, with about 225 on each side. The animals are generally black in color although individuals often exhibit variable white patches on the throat and belly. The tail is broad, deeply notched, and all black with a smooth trailing edge. Because of the two widely separated blowholes, its spout or blow forms a distinctive V-shape when seen from the front or back. The animals blow is a useful field characteristic for identifying a right whale from a distance. (Kraus *et al.*, 1988).

In this plan, the recommendations of Schevill (1986) will be followed and all northern right whales in both the North Atlantic and North Pacific oceans will be considered as one species, *Eubalaena glacialis* (Müller, 1776). There is a question as to whether the Atlantic and Pacific populations deserve separate recognition at the subspecific level. If such a separation is demonstrated as valid, the North Atlantic population could be referred to as *Eubalaena glacialis glacialis* (Müller, 1776) and the North Pacific population could be *Eubalaena glacialis japonica* (Gray, 1864).

The southern right whale is currently considered to be a separate but closely related species, *Eubalaena australis* (Desmoulins, 1822). The justification for keeping the two species taxonomically separate rests on skeletal data (Müller, 1954) and recently completed genetics studies (Schaeff *et al.*, 1991). However, even if they are combined, right whales of the genus *Eubalaena* will, with the possible exception of the blue whale, still be the rarest of the world's large whales and will still require a committed effort to assist their recovery.

B. Zoogeography

The pre-exploitation distribution of the northern right whale probably included the temperate and subarctic, coastal and/or continental shelf waters of the North Pacific and North Atlantic Oceans. Post-exploitation distribution--that is, since 1935--is more limited in both oceans. In general terms, the waters between Nova Scotia and Florida in the Western North Atlantic and the waters in the Gulf of Alaska (50°-58°N, 140°-152°W) appear to be the primary areas inhabited by the present northern right whale populations. The recent distribution of both North Atlantic and North Pacific populations is described briefly in Sections III.A.2 and IV.A.2. Further detail is provided in Brownell *et al.* (1986).

Because of the disjunct geographic distribution of northern right whales in the North Atlantic and North Pacific Oceans and their ocean-specific recovery needs, the plan will address the two populations separately.

C. Protective Legislation

Right whales have been protected from commercial whaling by the International Whaling Commission and its implementing legislation since 1949. In U.S. waters, northern right whales are protected by the Marine Mammal Protection Act (MMPA) and ESA. Right whales are also listed as 'endangered' (Appendix I) under the Convention on International

Trade in Endangered Species of Wild Fauna and Flora (also known as CITES), and by the Committee on the Status of Endangered Wildlife in Canada under the Cetacean Protection Regulations of Canada (Gaskin, 1987). Except for one known incident of directed take (Sergeant, 1966), international protection for this species has been followed.

Under the ESA it is a violation to 'take' (defined as; to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt any of the above) endangered species of fish or wildlife. In addition, endangered species or their parts or products may not be exported from, or imported into the United States, except for "scientific purposes or to enhance the propagation or survival of the affected endangered species." The ESA also authorizes Cooperative Agreements between states and the Federal Government for increased endangered species management, research, and law enforcement. In addition, the ESA requires all Federal agencies to consult with The National Marine Fisheries Service (NMFS) to ensure that any action taken, permitted or funded will not jeopardize the continued existence of listed species under the jurisdiction of NMFS. This requirement is a very important regulatory tool for protecting the northern right whale and its habitat because many activities that may affect the northern right whale or its habitat will be conducted, permitted, or funded by a Federal agency.

The MMPA established a national policy to protect marine mammals so that they can reach and maintain optimum sustainable population levels consistent with the maintenance of the health and stability of the ecosystem of which they are a part. The MMPA prohibits the 'take' of any marine mammal, with certain specific exceptions, in a manner similar to the ESA.

III. NORTH ATLANTIC POPULATION

A. Natural History

1. Stocks

Historical data and recent sightings suggest that the North Atlantic was inhabited by two stocks, one on each side of the ocean. However, there is no current evidence to suggest that a viable population in the eastern North Atlantic still exists, although very small numbers may remain (Brown, 1986).

2. Distribution and habitat use

Although 20th century sightings of northern right whales have been recorded from areas such as Greenland, Bermuda and Texas, observations of the western North Atlantic population are concentrated in five known 'high-use' areas: (1) coastal Florida and Georgia, (2) the Great South Channel east of Cape Cod, Massachusetts, (3) Cape Cod Bay and Massachusetts Bay, (4) the Bay of Fundy, and (5) Browns and Baccaro Banks south of Nova Scotia. Sightings also occur in waters between these five areas. Additional 'high-use' areas may exist, since recently collected photographic and genetic data indicates a segment of the population that is not often seen in the known habitats frequently (Kraus, pers. comm.).

The population appears to migrate seasonally. Generally, most of the whales spend the spring and early summer off the coast of New England, then in the latter part of the summer and fall, move to the waters off southern Canada. Some whales may remain in these northern waters throughout the winter, but most leave. A small portion of the population, consisting almost entirely of pregnant females and juveniles, migrates south in the winter to the only known calving ground for the species, the coastal waters of Georgia and northeast Florida. Winn *et al.* (1986) characterized this distribution pattern as occurring in distinct seasonal phases, although a certain amount of variability is to be expected as whales respond to changing environmental conditions including the availability of prey. Because many recommended recovery actions are both seasonally and geographically specific, these phases are described in more detail below.

Phase I. Winter calving

The coastal waters of the southeastern United States, and especially the shallow waters from Savannah, Georgia, south to Cape Canaveral, Florida, are a wintering ground for a small but significant part of the population. Although a few juveniles and males have been sighted in the region, most of the records of the last decade involve adult females, many of whom are accompanied by very young calves (Kraus *et al.*, 1988). The fact that at least six newborn calves have washed ashore on the southeast coast in the last 10 years adds to the evidence that these waters are an important calving ground. In addition, adult females are occasionally observed unaccompanied early in the season and later with a calf. The winter calving season appears to begin as early as September and can end as late as April. However, sporadic sightings of newborn calves have occurred in May, July and September. Peak abundance and calving appears to be from December through March. Sighting effort has not been uniform throughout the entire period, however, and further work is needed to determine more accurately when whales are present and the frequency of their occurrence. The whales seen in the southeast represent only a small portion (approximately 5-10 percent) of the total known population (Kraus, 1985). The wintering ground(s) for the remainder of the population remains unknown. It is believed that remote telemetry research will be essential in locating the wintering ground(s) for the rest of the population.

traditional/historical northern right whale habitat. One northern right whale was killed by a ship in this area in 1986. Shipping frequency needs to be assessed.

1114. Great South Channel.

Northern right whales are present in the area from mid-April through June, although distribution varies from year to year. The Great South Channel is the southern passage to and from the Gulf Of Maine for shipping between Boston, Portland, and points south. Since the shipping lanes are bounded on the east by Georges Bank and on the west by Cape Cod and Nantucket Shoals, it would be difficult to shift them. The frequency of shipping through the channel needs to be assessed.

1115. Southeastern United States (Charleston, South Carolina, to Miami, Florida).

This region is the known primary calving ground for North Atlantic right whales, and is occupied by females before, during and after calving from September through April. Significant shipping ports include Charleston, South Carolina, Savannah and Brunswick, Georgia; and Fernandina Beach, Jacksonville and Port Canaveral, Florida. There are also military installations with significant ship traffic at Kings Bay, Georgia, and Mayport and Canaveral, Florida. Because of the sand bottom and coastal currents, all of these ports and military installations require extensive maintenance dredging. An assessment of vessel traffic around Kings Bay was done by the Navy for the winters of 1988, 1989, and 1990. Vessel traffic frequency for the rest of the area is unknown.

1116. Migratory routes between the high-use areas discussed above.

Northern right whales move between the high-use areas off New England and Canada to and from the southeastern U.S. waters. The specific routes are poorly known. Northern right whales are vulnerable to ship strikes in these migratory routes but the level of vulnerability is unknown.

112. Analyze known kills and scarring patterns on living northern right whales to identify vessel activities that put whales at risk of collision.

Studies of scars or injuries on whales can provide information about how collision with ships occurred. Estimates of vessel sizes, types, and travel speeds are needed to identify ships posing a high risk to northern right whales. Such information should be used in conjunction with assessments of vessel types found in each known habitat to identify high risk seasons and regions to target for management actions.

All known ship collision mortalities have involved juveniles less than 4 years old. An assessment of age or sex related behaviors is needed to identify areas and/or seasons where such activities put juvenile northern right whales at risk of ship collisions. Existing data should be examined in more detail to determine how ship strikes may be occurring. Research is needed on the responses of northern right whales engaged in different activities to the approach of large vessels.

OBJECTIVE 3. Identify and protect habitats essential to the survival and recovery of the northern right whale.

By virtue of particular biological, physical, and/or chemical conditions, certain geographic areas appear to be essential for meeting the biological requirements of northern right whales. Human activities may either diminish the capacity of these areas to meet these requirements, or act to displace whales to less suitable habitats. For example, oil spills or discharges of toxic chemicals in preferred feeding areas may contaminate or reduce the abundance of prey. Similarly, if pregnant females are displaced from preferred calving areas, other sites may not be suitable for successful calving and nursing. Restoration and maintenance of a population can only succeed if essential habitats are maintained in an optimum condition over an extended period of time because the recovery of the northern right whale will probably not occur in our lifetime.

The marine ecosystem is a complex and dynamic environment. No single component or habitat exists in isolation from the system as a whole. Physical boundaries between regions or ecosystem components are usually variable and migratory species shift from one region or food web to another. As in all ecosystems, impacts on one component of the ecosystem usually affect the other components in some way. Long-term protection of any individual species or habitat must eventually include reduction of adverse anthropogenic impacts on the entire marine ecosystem.

Natural events or environmental conditions, such as changes in weather or climate, or shifts in the prey distribution, may affect the location and condition of essential habitats. Although such changes cannot be predicted at the present time, it is important that the recovery program be flexible to respond when changes are detected.

To date, five essential habitat areas have been identified in the coastal waters of the United States and Canada. Four of these areas are used seasonally as feeding, mating, and/or nursing areas. They are the Great South Channel, Cape Cod and Massachusetts Bays, the lower Bay of Fundy, and the southern Nova Scotian shelf. The fifth area, which is used during winter by females as a calving and nursing ground, includes nearshore waters off Georgia and northeast Florida. Habitats used by other age and sex classes of northern right whales during the winter have not yet been located, and other feeding or calving grounds might exist.

The survival and eventual recovery of the North Atlantic right whale population is dependent upon protective measures both for the species and its habitat. Existing Federal, state, provincial and local laws and regulations must be rigorously enforced in regard to northern right whale habitat. If existing conservation statutes or programs are found to be inadequate to protect northern right whale habitat, then additional statutes should be promulgated as necessary, and programs developed to improve protection of essential habitat.

Under the ESA, special emphasis should be placed on protection of essential northern right whale habitat in Section 7 consultations carried out by all Federal agencies. Other applicable Federal and state statutes should be strictly applied in situations involving known northern right whale habitat.

Existing protective mechanisms may or may not be adequate to detect problems affecting northern right whale habitat. In addition, restrictions put in place to mitigate known adverse effects to essential northern right whale habitats may not be properly carried out due to inadequate follow-up monitoring. An evaluation of the adequacy of existing statutes to protect each known habitat is necessary.

TABLE 3

Unpublished list of Pacific northern right whale sightings north of 50° N contained in the Platforms of Opportunity Program data base, NMFS National Marine Mammal Laboratory, Seattle, WA. Numbers contained in parentheses are tentative sightings. Current listings taken June 10, 1987.

Date	Latitude	Longitude	Number of Individuals	Comments
07/07/77	56°27.5'N	135°38.4'W	1	
03/27/79	59°35.8'N	139°55.8'W	4	Seen at 25 yards
10/16/80	58°48.1'N	145°00.3'W	(1)	
06/21/83	51°29.0'N	173°38.5'E	1	Gillnet Retrieval
09/01/85	54°29.5'N	133°45.0'W	(1)	
09/08/85	56°54.1'N	163°55.6'W	1	