UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, Maryland 20910

Endangered Species Act - Section 7 Consultation

Biological Opinion

Agency: U.S. Army Corps of Engineers, South Atlantic Division

Activity: Hopper dredging of channels and beach nourishment activities in the Southeastern United States from North Carolina through Florida East Coast

Consultation Conducted By: National Marine Fisheries Service, Southeast Regional Office

Date Issued: August 25, 1995

BACKGROUND

The U.S. Army Corps of Engineers (COE) has primary responsibility for maintaining navigational channels in U.S. waters. To accomplish this task, dredging is periodically required. A variety of dredge types and techniques are employed on a channel-specific basis, dependent upon the characteristics of channels, availability of disposal sites, local environmental regulations, types of material to be removed, proposed timing of the dredging, etc. In the southeastern United States, at least three types of dredges (hopper dredges, clamshell dredges, and pipeline dredges) are commonly used.

In addition, Congress has mandated that the COE provide periodic beach nourishment to certain beaches in the southeastern U.S. that suffer severe erosion rates. Nourishment activities consist of dredging coarse high-quality sand from offshore borrow areas then pumping the material onshore.

A formal consultation conducted on dredging and beach nourishment operations from North Carolina through Cape Canaveral, Florida, in 1991, and incorporated by reference, concluded that clamshell and pipeline dredges were not likely to adversely affect listed species. There is no new information to change the basis for

that finding. Lethal takes of sea turtles by hopper dredges have been documented, however, and consultations on takes have been conducted since 1980.

Previous Consultations

Consultation on the effects of hopper dredging in the Canaveral ship channel was initiated in August 1978, after NMFS trawl surveys verified reports of high turtle abundance in the channel. On March 30, 1979, NMFS issued a biological opinion based on a threshold examination of the situation. This opinion concluded that insufficient information existed to determine whether or not dredging was likely to jeopardize the continued existence of sea turtles. Through agreement with the COE and the U.S. Navy, trawl surveys were implemented to further assess turtle abundance and distribution in the channel.

On January 22, 1980, the National Marine Fisheries Service (NMFS) issued a biological opinion concluding that "dredging may result in the loss of large numbers of loggerhead sea turtles but is not likely to result in jeopardizing either the loggerhead or Atlantic ridley sea turtle stocks." This opinion recommended that NMFS-approved observers be placed aboard hopper dredges in the Canaveral channel to monitor turtle take, and that dredging be restricted to the period of August 1 through November 1. No evidence of turtle take by hopper dredges existed at this point, but the potential for take was recognized.

A total of 71 turtle takes by hopper dredges were documented in the Canaveral channel over the period of July 11 through November 13, 1980. These takes were considered minimum estimates of mortality due to restrictions inherent in observing turtles within the dredged material. From 1980 through 1986, NMFS, the COE, and the U.S. Navy continued efforts to reduce or eliminate turtle take by hopper dredges in the Canaveral entrance channel. Efforts included attempts to scare turtles out of the channel, detect and capture turtles, remove and relocate turtles, and deflect turtles from the draghead. No acceptable means of eliminating the take of sea turtles by hopper dredges was identified, and take of sea turtles continued.

Trawl surveys of five east coast channels, conducted during 1981 and 1982 (Butler et al., 1987), indicated that these channels did

not contain sea turtles at abundances approaching those observed in Canaveral. One or two turtles were collected in each of the surveyed channels, while hundreds were caught in the Canaveral channel. Because NMFS had no information to suggest that turtle takes in other channels was significant, additional channel surveys were not required, and the Canaveral hopper dredging project was treated as a unique problem.

In 1986, the U.S. Navy reinitiated Endangered Species Act (ESA) Section 7 consultation on Kings Bay, Georgia, channel dredging. The scope of the project involved widening and deepening existing channels and extension of the channel approximately 14 miles. The Navy proposed to implement sea turtle conservation measures including observer coverage, screening of the dredge, and a stand-by trawler to catch and remove turtles, if necessary. From July 1987 through December 1989, a total of 21 turtles were taken during hopper dredging operations in the Kings Bay project.

Turtle take by hopper dredges in Kings Bay resulted in major changes in NMFS policy on channel dredging. This was the first documented take of turtles by hopper dredges anywhere other than in the Canaveral channel. Additionally, while takes in Canaveral were confined to loggerhead turtles, Kings Bay takes included three endangered Kemp's ridley turtles and three endangered green turtles. NMFS began to consider the additive consequences of hopper dredging along the southeast coast.

The Jacksonville District COE and the COE Waterways Experiment Station jointly sponsored a May 11-12, 1988, "National Workshop on Methods to Minimize Dredging Impacts on Sea Turtles," held in Jacksonville, Florida. This workshop brought together representatives of the COE, NMFS, the U.S. Navy, the dredging industry and the environmental community to discuss the dredging/sea turtle conflict. In a July 8, 1988, letter from the Assistant Administrator for Fisheries to the Acting Commander of the COE, NMFS applauded the COE efforts in sponsoring the workshop and advised the COE of agency plans to assess the cumulative impacts to sea turtles of dredging in channels other than Canaveral. Formal consultation was requested for all areas in which hopper dredging was proposed, and observers were required on 25-100 percent of all hopper dredging activities in Brunswick, Savannah, and Wilmington Harbor dredging projects.

Consultation was reinitiated in 1991 in response to the high levels of turtle takes observed, as well as nearby strandings of crushed turtles, during hopper dredging in Brunswick and Savannah channels. The biological opinion, issued November 25, 1991, found that continued unrestricted hopper dredging in channels along the southeast region's Atlantic coast could jeopardize the continued existence of listed sea turtles. A reasonable and prudent alternative was given which included the prohibition of hopper dredging in the Canaveral channel, seasonal restrictions which allowed hopper dredging from December through March in channels from North Carolina through Canaveral, or use of alternative dredges in all southeastern U.S. channels.

The reasonable and prudent alternative issued in the 1991 biological opinion has proven very effective in reducing sea turtle captures. Since the implementation of the measures of the 1991 biological opinion, only 14 takes of sea turtles, including three live turtles, have been documented on board hopper dredges in channels along the southeastern U.S. Atlantic coast.

The COE has recently concluded extensive research in six southeast channels: Morehead City Harbor entrance channel, Charleston Harbor entrance channel, Savannah Harbor entrance channel, Brunswick Harbor entrance channel, Fernandina Harbor - St. Marys River entrance channel, and the Canaveral Harbor entrance channel. Seasonal restrictions were supported by the research; however, refinements in the restrictions due to new, more precise information were requested in the COE request for a new consultation, dated November 8, 1994. Additionally, a draghead deflector has been developed that has shown promising results in preliminary tests.

PROPOSED ACTIVITY

This consultation addresses COE channel dredging activities along the southeastern Atlantic seaboard from North Carolina through Key West, Florida (see Figure 1 from COE's Biological Assessment submitted November 8, 1994). This includes maintenance dredging, new construction dredging, and beach nourishment activities. A summary of major channel dredging projects in which hopper dredges are normally used include: Oregon Inlet, Morehead City, and Wilmington Harbor in North Carolina; Charleston and Port

Royal in South Carolina; Savannah, Brunswick, and Fernandina-St. Marys in Georgia (King's Bay); Jacksonville, St. Augustine, Ponce Inlet, Canaveral, West Palm Beach, and Miami in Florida.

Information on the timing and amount of materials removed during past hopper dredging projects in these channels was provided in the Biological Assessment (COE, November 8, 1994). Generally, the COE has asked that channel hopper dredging windows specified in the 1991 biological opinion be modified from no hopper dredging in Canaveral and dredging in other regional channels from December through March to:

HOPPER DREDGING IN SOUTH ATLANTIC DIVISION

LOCATION	HOPPER DREDGING WINDOW[1]	INCIDENTAL TAKE MONITORING[2]
North Carolina to Pawles Island, S.C.	Year Round	1 May - 1 Nov
Pawles Island, S.C. to Tybee Island, Ga.	1 Nov - 31 May	1 Nov - 1 Jan 1 Apr - 31 May
Tybee Island, Ga. to Titusville, Fla.	15 Dec - 1 May	15 Dec - 1 Jan 15 Mar - 1 May
Titusville, Fla. to Key West, Fla.	Year Round[3]	Year Round

1 Applies to all hopper dredging along South Atlantic Coast. Use of sea turtle deflecting draghead is required unless waiver is granted by CESAD.

2 For navigation projects this requires inflow screens and NMFS approved observers. For beach nourishment projects this can be accomplished by either monitoring the beach or use of observers and screens on the hopper dredge.

3 Use of hopper dredging at Canaveral Navigation Channel will be restricted to those times when there is an urgent need for this type of equipment.

During a meeting between the COE and NMFS in February 1995, it was determined that the impacts of beach nourishment activities along the southeastern U.S. Atlantic coast should also be considered in this biological opinion. Therefore, projects being considered in this consultation include those listed in the Biological Assessment submitted on November 8, 1994, as well as channels south of Canaveral, and beach nourishment activities along the southeastern U.S. Atlantic coast in which hopper dredges may be used. Specific projects which have been considered in ongoing consultations include: Palm Beach Harbor maintenance dredging; the Fort Pierce Harbor entrance channel and turning basin; and the Dade County Beach Erosion Control Project at the northern end of Sunny Isles.

LISTED SPECIES AND CRITICAL HABITAT

Listed species under the jurisdiction of the NMFS that may occur in channels along the southeastern United States and which may be affected by dredging include:

THREATENED:
(1) the threatened loggerhead turtle - Caretta caretta

ENDANGERED:
(1) the endangered right whale - Eubalaena glacialis
(2) the humpback whale - Megaptera novaeangliae
(3) the endangered/threatened green turtle - Chelonia mydas
(4) the endangered Kemp's ridley turtle - Lepidochelys kempii
(5) the endangered hawksbill turtle - Eretmochelys imbricata
(6) the endangered shortnose sturgeon - Acipenserbrevirostrum

Green turtles in U.S. waters are listed as threatened, except for the Florida breeding population which is listed as endangered.

Information on the biology and distribution of these species was given in the 1991 biological opinion, and is incorporated by reference. Channel-specific information has been collected by COE for channels at Morehead City, Charleston, Savannah, Brunswick, Fernandina and Canaveral, and is presented in detail in the COE summary report entitled "Assessment of Sea Turtle

Abundance in Six South Atlantic US Channels" (Dickerson et al., 1994) and in the COE Biological Assessment. New information is included below.

Additional endangered species which are known to occur along the Atlantic coast include the finback (Balaenoptera physalus), the sei (Balaenoptera borealis), and sperm (Physeter macrocephalus) whales and the leatherback sea turtle (Dermochelys coriacea). NMFS has determined that these species are unlikely to be adversely affected by hopper dredging activities.

PROPOSED, THREATENED:
(1) Johnson's seagrass - Halophila johnsonii

According to federal regulations (50 CFR Section 402.10), a conference is required if a planned federal action is likely to jeopardize the continued existence of a proposed species. At this time, NMFS is unable to make a determination on the collective effects of hopper dredging in and adjacent to channels in which Johnson's seagrass occurs. The COE should develop estimates of annual take of seagrass anticipated by projects within Florida's intracoastal waterways within Johnson's seagrass habitat. Consideration of impacts to H. johnsonii should continue on a project-by-project basis until collective impacts have been estimated and/or listing has been finalized.

ASSESSMENT OF IMPACTS

Sturgeon

Table 1, taken from the February 6, 1995 draft Shortnose Sturgeon Recovery Plan (NMFS, 1995), gives the current, best available information on the distribution and abundance of shortnose sturgeon. South of the Chesapeake Bay, there is inadequate information to estimate the shortnose sturgeon population size in most rivers. Low abundance estimates have been made for the Ogeechee and Altamaha rivers.

Generally in southern rivers, adult sturgeon remain in estuaries and at the interface of salt and freshwater until late winter, when they move upriver to spawn. Embryos produced tend to remain

in areas of irregular bottom, where they appear to seek cover. Juveniles, like adults, occur primarily at the interface between salt and freshwater. Recent observations suggest that salinity levels greater then seven ppt are harmful (Smith et al., 1992). In the Savannah River, shortnose sturgeon are found over sand/mud substrate in 10-14 m. depths (Hall et al., 1991). Spawning occurs in upstream channels of the Savannah, where the substrate consists of gravel, sand and logs (Hall et al., 1991). Shortnose sturgeon feed on crustaceans, insect larvae, and molluscs (NMFS, 1995).

Impacts of hopper dredging on sturgeon

NMFS believes that shortnose sturgeon may be adversely affected by hopper dredging within some channels and seasons. While endangered species observers on hopper dredges have documented the take of Atlantic sturgeon, no take of a shortnose sturgeon has been observed. Sturgeon may be encountered in channels north of Pawles Island, South Carolina, where dredging may be conducted year-round. Winter windows south of Pawles, however, will reduce the period in which shortnose sturgeon may be impinged. Adult sturgeon may occur in estuarine and tidal waters until February, when they migrate upstream to spawn. Salinity ranges favorable to adults and juveniles can exist in inner harbors during fall months. Use of the rigid draghead deflector developed to reduce the likelihood of incidental take of sea turtles by hopper dredges may also reduce the take of shortnose sturgeon. The impacts on small juveniles, larvae, and eggs, by other suction dredge types used upriver, will be considered on a case-by-case basis.

In addition to the possibility of a direct take of sturgeon, maintenance dredging by all dredge types has likely reduced foraging areas within dredged channels, since inter-dredging periods may be too brief to allow forage species to re-establish. Current primary foraging habitat is thought to occur outside of dredged channels.

Shortnose sturgeon are not likely to be affected by beach nourishment activities.

Sea Turtles

Precise data regarding the total number of sea turtles in waters of the southeastern U.S. Atlantic are not available. Trends in turtle populations are identified through monitoring of their most accessible life stages on the nesting beaches, where hatchling production and the number of nesting females can be directly measured. Figures 2 through 4 illustrate loggerhead, green and Kemp's ridley nesting trends at regularly monitored nesting beaches.

Index nesting beaches on which data collection methods and effort were standardized were established in Florida in 1989. Over 90 percent of all U.S. loggerhead nests occur in Florida, and over 80 percent of these are within indexed beaches (B. Schroeder, pers comm). During the six years monitored in this standardized manner, illustrated in Figure 2, loggerhead nesting appears to be stable. All green turtle nests in the United States occur in Florida, and most occur on index beaches. The pattern of green turtle nesting shows biennial peaks in abundance, with a generally positive trend during the six years of regular monitoring (Figure 3).

The abundance of ridleys nests in Rancho Nuevo, Mexico, have been increasing since 1987 (Figure 4). Over 1500 nests were observed during the 1994 nesting season, representing the highest nesting year since monitoring was initiated in 1978. While these data need to be interpreted cautiously due to expanded monitoring efforts since 1990, up to 110,000 hatchlings were released from Rancho Nuevo during 1994, compared to 50,000 to 80,000 over the previous five to six years (Byles, pers comm).

Stranding data are generally believed to reflect the nearshore distribution of sea turtles (Figure 5). The use of turtle excluder devices (TEDs) in shrimp trawls is likely responsible for the sharp decrease in strandings after 1990 through a reduction in mortality resulting from incidental capture in shrimp trawls. While TEDs were required seasonally in most areas during much of 1990, compliance was poor until 1991. Since 1991, documented strandings of loggerheads were steady, while green turtle strandings increased in 1994 and ridleys in 1993 and 1994. Factors that may be affecting the distribution and abundance of sea turtles and turtle mortalities (ie. the distribution of

strandings) include: vessel activity, fishery operations, and environmental factors such as storms, temperature changes, and eutrophication events.

The data suggest that green and Kemp's ridley turtle populations may be rising. While this supports cautious optimism, the numbers are well below recovery criteria established in the recovery plans.

Impacts of hopper dredging on sea turtles

Channels

NMFS believes that hopper dredging activities in the southeastern United States may adversely affect the endangered Kemp's ridley and Florida green turtles and the threatened loggerhead turtle. While hawksbill turtles likely occur infrequently in ship channels, they may be present during beach nourishment activities in areas near or between hard-bottom reefs.

Past maintenance dredging in the southeastern United States has been demonstrated to adversely affect sea turtles. The biological opinion issued in 1991 in response to the high levels of turtle takes observed, as well as nearby strandings of crushed turtles during hopper dredging in Brunswick and Savannah channels, concluded that continued unrestricted hopper dredging in channels along the southeast region's Atlantic coast could jeopardize the continued existence of listed sea turtles. Takes of 225 sea turtles had been documented since 1980 in southeast channels, including 22 turtles that were alive when found. The COE's strict adherence to the measures included in the 1991 biological opinion, including a prohibition of hopper dredging in Canaveral and seasonal restrictions on hopper dredging from North Carolina through the Canaveral ship channel, has greatly reduced the rate of sea turtle takes by hopper dredges. Only 14 sea turtle takes have been documented in hopper dredges since 1991, including three turtles that were alive when collected.

The COE conducted a comprehensive research program, beginning in 1991, to investigate the occurrence of sea turtles in six southeast channels to determine seasonal abundance, as well as spatial distribution within the channel and within the water column. Monthly surveys were conducted in Canaveral, Kings Bay, Brunswick, Savannah, Charleston, and Morehead City channels. The

Canaveral surveys supplement surveys conducted by NMFS and the COE since 1978.

Briefly, the surveys found the following: In areas where sea turtles occur, moderate to high abundance can be expected when water temperature is greater than or equal to 21 degrees C. Lower abundances were observed when temperatures were less than 16 degrees C. Other workers have observed sea turtles in waters as low as 8 degrees C, sometimes for extended periods (Morreale, pers comm 1993). Loggerheads, primarily adults, were the most abundant turtle captured (n = 645), although some Kemp's ridleys (n = 20) and green turtles (n = 5) were also taken. Juveniles of all species were observed, although only a few juvenile loggerheads were encountered in Canaveral. As documented in previous surveys, the Canaveral ship channel supports aggregations of sea turtles during all months of the year and particularly during cooler winter months (Henwood, 1987; Butler et al., 1987; Henwood and Ogren, 1987). North of Canaveral, turtles were seasonally abundant, with lower numbers from December through February. Recaptures of relocated sea turtles suggest some site fidelity, and the effectiveness of relocation efforts appeared to be related to the distance of relocation. Catch per unit effort (CPUE) in the surveyed channels, for all seasons cumulatively, was: Canaveral, 1.43 turtles per hour; Kings Bay, 0.571 turtles per hour; Brunswick Harbor, 0.489 turtles per hour; Charleston Harbor, 0.206 turtles per hour; and Morehead City Harbor, 0.025 turtles per hour.

As a result of observed CPUE, which were generally lower during cool water periods in the northern channels, the COE has asked NMFS to relax dredging windows to allow year-round dredging north of Pawles Island, South Carolina (which includes the ship channels at Oregon Inlet, Morehead City and Wilmington), and between November and May 31 from Tybee Island, Georgia through Pawles Island (including Charleston, Port Royal and Savannah channels). In recent years, the COE SAD has shown a willingness to cease dredging in channels in which take rates exceed those anticipated, despite the fact that the incidental take level was not approached. Given the COE's conservative record in these channels, and the great reduction in takes observed under current dredging windows, NMFS concurs that some expansion of hopper dredging windows, with requirements for observers and use of the rigid draghead deflector, may result in sea turtle takes, but is

not likely to jeopardize the continued existence of any sea turtle species.

Beach Nourishment Activities

There has been increasing concern regarding the effects of hopper dredging during beach nourishment activities along the southeastern U.S. coast. Anecdotal accounts from divers and biologists suggest that sea turtles may use offshore fine sediment bottoms, as well as areas adjacent to hard bottom reefs, as internesting habitat. Limited observations have noted that at times of extreme drops in temperature, turtles have been observed buried in fine silt covering area reefs, either after beach nourishment or extreme freshwater runoff. Over 174 sea turtles have been observed on the sea surface during 16 right whale aerial surveys conducted between February 27 and March 19, 1995 along line transects within approximately 10 nm of the borrow area off of Jacksonville, Florida, suggesting an abundance of sea turtles in the vicinity of the borrow area. These turtles may be taken by hopper dredges. There has been no documented take of sea turtles during past beach nourishment activities at the borrow areas. However, due to potential impact, one hundred percent observer coverage is necessary for beach nourishment activities during the periods identified on the table. This observer coverage may be subsequently altered upon authorization from NMFS.

NMFS remains concerned that nearshore reefs, which provide foraging habitat and shelter for sea turtles, can be impacted by turbidity caused by dredging. While hopper dredges produce less turbidity than other dredge types, water quality impacts are still likely. State monitoring requirements do not relate directly to light restrictions caused by dredging, which has been shown to impact these ecosystems. Direct mechanical damage to hard bottom reefs, which may also be important turtle habitats, has also been documented (Draft Environmental Assessment prepared for the Second Periodic Nourishment of the Sunny Islands and Miami Beach Segments, Beach Erosion Control and Hurricane Protection Project, Dade County, Florida, January, 1995). The COE has proposed 1:1 mitigation of hard bottom habitat; however, replacement of biological material lost cannot be mitigated. Preventative steps should be identified within dredging contracts for borrow areas near hard-bottom reefs.

Rigid Draghead Deflector

Included within the COE's comprehensive research program, initiated in 1991, was a program to develop a mechanical solution to reduce the take of sea turtles at the dredge draghead. The COE SAD and the Waterways Experiment Station (WES) developed a rigid deflector for attachment to the draghead. This rigid draghead deflector has shown promising results during preliminary tests. The rigid device, similar in principal to the cow catchers developed for trains, is designed to deflect sea turtles encountered during hopper dredging activities. When deployed with mock turtles, the deflector draghead effectively avoided taking 95 percent of the models. According to the terms and conditions of the Incidental Take Statement issued for the 1991 biological opinion, testing of the effectiveness of the rigid deflector draghead in a channel where sea turtles occur present was necessary. NMFS recommended that the COE evaluate the new draghead in September in the Canaveral shipping channel, when juvenile turtles are present, but adults and gravid females are scarce. A supplementary biological opinion regarding the impacts of dredging using the deflector draghead in the Cape Canaveral channel for up to 15 days between September 14 and October 14, 1994 was issued in September 1994.

Although trawl sampling indicates that sea turtles were present in Canaveral at levels observed in previous years, only one sea turtle, a live green turtle, was observed entrained by the dredge. Twenty-one surface sightings of sea turtles were made in the channel, transit area, and at the disposal site. These results supported the mock turtle trials. However, despite the use of the rigid draghead deflector, two green turtle entrainments were documented in the Palm Beach Harbor entrance channel. Takes by a hopper dredge equipped with the deflector were also documented in Brazos Pass, in the Gulf of Mexico. NMFS believes that instruction of private dredge contractors is necessary to improve the performance of the rigid deflector draghead. Additionally, the effectiveness of the draghead may be dependent on the ability of the dredge operator to keep the dredging pumps disengaged when the dragheads are not firmly on the bottom to prevent impingement of sea turtles within the water column. Lastly, flexibility at the draghead is reportedly needed to improve the performance and ease of operation of this mechanical device. Additional assessment and development appears to be needed before the rigid draghead deflector can replace

seasonal restrictions as a method of reducing sea turtle captures during hopper dredging activities.

Whales

Right whale

The nearshore waters of northeast Florida and southern Georgia were formally designated as critical habitat for right whales on June 3, 1994 (28793). These waters were first identified as a likely calving and nursery area for right whales in 1984. Since that time, Kraus et al. (1993) have documented the occurrence of 74 percent of all the known mature females from the North Atlantic population in this area. While sightings off Georgia and Florida include primarily adult females and calves, juveniles have also been observed.

Twenty percent of all right whale mortalities observed between 1970 and 1989 were caused by vessel collisions/interactions with right whales. Seven percent of the population exhibit scars indicative of additional, non-lethal vessel interactions (Kraus, 1990). As a result of the potential for interactions between hopper dredges and right whales, the 1991 biological opinion required observers on board dredges operating from December through March in Georgia and northern Florida to maintain surveys for the occurrence of right whales during transit between channels and disposal areas. Continuation of aerial surveys, which had been instituted in Kings Bay, Georgia, was also required. Since January 1994, aerial surveys funded by the COE in association with dredge activities in the southeast have been amplified through the implementation of the right whale early warning surveys. These surveys, funded by COE, as well as the Navy and Coast Guard, are conducted to identify the occurrence and distribution of right whales in the vicinity of ship channels in the winter breeding area, and to notify nearby vessel operators of whales in their path. The COE has been instrumental in NMFS' communications with other federal action agencies regarding the importance of pro-active protection of right whales through a cooperative recovery plan implementation team.

Whales observed on aerial and shipboard surveys are individually identified and counted, cow/calf pairs are recorded, and the movements and distribution of the whales are noted. Dredge speeds are reduced to five knots or less during evening hours or

periods of low visibility for 24 hours after sightings of right whales within 10 nm of the channel or disposal areas.

Data collected during these surveys suggest that right whales are observed off Savannah, Georgia, in December and March, and are relatively abundant between Brunswick, Georgia, south to Cape Canaveral from December through March. During early 1995, a right whale was also observed by shipboard observers off Morehead City, North Carolina (1/10/95, probable right whale).

Humpback whale

Humpback whales occur in waters under U.S. jurisdiction throughout the year. Migrations occur annually between their summer and winter ranges. The summer range for the Western North Atlantic stock includes the Gulf of Maine, Canadian Maritimes, western Greenland, and the Denmark Strait. All humpback whales feed while on the summer range.

The primary winter range includes the Lesser Antilles, the Virgin Islands, Puerto Rico, and the Dominican Republic (NMFS, 1991). In general, it is believed that calving and copulation take place on the winter range. Calves are born from December through March and are about 4 meters at birth. Sexually mature females give birth approximately every two to three years. Sexual maturity is reached between 4 and 6 years of age for females and between 7 and 15 years of age for males. Size at maturity is about 12 meters.

Until recently, humpback whales in the mid- and south Atlantic were considered transients. Few were seen during aerial surveys conducted over a decade ago (Shoop et al., 1982). However, since 1989, sightings of feeding juvenile humpbacks have increased along the coast of Virginia and North Carolina, peaking during the months of January through March in 1991 and 1992 (Swingle et al., 1993). Studies conducted by the Virginia Marine Science Museum (VMSM) indicate that these whales are feeding on, among other things, bay anchovies and menhaden. Researchers theorize that juvenile humpback whales, which are unconstrained by breeding requirements that result in the migration of adults to relatively barren Caribbean waters, may be establishing a winter foraging area in the mid-Atlantic (Mayo, pers comm, 1993). The lack of sightings south of the VMSM study area is a function of

shipboard sighting effort, which was restricted to waters surrounding Virginia Beach, Virginia.

In concert with the increase in whale sightings, strandings of humpback whales have increased between New Jersey and Florida since 1985. Strandings were most frequent during the months of September through April in North Carolina and Virginia waters, and were composed primarily of juvenile humpback whales of no more then 11 meters in length (Wiley et al., 1995). Of the 18 humpbacks for which the cause of mortality was determined, 6 (33 percent) were killed by vessel strikes. An additional humpback had scars and bone fractures indicative of a previous vessel strike that may have contributed to its mortality.

Shipboard observations conducted during daylight hours during dredging activities in the Morehead City Harbor entrance channel during January and February 1995 documented sightings of young humpback whales on at least six days near the channel and disposal area, until the last sighting on January 22, 1995. Three humpback strandings were documented in North Carolina, one each in February, March, and April, suggesting that humpback whales remained within waters of the South Atlantic Division through April.

Impacts of hopper dredging on whales

Hopper dredging may adversely affect right and humpback whales, which occur during winter months in the vicinity of dredging projects within the SAD. While dredging itself is not likely to be a problem, the transit of hopper dredges between borrow, channel, and disposal areas is likely to result in increased vessel traffic in the vicinity of humpback and right whales, especially within right whale critical habitat. As discussed above, ship strikes are one of the primary human-caused sources of mortality for both humpback and right whales, and increased vessel traffic may increase the likelihood of whale/vessel interactions. Although whales have been observed in areas of dredge operations, as discussed below, there have been no documented collisions between dredges and whales.

Observers on dredges have documented close approaches between whales and dredges. On February 6, 1988, a right whale reacted to the approach of a hopper dredge within 100 yards by orienting

itself toward the vessel in a defensive profile. On February 28, 1988, during clamshell dredging of Canaveral channel, a right whale remained in the Canaveral channel for a period of about 10 minutes. Fortunately, this took place during daylight hours and when no vessels were transiting the channel. On January 12, 1995, a humpback whale was observed within a quarter of a mile of the dredge at Wilmington channel and resurfaced near the dredge. An approaching humpback on January 13, 1995 was observed ahead of the dredge initially, but resurfaced near the stern after the vessel slowed. Dredging was stopped while the whale, and two other humpbacks nearby, approached within 100 yards, including one passage under the bow. On January 18, still within the Wilmington Harbor channel dredging area, one of a few humpbacks observed feeding surfaced and quickly dove again within 10 meters of the dredge.

NMFS believes that the cooperation of the dredge operators with endangered species observers greatly reduces the chance of whale/dredge interactions. Additional precautions that reduce the likelihood of dredge collisions with endangered whales include: aerial surveys conducted in right whale critical habitat during the breeding season, the adoption by dredge operators of necessary precautions when whales are sighted, and reduction in dredge speed during evening hours or days of limited visibility when whales have been spotted within the previous 24 hours.

CONCLUSIONS

NMFS concludes that endangered and threatened sea turtles, including the threatened loggerhead (Caretta caretta), and endangered Kemp's ridley (Lepidochelys kempii), green (Chelonia mydas) and hawksbill (Eretmochelys imbricata) sea turtles, may be adversely affected by hopper dredging of channels and during beach nourishment activities along the U.S. southeast Atlantic coast, but are not likely to be jeopardized under the terms and conditions of the attached Incidental Take Statement. Shortnose sturgeon (Acipenser brevirostrum) may be adversely affected by hopper dredging of channels, but are not likely to be jeopardized in rivers of the Southeast Region. Right whales (Eubalaena glacialis) and humpbacks (Megaptera novaengliae) also may be adversely affected due to increased vessel traffic, but severe

impacts can be avoided through continued cooperation between dredge operators and endangered species observers during the seasons whales may occur in the project area.

CONSERVATION RECOMMENDATIONS

Pursuant to section 7(a)(1) of the ESA, the following conservation recommendations are made to assist the COE in reducing/eliminating adverse impacts to loggerhead, green, and Kemp's ridley turtles that result from hopper dredging in the southeastern United States. Many of these recommendations have been discussed and agreed upon at the recent COE/NMFS meeting in St. Petersburg, Florida.

1. The COE should continue to investigate possible modifications to existing dredges which might reduce or eliminate the take of sea turtles. The effectiveness of the rigid draghead deflectors should continue to be evaluated.

2. Spring and fall surveys are necessary in the Canaveral shipping channel to identify sea turtle temporal and spatial movement patterns if hopper dredging will be needed regularly for the Canaveral channel in the future. Telemetry using depth recorders may be needed to obtain information on water column use.

3. Spatial distribution of sea turtles taken in COE trawl surveys of southeast ship channels appeared to be non-random. Additional investigation into the characteristics of "preferred" sites may provide information to expand dredging windows in channel areas adjacent to these areas of greater abundance.

4. The COE should provide NMFS with a list of inshore and offshore borrow areas along the southeastern U.S. Atlantic in which hopper dredges are likely to be used. Frequency of anticipated beach nourishment activities should be identified as accurately as possible.

5. The COE should summarize information regarding borrow areas in which hopper dredges may be deployed. Information regarding the biological resources found at each borrow area

should be listed to identify the possible suitability of the area for foraging sea turtles.

6. The COE should evaluate the collective impact of all dredging projects within the Florida intracoastal waterways on Johnson's seagrass. A summary of anticipated projects and estimates of annual seagrass take levels should be developed to allow NMFS to provide a comprehensive conference or consultation.

7. NMFS, based on the recommendations of Griffen (1974), has recommended water column sediment load deposition rates of no more then 200 mg/cm²/day, averaged over a seven day period to protect coral reefs and hard bottom communities, rather than use of only state standards.

INCIDENTAL TAKE STATEMENT

Section 7(b)(4) of the Endangered Species Act (ESA) requires that when a proposed agency action is found to be consistent with section 7(a)(2) of the ESA, and the proposed action may incidentally take individuals of listed species, NMFS will issue a statement that specifies the impact of any incidental taking of endangered or threatened species. It also states that reasonable and prudent measures, and terms and conditions to implement the measures, be provided that are necessary to minimize such impacts. Only incidental taking resulting from the agency action, including incidental takings caused by activities approved by the agency, that are identified in this statement and that comply with the specified reasonable and prudent measures, and terms and conditions, are exempt from the takings prohibition of section 9(a), pursuant to section 7 of the ESA.

Based on results of previous hopper dredging activities in southeastern U.S. channels, new information regarding Kemp's ridley and green sea turtle abundance, and expanded dredging windows and appended monitoring of beach nourishment activities in the South Atlantic Division, NMFS anticipates that future hopper dredging activities may result in the injury or mortality of loggerhead, Kemp's ridley, green, and hawksbill turtles. Therefore, a low level of incidental take, and terms and conditions necessary to minimize and monitor takes, is established. The documented incidental take, by injury or mortality, of seven (7) Kemp's ridleys, seven (7) green turtles, two (2) hawksbills, twenty (20) loggerhead turtles, and five (5) shortnose sturgeon is set pursuant to section 7(b)(4) of the ESA. This take level represents the total authorized take per year for hopper dredging in the Atlantic projects of the South Atlantic Division (SAD).

To ensure that the specified levels of take are not exceeded early in any project, the COE should reinitiate consultation for any project in which more than one turtle is taken in any day, or once five or more turtles are taken. The Southeast Region, NMFS, will cooperate with the COE in the review of such incidents to determine the need for developing further mitigation measures or to terminate the remaining dredging activity. Formal consultation must be reinitiated when 75% of the authorized incidental take is reached. The authorization for these incidental takes expires on August 31, 2000.

Section 7(b)(4)(c) of the ESA specifies that in order to provide an incidental take statement for an endangered or threatened species of marine mammal, the taking must be authorized under section 101(a)(5) of the Marine Mammal Protection Act of 1972 (MMPA). Since no incidental take in the Atlantic Region has been authorized under section 101(a)(5) of the MMPA, no statement on incidental take of listed right whales is provided.

The reasonable and prudent measures that NMFS believes are necessary to minimize the impact of hopper dredging in the southeastern United States have been discussed with the COE. The following terms and conditions are established to implement these measures and to document the incidental take should such take occur. It is anticipated that beach nourishment will not occur year-round, due to environmental protections instituted by other agencies.

1. Regular maintenance activity in Canaveral Harbor shall not be conducted with a hopper dredge. A hopper dredge should be considered only under emergency conditions when no other type of dredge can be used to remove hazardous shoaling in an expedited timeframe. Separate, specific Section 7 consultations must be conducted for all dredging activities in the Canaveral ship channel that may require the use of a hopper dredge. These consultations will be accelerated if warranted by emergency conditions.

2. One hundred percent inflow screening is required, and 100 percent overflow screening is recommended when sea turtle observers are required on hopper dredges in areas and seasons in which sea turtles may be present (see table below). If conditions disallow 100 percent inflow screening, inflow screening can be reduced but 100 percent overflow screening is required, and an explanation must be included in the preliminary dredging report (see 6, below).

3. The sea turtle deflecting draghead is required for all hopper dredging during the months that turtles may be present, unless a waiver is granted by the COE SAD in consultation with NMFS.

4. Beach observers cannot be used in place of shipboard observers for hopper dredging of borrow areas unless the COE

can demonstrate that the volume of sand deposited on beaches will not preclude observation and identification of turtles or turtle parts.

5. To prevent impingement of sea turtles within the water column, every effort should be made to keep the dredge pumps disengaged when the dragheads are not firmly on the bottom.

6. Reporting: A preliminary report summarizing the results of the dredging and the sea turtle take must be submitted to the COE and NMFS within 30 working days of completion of any given dredging project. An annual report (based on either calendar or fiscal year) must be submitted to NMFS summarizing hopper dredging projects, documented sea turtle and sturgeon incidental takes, and whale sightings.

7. The COE's continued participation in the Right Whale Early Warning System is necessary. Dredging within right whale critical habitat from December through March must follow the protocol established within the Early Warning System.

8. NMFS requires monitoring by endangered species observers with at-sea large whale identification experience to conduct daytime observations for whales between December 1 and March 31, when humpback and right whales occur in the vicinity of channels and borrow areas, north of Cape Canaveral. Monitoring will be 100% for the first year of the biological opinion, unless subsequently altered upon authorization from NMFS. During daylight hours, the dredge operator must take necessary precautions to avoid whales. During evening hours or when there is limited visibility due to fog or sea states of greater than Beaufort 3, the dredge must slow down to 5 knots or less when transitting between areas if whales have been spotted within 15 nm of the vessel's path within the previous 24 hours. South of Cape Canaveral, surveys for whales should be conducted by endangered species observers during the intervals between dredge spoil monitoring.

9. The seasonal observer requirements under these terms and conditions are listed on the following table. North of the St. Johns River, in Florida, endangered species observers on hopper dredges within nearshore and riverine areas must also monitor for shortnose sturgeon impingements.

RESTRICTIONS AND MONITORING REQUIREMENTS FOR HOPPER DREDGING ACTIVITIES IN THE ATLANTIC WATERS OF THE COE SOUTH ATLANTIC DIVISION

AREA	WHALE MONITORING for beach nourishment, navigation channels, and transit	SEA TURTLE MONITORING: NAVIGATION CHANNELS		SEA TURTLE MONITORING: BEACH NOURISHMENT ACTIVITIES	
		WINDOWS	MONITORING	WINDOWS	MONITORING[1]
North Carolina to Pawles Island, SC (includes channels at Oregon Inlet, Morehead City and Wilmington)	100% dedicated daytime whale observer coverage between 1 Dec and 31 Mar. Monitoring by sea turtle observer between 1 Apr and 30 Nov.	Year Round	100% observer monitoring from 1 Apr - 30 Nov	Year Round	100% observer monitoring from 1 Apr - 30 Nov
Pawles Island, SC to Tybee Island, GA (includes channels at Charleston, Port Royal and Savannah)	100% dedicated daytime whale observer coverage between 1 Dec and 31 Mar. Monitoring by sea turtle observer between 1 Apr - 30 Nov.	1 Nov - 31 May	100% observer monitoring from 1 Nov - 30 Nov and 1 Apr - 31 May	Year Round	100% observer monitoring from 1 Apr - 30 Nov
Tybee Island, GA to Titusville, FL (includes channels at Brunswick, Kings Bay, Jacksonville, St. Augustine, and Ponce de Leon Inlet)	Aerial surveys in right whale critical habitat, 1 Dec thru 31 Mar. 100% dedicated daytime whale observer coverage between 1 Dec and 31 Mar.	1 Dec - 15 Apr	100% observer monitoring from 1 Apr - 15 Apr	Year Round	100% observer monitoring from 1 Apr - 15 Dec
Titusville, FL to Key West, FL (includes channels at West Palm Beach, Miami and Key West)	Whale observations are not necessary beyond those conducted between monitoring of dredge spoil.	Year Round	100% observer monitoring year round	Year Round	100% observer monitoring year round

[1] 100% of the dredge material must be screened and 100% of the screened material must be observed.

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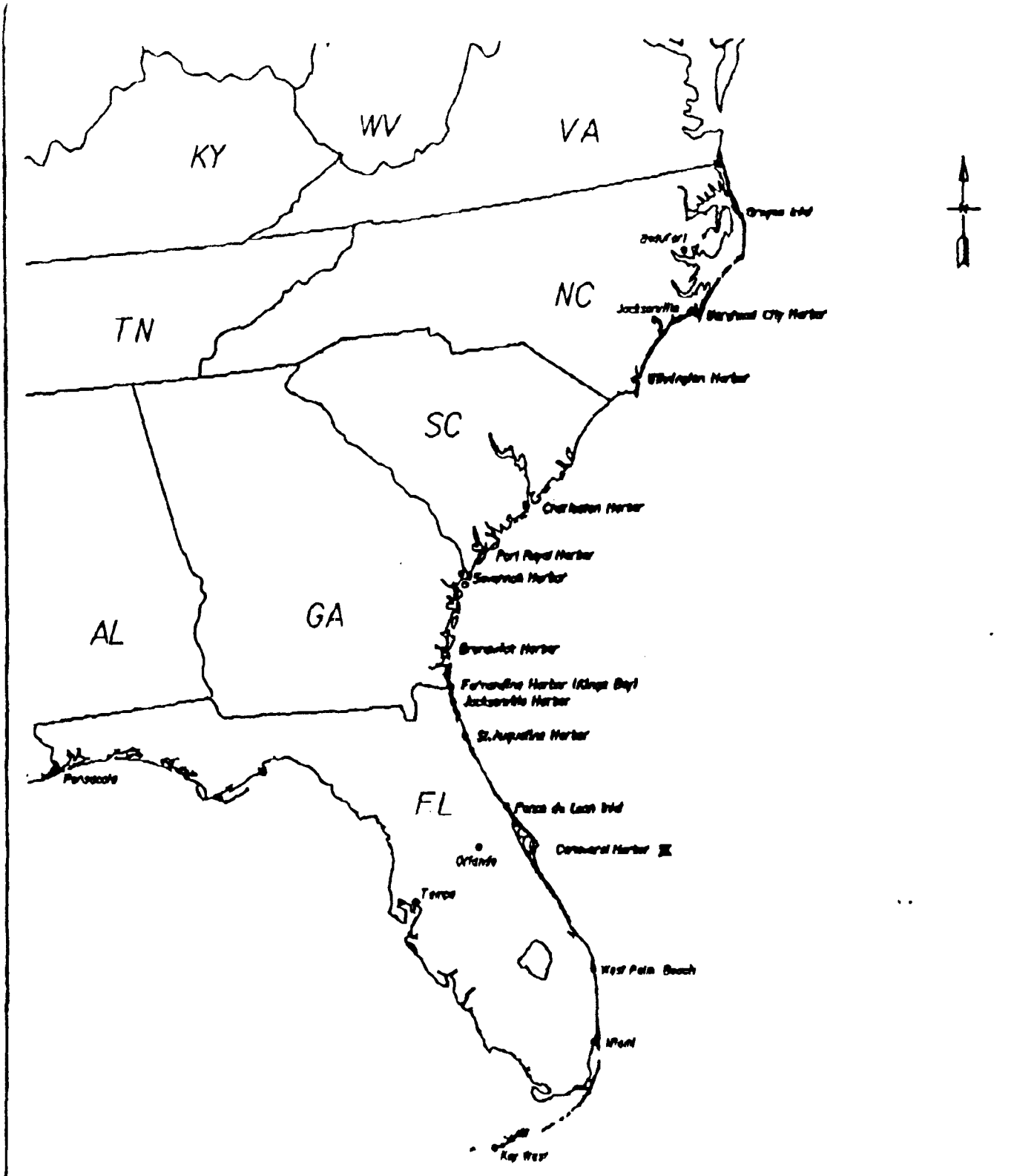
Table 1. Shortnose Sturgeon Population Estimates.

Locality	Time Segment	Population Segment	Marked m	Captured c	Recaptured r	Estimate Type	Population Estimate	Precision 95% CI		mc/4N	Source and Notes
St. John	1973-77	Adult	3,705	4,082	343	S-J	18,000	±30%		>1	Cadswell (1979)
Kennebec	1977-81	Adult	675	272	34	PET	5,273	3,632	6,914	8.7	Squiers et al. (1982)
	1977-81	Adult	703	272	58	SCH	7,222	5,046	10,765		Squiers et al. (1982)
Merrimack	1989	Spawning, males				CAP	5	5	20		Kynard (unpublished data)
	1988-90	Spawning, males				CAP	12	10	28		Kynard (unpublished data)
	1989-90	Total				CAP	33	18	89		Kynard (unpublished data)
Connecticut											
Upper	1992	Spawning				CAP	47	33	80		Kynard (unpublished data)
	1993	Spawning				CAP	98	58	231		Kynard (unpublished data)
	1976-77	Total	51	162	16	PET	516	317	898	>1	Taubert (1980)
	1976-78	Total	51	56	4	PET	714	280	2,856	>1	Taubert (1980)
	1977-78	Total	119	56	18	PET	370	235	623	>1	Taubert (1980)
	1976-78	Total	170	56	24	PET	297	267	618	>1	Taubert (1980)
Lower		Total				SHU	895	799	1,018		Savoy and Shake (1993)
		Total				SCH	875				
		Total				CHA	856				
Hudson	1979	Spawning	548	899	38	PET	12,669			>1	Dovel (1981)
	1980	Spawning	811	698	40	PET	13,844			>1	Dovel (1981)
	1980	Total					30,311				Dovel (1981), extrapolation
Delaware	1981-84	Partial				PET	14,080	10,079	20,378		Hastings et al. (1987)
	1981-84	Partial				SCH	12,796	10,288	16,267		Hastings et al. (1987)
	1983	Partial				S-J	6,408				Hastings et al. (1987)
Ogeechee	1993	Total	31	38	5	PET	223				Rogers and Webber (1993)
Altamaha	1991	Total	551			SPET	3,250				Rogers (unpublished data)

Estimates Type:
S-J: Seber Jolly
PET: Modified Peterson
SCH: Modified Schnabel
CAP:CAPTURE Methodology
SHU: Schumacher
CHA:Chapman
SPET:Simple Peterson



LOCATION OF SOUTHEASTERN HARBOR PROJECTS IN WHICH HOPPER DREDGES ARE USED

※ NOTE: HOPPER DREDGING IN CANAVERAL HARBOR WAS SUSPENDED IN 1991.

FIGURE 1

FIGURE 1

FIGURE 22

FLORIDA INDEX NESTING BEACH SURVEYS
Caretta caretta

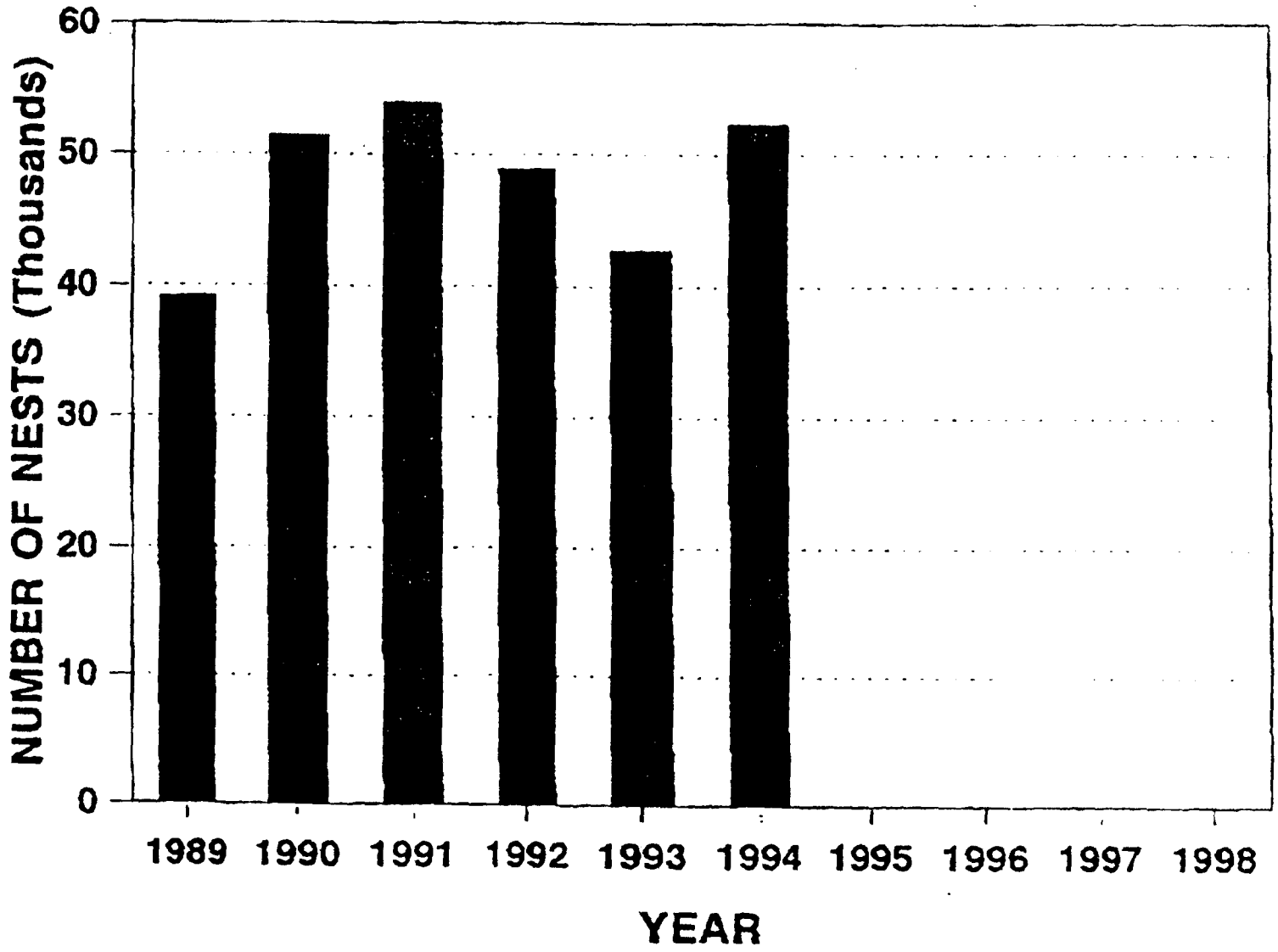


FIGURE 4

KEMP'S RIDLEY NESTS AT RANCHO NUEVO

FWS/INP DATA 1978-1994 (R BYLES 12/94)

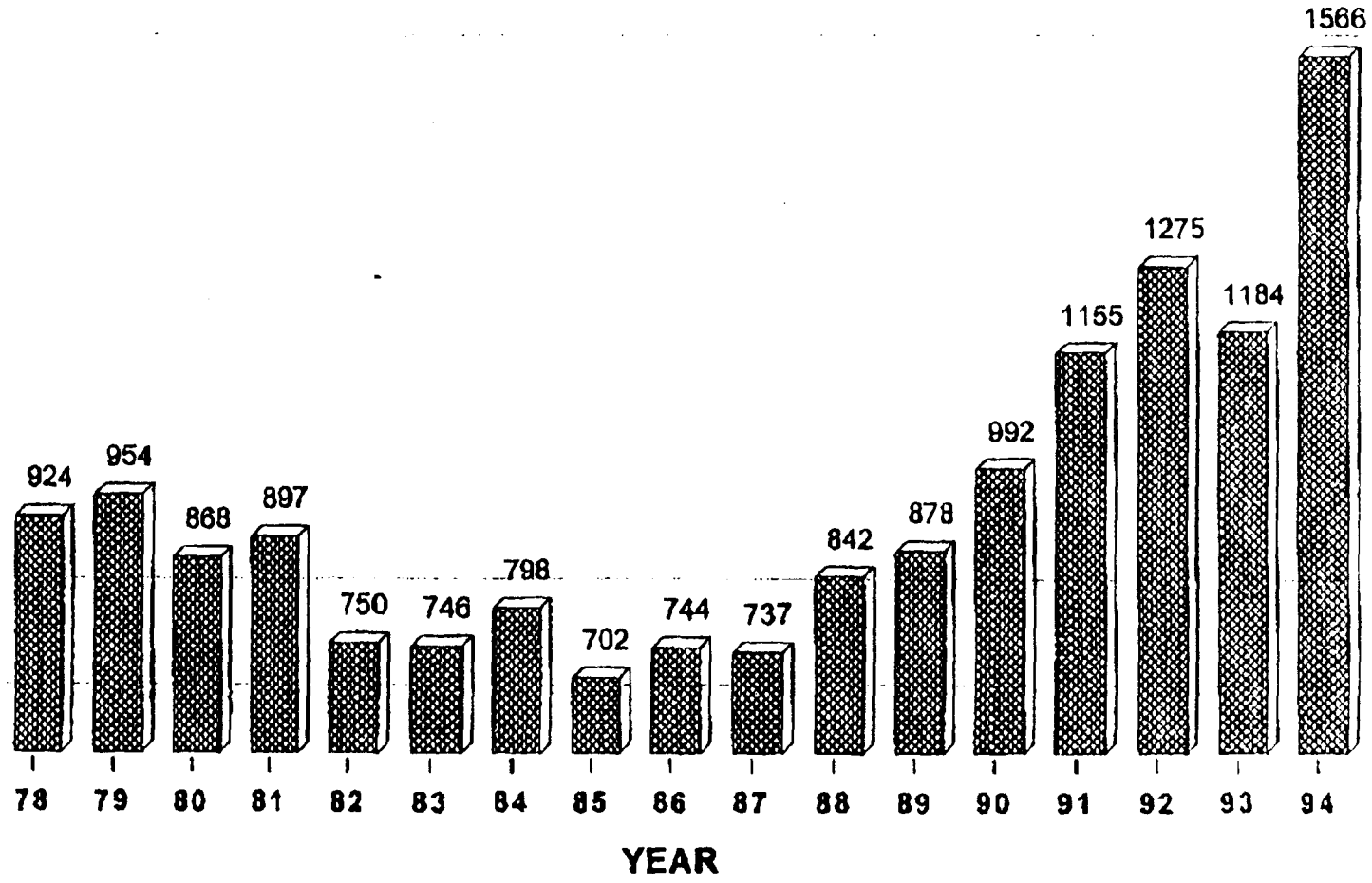


FIGURE 3

FLORIDA INDEX NESTING BEACH SURVEYS

Chelonia mydas

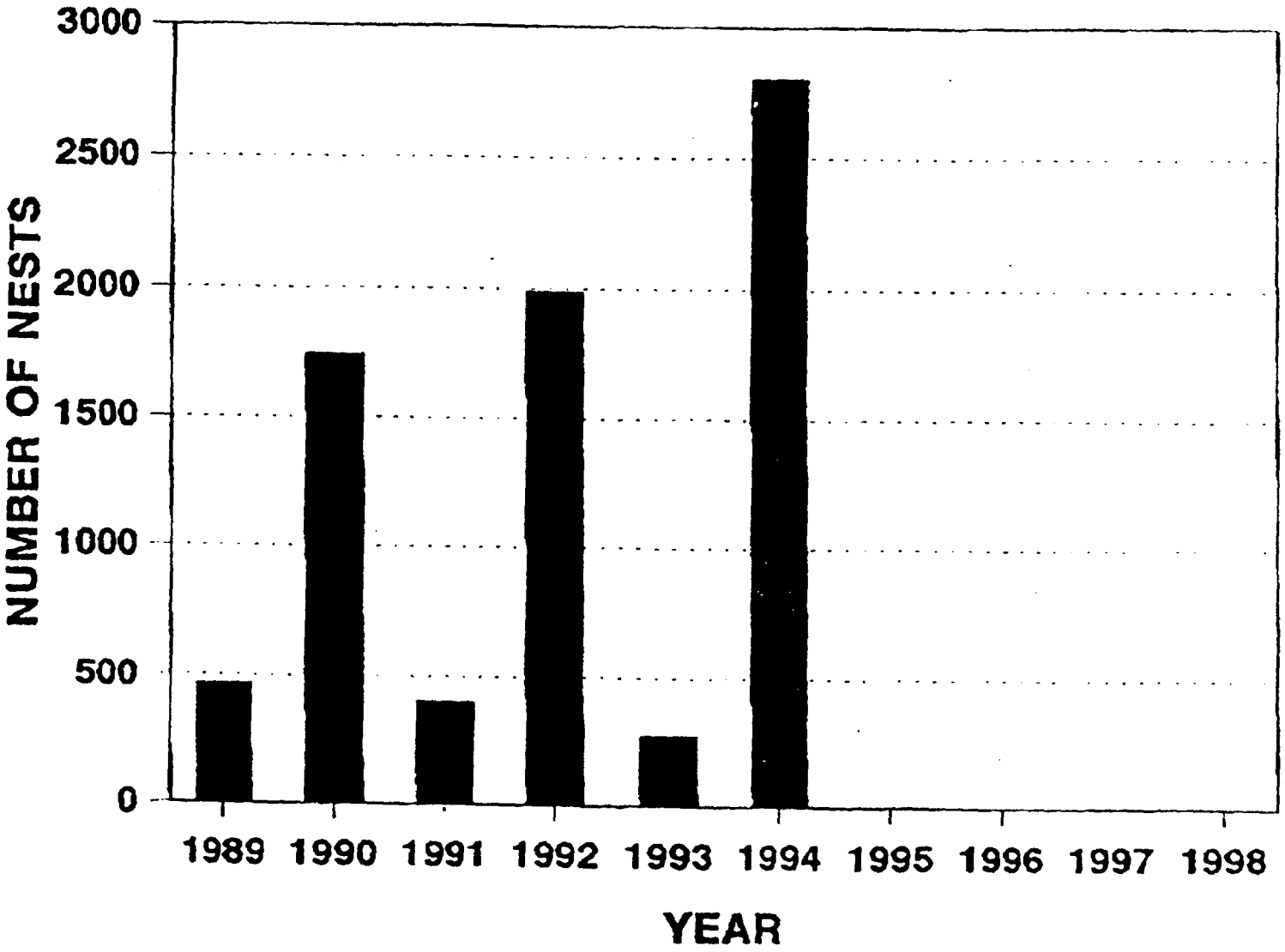
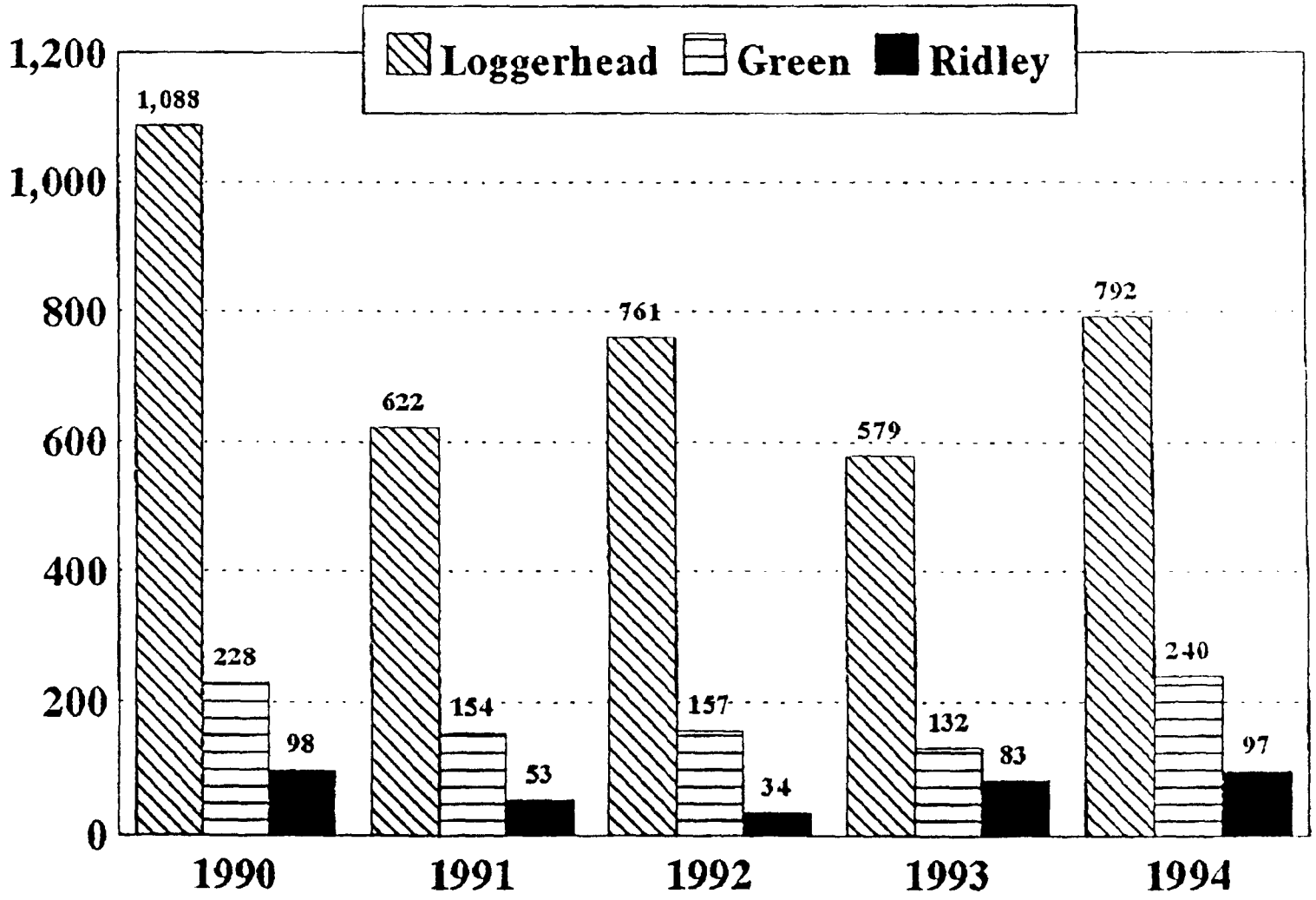


Figure 5

Southeast U.S. Atlantic Coast

Sea Turtle Strandings, 1990 - 1995



DEPARTMENT OF THE ARMY
SOUTH ATLANTIC DIVISION, CORPS OF ENGINEERS
ROOM 313, 77 FORSYTH ST., S.W.
ATLANTA, GEORGIA 30335-6801

NOV 08 1994

REPLY TO
ATTENTION OF:

Directorate of Engineering and Planning

Dr. Andrew J. Kemmerer
Director, Southeast Regional Office
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
9720 Executive Center Drive
St. Petersburg, Florida 33702

Dear Dr. Kemmerer:

The purpose of this correspondence is to reinitiate formal consultation in accordance with Section 7 of the Endangered Species Act regarding hopper dredging in navigation channels along the South Atlantic coast from North Carolina to Cape Canaveral, Florida. While the emphasis of this consultation is on sea turtles, other threatened and endangered species under your purview are also addressed.

Sea turtle entrainment by hopper dredges was first documented in 1980 during routine maintenance dredging at the Canaveral Harbor, Florida navigation channel. Relatively low levels of sea turtle entrainment were also documented in 1986 during maintenance dredging at the Kings Bay navigation channel. This was followed in the spring and summer of 1991 by a succession of significant sea turtle entrainment events at Brunswick, Savannah and Charleston ship channels. In response to this widespread entrainment, we provided guidance to our districts in August 1991 that restricted hopper dredging to those months when sea turtles were least abundant in the ship channels, and implemented more precise measures for monitoring entrainment.

Because of concerns regarding the cumulative impact that this level of entrainment could have on sea turtles, NMFS issued a Regional Biological Opinion (RBO) on November 25, 1991. The RBO restricted hopper dredging in the navigation channels along the South Atlantic coast from North Carolina to Cape Canaveral, Florida to the months of December through March. However, the RBO is flexible, allowing extension of the hopper dredging window whenever it could be demonstrated that sea turtles were not present in sufficient numbers for dredging to likely have a significant impact on them, or when an engineering solution to the problem was developed.

The enclosed draft report "Assessment of Sea Turtle Abundance in Six South Atlantic U.S. Channels," Waterways Experiment Station, April 1994, provides a scientific basis for evaluating potential impacts hopper dredging could have on sea turtles on a seasonal basis. The enclosed Regional Biological Assessment (RBA) evaluates this scientific information relative to expanding the current hopper dredging windows in some navigation channels.

Our test of a new sea turtle deflecting draghead in Cape Canaveral, Florida in September 1994 was successful. However, while this new design may constitute an engineering solution to the entrainment problem, we are not addressing its use in this RBA. We will prepare a supplement to this RBA and consult further with you after we have fully evaluated results of that test.

In addition to sea turtles, the enclosed RBA addresses all threatened and endangered species under the jurisdiction of NMFS that could be encountered while dredging navigation channels along the South Atlantic coast from North Carolina to Cape Canaveral, Florida. By adhering to the operational plan presented in the RBA, we conclude that our activities will not have any significant effect on threatened and endangered species under the purview of the NMFS.

We appreciate the extensive involvement of your staff in helping us accomplish our navigation responsibilities in the short term while also working with us on finding a long term solution for protecting sea turtles from hopper dredging activities. We look forward to further such cooperative efforts with your agency to help us protect endangered species and promote their recovery. Our staff point of contact for these actions is Rudy Nyc at (404) 331-4619.

Sincerely,

James H. Simms
Colonel, U.S. Army
Acting Commander

Enclosures

BIOLOGICAL ASSESSMENT

DREDGING NAVIGATION CHANNELS IN THE SOUTHEASTERN UNITED STATES FROM NORTH CAROLINA THROUGH CAPE CANAVERAL, FLORIDA

BIOLOGICAL ASSESSMENT
DREDGING NAVIGATION CHANNELS IN THE SOUTHEASTERN UNITED STATES FROM NORTH CAROLINA THROUGH CAPE CANAVERAL, FLORIDA

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BIOLOGICAL ASSESSMENT
DREDGING NAVIGATION CHANNELS IN THE SOUTHEASTERN UNITED STATES FROM NORTH CAROLINA THROUGH CAPE CANAVERAL, FLORIDA

1. Introduction. The U.S. Army Corps of Engineers, South Atlantic Division (CESAD), and its component Districts are responsible for constructing and maintaining navigation channels along the coastal areas of the Southeast United States. During 1980, the Jacksonville District encountered sea turtles while performing maintenance dredging with a hopper dredge in the Canaveral Harbor ship channel. Monitoring and subsequent studies by the Jacksonville District, in cooperation with the National Marine Fisheries Service (NMFS), demonstrated that significant numbers of sea turtles occurred in the Canaveral ship channel and were vulnerable to take by hopper dredges. In 1981, the Jacksonville District implemented protective measures and initiated research efforts through the Corps' Waterways Experiment Station and developed and tested a sea turtle deflector at Canaveral. Also during 1981, relocation trawling was deployed as a means of protecting sea turtles.

In 1981 and 1982, trawl surveys were conducted at five other ship channels in the southeast to determine how widespread the sea turtle problem actually was. When the results from this trawling yielded very few sea turtles, it became common belief that Canaveral ship channel was unique. However, based on sea turtle take by shrimp trawlers, NMFS remained concerned about potential entrainment of sea turtles by hopper dredges in other ship channels. In 1986, as a result of Section 7 consultation, the hopper dredge performing work in the entrance channel to Fernandina Harbor and Kings Bay began monitoring for the incidental take of sea turtles. After a significant take of turtles was documented at Kings Bay (Table 1), monitoring was expanded to the other ship channels along the South Atlantic coast. Since it was then becoming apparent that the sea turtle entrainment by hopper dredges could be a widespread problem, Corps of Engineers began developing short and long term strategies for resolving this issue. The short-term strategy was to use trawlers to relocate sea turtles from ship channels during hopper dredging operations and to use seasonal dredging windows. The long-term strategy was to develop a draghead that would not take turtles, refine seasonal windows, and to investigate possible deterrents such as sound, seismic devices and water jets to make sea turtles move away from the path of the dredge.

Prior to 1991, each District within CESAD was preparing

Biological Assessments and receiving Biological Opinions from the NMFS for each hopper dredging event. While this was technically the correct approach, it did not provide any indication of what was happening regionwide. The Corps and NMFS were concerned that the cumulative take could potentially be very high, particularly since the screening and monitoring methods being used could only approximate the actual sea turtle take. Because of the complicated administrative record resulting from numerous Biological Assessments and Biological Opinions and a concern over cumulative take, the NMFS decided to develop a single Regional Biological Opinion (RBO) that would address the dredging of channels along the Atlantic Coast from North Carolina through Cape Canaveral, Florida.

In August 1991, prior to receipt of the RBO, CESAD sent a memorandum, to the Districts setting policies and procedures for minimizing impacts on sea turtles while hopper dredging. This memorandum outlined the following policies: 1) schedule hopper dredging when the least number of turtles are present, 2) use inflow screening to provide 100% coverage of hopper inflow and to more accurately document take, 3) have NMFS approved sea turtle observers on board 100% of the time to monitor take, and 4) use the sea turtle chain deflector on the dredge draghead. The NMFS Regional Biological Opinion, dated November 25, 1991, confirmed this approach but also set the hopper dredging window to December through March of each year. These two actions have combined to greatly reduced the cumulative incidental take of sea turtles. In addition to sea turtles, the RBO also addresses other marine threatened and endangered species under NMFS jurisdiction and contains considerably more background information than is presented in this document. The RBO is incorporated here by reference.

2. Description of the Proposed Action. The proposed dredging activities are described in previous Corps' Biological Assessments and in the November 25, 1991 Regional Biological Opinion and are incorporated here by reference. The major channel projects in which hopper dredging is used are identified on the attached location map, Figure 1. Table 2 shows the channel dimensions, average quantity of material dredged, maintenance frequency and duration, and disposal method for each project.

3. Identification of Listed Species and Critical Habitat.

Listed species under NMFS jurisdiction which are known to occur along the Atlantic coast include:

a. right whale (*Eubalaena glacialis*) - endangered
b. finback whale (*Balaenoptera physalus*) - endangered
c. humpback whale (*Megaptera novaengaliae*) - endangered
d. sei whale (*Balaenoptera borealis*) - endangered

e. sperm whale (*Physeter macrocephalus*) - endangered
f. hawksbill turtle (*Eretmochelys imbricata*) - endangered
g. leatherback turtle (*Dermochelys coriacea*) - endangered
h. loggerhead turtle (*Caretta caretta*) - threatened
i. green turtle (*Chelonia mydas*) - endangered/threatened
j. Kemp's ridley turtle (*Lepidochelys kempi*) - endangered
k. shortnose sturgeon (*Acipenser brevirostrum*) - endangered

The NMFS has designated certain areas as critical habitat for the northern right whale (Federal Register, June 3, 1994). Critical habitat that has been designated within the area covered by this Biological Assessment encompasses the coastal waters between the mouth of the Altamaha River in Georgia and Jacksonville, Florida from the shoreline out to 15 nautical miles offshore; and the coastal waters between Jacksonville and Sebastian Inlet, Florida from the shoreline out to 5 nautical miles. The proposed critical habitat covers a primary calving ground for the northern right whale.

4. Species Assessments.

a. Whales. The right whale calving grounds occur near shore off the coast of north Florida and southern Georgia. The calving season can start as early as September and end as late as April with peak abundance and calving occurring from December through March (NMFS 1991). Unrestricted transit of dredging vessels, without proper safeguards, to offshore dredged material disposal sites could adversely affect the right whale in their calving grounds during calving season. The biology, life history and potential effects of dredging on the right whale are covered in detail in previous Corps Biological Assessments and in the November 1991 RBO. The right whale, outside the calving season, does not frequent the coastal waters of the Southeasten United States and is not likely to be affected by dredging activities occurring during this time period.

b. Shortnose sturgeon. The shortnose sturgeon (*Acipenser brevirostrum*) was not included in the November 1991 RBO; therefore, there is no previous report to incorporate by reference. Since the species might occur in some of the river systems dredged in the southeast region, it is discussed in detail here to form a basis for the Regional Biological Opinion. The shortnose sturgeon ranges along the Atlantic seaboard from the St. Johns River in New Brunswick, Canada, to the St. Johns River in Florida. This species may once have been abundant throughout the major river systems of the southeast. However, anecdotal records of this species were frequently combined with those of the Atlantic sturgeon (*A. oxcyrhynchus*), making precise delineation of historic population centers difficult.

The following information on the life history of the shortnose sturgeon is extracted from Dadswell, et al. (1984) or

Moser and Ross (1993).

Habitat. Use of the nearshore ocean by the shortnose sturgeon is questionable. Available ocean records are within a few miles of land and the species may be exiting river systems during periods of high flow when estuarine conditions extend offshore. However, many of these offshore records may be based on misidentified juvenile Atlantic sturgeon.

The species is known to use three distinct portions of river systems: (1) non-tidal freshwater areas for spawning and occasional over-wintering; (2) tidal areas in the vicinity of the fresh/saltwater mixing zone, year-round as juveniles and during the summer months as adults; and (3) high salinity estuarine areas (15 parts per thousand (ppt) salinity or greater) as adults during the winter. Variation from this general scheme does exist, however, due to the wide range of habitats available in the major river systems along the Atlantic seaboard.

Upstream spawning migrations by adults are known to begin when water temperatures reach approximately 8 to 9 degrees Celsius. Spawning subsequently takes place at temperatures of 9 to 12 degrees Celsius, which usually occur in February and March in the southeast. The species spawns above the influence of tides in waters which are totally fresh. For this reason, spawning habitat for the shortnose sturgeon should lie well outside of the portions of the harbors being maintained by hopper dredge.

Post-spawning adults and juvenile young-of-the-year move downstream to tidal areas and concentrate at, or just upstream, of the salt-front during the summer months (June through August). This summer concentration zone in the Winyah Bay estuary (South Carolina) corresponds to the area with a salinity of 0.5 to 1.0 ppt. Here the juveniles spend the next 2 to 8 years of life, moving up and down stream with the movements of the salt-front until they reach a size of approximately 45 centimeters. Salinity throughout many of the project areas depending on location and time of year. It is expected that conditions suitable for concentrations of juvenile shortnose sturgeons and summering adults exist periodically within the interior portions of each of the harbors. As water temperatures begin to cool, adults would be expected to leave the summer concentration zone and move downstream to the lower estuary where salinities exceed 15 ppt. This movement would be expected to occur in about September in North Carolina and may occur as late as October in southern channels. Some adults, however, are known to move back upstream to the spawning grounds in the fall, remaining there until after the spawning season. It is during the winter season, when shortnose sturgeon may be in the outer channel reaches affected by hopper dredging events.

Juvenile shortnose sturgeon are known to occupy deep-water portions (greater than 27 feet) of rivers. Juveniles would, therefore, be expected to occur within the deep-water channels within the project rivers, but in areas upstream of hopper dredging activity. Adults are found in shallow-to-deep water and would be expected to occupy ship channels during the day, and forage in the more shallow areas adjacent to the channel during the night.

The ship channels covered under this Biological Assessment are maintained at their current, or possibly deeper, dimensions. Due to the apparent preference by the shortnose sturgeon for deep-water habitat, maintenance of this deep water condition would not be considered an adverse effect. As deep water areas are already disturbed by maintenance dredging and no increase in the frequency of maintenance is proposed, future maintenance will simply maintain the status quo.

Food Availability. The shortnose sturgeon is a bottom feeder, consuming various invertebrates and, occasionally, plant material. Adult foraging activities normally occur at night in shallow water areas adjacent to the deep water areas occupied during the day. Juveniles are not known to leave deep water areas and are expected to feed there. All bottoms dredged during maintenance of the projects will suffer temporary declines in benthic fauna populations. These channel bottoms will continue to be dredged at the same frequency as under existing conditions and would be expected to continue to support benthic populations similar to those currently present. Because the available shallow water feeding areas adjacent to the channels will not be affected by continued maintenance of these projects, and channel benthic populations should continue to have their existing levels of benthic organism production, it is believed that the food supply of the shortnose sturgeon will remain essentially at current levels.

Relationship to Critical Periods in Life Cycle. Spawning sites in each of the project areas occur outside of the areas which are hopper dredged. During the winter months, adults would be expected in their highest concentration in the lower portions of estuaries where salinities normally exceed 15 ppt. Juveniles occur during the months of January through April, and adults could occur during any time of the year. However, these portions of the harbors are not maintained by hopper dredge due to the long hauling distances which would be required to reach the approved ODMDS's.

Juvenile shortnose sturgeons should occur in the upper portions of each harbor when the salinities are less than 1 ppt. Due to the variability of flows (hence salinities), conditions suitable for juvenile concentrations (0.5 ppt-1.0 ppt) in the upper reaches of these harbors could occur during any time of the

year. However, these portions of the harbors are not maintained by hopper dredge due to the long hauling distances which would be required to reach the approved ODMDS's.

Because of the mobility of shortnose sturgeons, they should be able to avoid any areas being dredged. However, portions of a sturgeon were found on one occasion by an observer stationed on a hopper dredge (Christopher Slay, personal communication). Which species of sturgeon involved is unknown; nor is it known whether the fish was alive or dead when pulled into the dredge. Therefore, direct mortality as a result of hopper dredging appears to remain a possibility though it is not likely to occur with any frequency. Bottom trawling conducted by CEWES as part of the Corps sea turtle research effort, captured 69 predominately Atlantic sturgeons in 1,393 hours of trawling.

c. Sea Turtles. Hawksbill sea turtles prefer tropical waters and are commonly seen in the Florida Keys, Bahamas and the southwestern Gulf of Mexico (National Research Council 1990). They are not reported to frequent shallow coastal systems with soft bottoms and turbid water such as the eastern United States north of Cape Canaveral (NRC 1990). Leatherback sea turtles are pelagic generally occurring well offshore. When leatherback or hawksbill do occur near shore they are not expected to spend any significant time on the bottom where they could be vulnerable to impact from dredging. Past trawling efforts associated with the relative abundance and pre-dredging surveys have not captured any hawksbill or leatherback turtles, and there have been no documented takes of hawksbill or leatherback sea turtles by dredging equipment.

The Kemp's ridley sea turtle is the most endangered of all sea turtles in the western hemisphere. Populations of this species have declined from around 90,000 in the 1947 to 600 breeding adult females. Significant numbers of Kemp's ridley's are known to occur in New York Harbor area and Chesapeake Bay. The largest numbers of Kemp's ridley's occur in the Gulf of Mexico. Along the South Atlantic coast the greatest likelihood of locating a Kemp's ridley sea turtle is in the vicinity of Savannah, Brunswick and Kings Bay where incidental takes with hopper dredges have occurred (Table 1).

Green sea turtles are listed as threatened except for Florida where breeding populations are listed as endangered. Green sea turtles generally occur near shore and in harbors where they forage on sea grasses. Green sea turtles are relatively abundant but were listed because of over-harvesting, particularly in the Caribbean and on their nesting beaches. Entrainment of green sea turtles has occurred at Canaveral and Kings Bay (Table 1). Perhaps because of their relatively small size, the green sea turtles were recovered alive from the hopper dredge in slightly more than half of these entrainments.

The loggerhead sea turtle is listed as threatened; however this species is relatively abundant with about 38,000 nests being laid per year along the South Atlantic Coast. Greatest source of mortality for loggerheads had been drowning in shrimp trawl nets. With the required use of Turtle Excluder Devices (TED) turtle mortality from shrimp trawlers has been reduced from as high as 12,000 - 15,000 mortalities per year to a low of 300. Increased loggerhead nesting, particularly on south Florida beaches, is likely a direct result of NMFS requirement that shrimp trawlers use TED's. Significant numbers of loggerhead sea turtles have been entrained by hopper dredges (Table 1), however this activity is of short duration and localized.

The biology, life history, and potential effects to sea turtles has been discussed in detail in previous Corps Biological Assessments and in the 1991 Regional Biological Opinion. These documents are incorporated here by reference.

5. Efforts To Eliminate Adverse Impacts on Sea Turtles.

a. Relocation Trawling. Jacksonville District first developed the technique of using shrimp trawlers to capture sea turtles and release them at a location where they were not likely to return the ship channel while dredging was in progress. Based on studies conducted by CEWES and others at Canaveral, FL, Kings Bay, GA, Brunswick, GA, and Savannah, GA, the Corps considers this to be a viable method to reduce but not eliminate sea turtle take.

b. Chain Sea Turtle Deflector. Jacksonville District developed a chain sea turtle deflector that was used effectively in Canaveral and Kings Bay. However, the chain deflector requires precise use by the draghead operator. Otherwise, it can act as a trap, thereby increasing rather than decreasing sea turtle mortality. The chain deflector also requires considerable maintenance, particularly in ship channels that have rock or snags.

c. Relative Abundance Surveys. In order to better define seasonal windows when sea turtles are least likely to be present, relative abundance surveys were conducted in six coastal channels within the Southeastern United States. The sites were selected to be representative of the region and consisted of the Morehead City Entrance Channel in North Carolina, the Charleston Harbor Entrance Channel in South Carolina, the entrance channels for Savannah and Brunswick Harbors, Georgia, and the St. Mary's River (Fernandina Harbor/Kings Bay) and Canaveral Harbor Entrance Channels in Florida. These surveys were conducted or contracted by CEWES and were completed in March 1993. The results of the studies are presented in a draft CEWES technical report dated April 1994. The relative abundance survey data is supplemented with incidental take information to help define relatively safe

hopper dredging windows. Based on the results of this study we can break out the southeast Atlantic coast into the following regions: North Carolina, South Carolina/North Georgia, South Georgia/North Florida and Cape Canaveral. The results of the CEWES study are summarized below.

North Carolina. During the 12 month (March 1992 through February 1993) study in Morehead City only two sea turtles were captured in 242 trawls. Both were loggerhead turtles, one captured 31 July 1992 and the other 12 October 1992. Another loggerhead was captured in the entrance channel in December 1991 during a pre-dredging survey (54 tows) unrelated to the study. Water temperature varied from 8° C in late February to 28° C in July and August. From late November to early April water temperatures were below 16° C which are probably less than optimal for sea turtles. The small number of turtles captured per unit effort indicates a very low relative abundance for this area throughout the year. Incidental take for Morehead City and Wilmington ship channels supports this conclusion. Only one loggerhead sea turtle has been taken in North Carolina since monitoring for turtle take began in 1991. This occurred in the Morehead City ship channel on April 2, 1994 when the sea temperature was 15° C.

South Carolina. A total of thirty loggerheads and one green turtle were captured during nine monthly trawling surveys performed in the Charleston Harbor Entrance Channel. A total of 238 trawls were made from March 1992 through December 1992. No surveys were performed during the month of August 1992. No surveys were conducted during January and February 1993, because it was suspected that no turtles were present in the channel. This was based on a previous study performed by Van Dolah (1992) in which 47 trawls were made during January and February with no turtle captures.

The catch per unit effort (CPUE) was calculated for each month surveyed to allow a comparison of relative abundance in other channels as well as seasonal differences in the same channel. Water temperature measurements were also obtained during each trawl survey. The number of turtles captured, CPUE, and mean monthly water temperatures for the Charleston Harbor entrance channel are shown on Table 3. The CPUE in the Charleston Harbor channel ranged from 0.104 turtles/hour in the spring (April) to 1.07 turtles/hour in the fall (October). During the spring months, March accounted for 3 turtle captures (CPUE 0.263 turtles/hour). The mean water temperatures for March and April were 14.6° C and 16.4° C respectively. By late spring the turtles were well established with 5 captures in May for a CPUE of 0.444 turtles/hour. The average temperature for May was 17.8° C.

During the summer months 6 turtles were captured in June

(CPUE 0.627 turtles/hour) and 5 in July (CPUE 0.490 turtles/hour). The mean water temperature for June was 23.0° C and in July was 26.6° C. As stated previously, there was no survey performed during August.

Turtle densities in the fall months of September, October and November were quite variable. September which had the highest mean water temperature (27.7° C) during the study resulted in no turtle captures. The largest catch per unit effort for the study was obtained in October with a CPUE of 1.07 turtles/hour. The mean bottom water temperature for the month was 21.3° C.

A significant decrease in turtle densities within the channel occurred in early winter. During December only one turtle was caught representing a CPUE of 0.04 turtles/hour. The mean water temperature for the month had dropped to 16.4° C. Although no surveys were conducted during January and February for the CEWES study, Van Dolah et al (1992) performed trawl surveys during these months in 1991 with no turtles captured. The mean water temperature in January was 14.2° C and February was 12.9° C. It is not expected that turtles will be found in the channel during these months.

The catch per unit efforts (CPUE) for loggerheads during the CEWES study were compared to the effort for the same months in a similar study by Van Dolah et al. (1992). Except for the fall months of September (0.00 turtles/hour, CEWES compared to 0.429 turtles/hour, Van Dolah) and October (1.07 turtles/hour, CEWES compared to 0.183 turtles/hour, Van Dolah) the CPUE for both studies were similar.

The CEWES study concluded that a viable population of loggerhead turtles exists in the Charleston entrance channel. The population arrives in early spring and increases in abundance until it peaks in the fall. No population of turtles is generally found in the channel from mid- to late December to early March.

Georgia - North Florida. Trawling surveys conducted in the entrance channels to Savannah Harbor, Brunswick Harbor, and Fernandina Harbor/Kings Bay yielded results similar to the Charleston Harbor study. Populations of sea turtles in all channels started to arrive in late spring around April and May as the water temperature starts to rise. The number of turtle captures increased during the summer months and peaked in the fall around October. Turtle populations then decreased significantly during the winter months December, January and February as water temperatures declined. Tables 4 through 6 and demonstrate the relative abundance and CPUE of sea turtles in those channels.

Canaveral Entrance Channel. A total of 172 loggerheads, 2

greens, and 1 Kemp's ridley turtle was captured during 12 monthly trawling surveys performed in Canaveral Harbor entrance channel. A total of 288 tows was made from March 1992 to February 1993. The number of turtle captures per hour (CPUE) in Canaveral ranged from 0.18 in December to 3.24 in June. The spring and summer had the highest numbers of turtles in Canaveral which was likely due to an influx of adult loggerhead turtles. In April (2.99 turtles/hour) and May (2.26 turtles/hour) the turtles were predominantly adult males (57%). In June (3.24 turtles/hour) and July (1.86 turtles/hour) the turtles were predominantly adult females (77%). While relatively high abundance was found year round in Canaveral when compared to other channels, the time of least abundance in Canaveral was from August to March (0.18 turtles/hour to 1.16 turtles/hour) when very few adult turtles were captured (12 adults, 58 juveniles total for the 8 months), the exception being the month of January (1.98 turtles/hour). Only 2 green turtles (one each in April and June) and 1 Kemp's ridley (January) were captured in Canaveral during the 12 months of the survey. To avoid entrainment of adult loggerheads, greens, and Kemp's ridleys in the channel, dredging during the late summer and early fall with the rigid deflector draghead, when properly tested, may prove hopper dredges can be used in this channel with minimal or no threat to sea turtles.

d. Behavior/Telemetry. Behavior studies using radio and sonic telemetry attached to Loggerheads were conducted by CEWES in four channels (Charleston, SC, Savannah, GA, Kings Bay, GA, and Canaveral, FL) to gain information on the cause of entrainment of sea turtles and to identify behaviors that might assist or prevent the implementation of management techniques to reduce hopper dredged entrainment. While the analysis of the behavior data is ongoing, certain preliminary generalizations can be made. The turtles appear to be active and not in a state of dormancy, a behavior which suggests that they can be actively moved from the path of the dredge. While certain individuals spend a high percentage of time in the channel, when the behavior of all the turtles is pooled, the time turtles spend in the channel is small. Loggerheads spend very little time in the water column or at the surface, most of their time is spent on the bottom, a location which makes them susceptible to the draghead. It also appears that turtles respond to cool water temperatures in the Spring by spending more time at or near the water surface. This behavior may allow for expansion of the dredging season during times of cool water temperatures since the turtles would not spend as much time on the bottom where they are most susceptible to the dredge. In the Spring and Fall, a high percentage (up to 50%) of the instrumented turtles left the release area within few days after capture which suggests that a high percentage of the turtles are short-term residence of the channel and are migrating through the area.

e. Sea Turtle Deflecting Draghead. In a cooperative effort

between CEWES and the Jacksonville District, the Corps has developed a rigid deflector draghead designed to move sea turtles away from the draghead. The draghead has been designed to act as a plow, creating a sediment wave that moves in front of it, thereby moving any sea turtle in its path out of the way. This draghead was tested at Fort Pierce, Florida, during the summer of 1993. The test involved using the new rigid deflector, the chain deflector and a standard California draghead on 300 mock sea turtles. The mock sea turtles were made using an air entrained, low strength concrete mix and designed to simulate the shape and submerged weight of a live sea turtle. Results showed that the rigid deflector successfully deflected 95% of the mock turtles encountered. The chain deflector deflected 85% and the standard California draghead deflected only 18% of the mock sea turtles. Complete results of the test are presented in CEWES Miscellaneous Paper HL-94-5 dated July 1994. During the month of September 1994 the new draghead was tested at Canaveral Harbor under operational conditions to see if the draghead would deflect live sea turtles. To determine turtle relative abundance, three standard trawl surveys were by personnel from CEWES. Five loggerheads (0.56 turtle/hour) were captured prior to the initiation of dredging. Seven loggerheads (0.71 turtles/hour) and one loggerhead (0.11 turtles/hour) were captured during dredging operations. A total of 13 turtles (0.47 turtle/hour) was captured for the three surveys. Compared to historical data the relative abundance of turtles during the draghead test should be considered moderate to high. The results of the relative abundance surveys were provided by Dave Nelson with CEWES. Dredging began on September 15th and was completed on September 30th. Approximately 250,000 cubic yards of shoal material was dredged from the channel and hauled to the ODMDS for disposal. The intake flow of the dredge was screened and monitored for turtle take. No lethal sea turtle takes occurred during the test. However, one small green sea turtle was found alive in one of the baskets on September 19th. The turtle was taken to Sea World for recovery and observation. Although the data have not been fully analyzed for this test, the fact that no lethal turtle takes occurred during 15 days (69.3 hours actual pumping time) of dredging, while a substantial population of sea turtles was present, indicates that the new draghead design is effective at deflecting sea turtles.

6. Efforts to Reduce Adverse Impact on Right Whale. Both Savannah and Jacksonville Districts have been conducting aerial surveys to spot whales in and around the area currently designated as critical habitat for the right whale in accordance with recommendations contained in the 1991 RBO. In addition to aerial surveys, endangered species observers or trained crew members stand watch on the bridge of the dredge to look for whales. Dredges and other disposal vessels are required to alter course and stop if necessary to avoid approaching whales. If whales are spotted during the day, within 10 nautical miles of

TABLE 2. DESCRIPTION OF HARBOR PROJECTS IN THE SOUTHEASTERN UNITED STATES

PROJECT	LENGTH (FT)	WIDTH (FT)	DEPTH BELOW MLW (FT)	QUANTITY (CY) (1,000)	MAINTENANCE FREQUENCY (MONTHS)	MAINTENANCE DURATION (DAYS)	DISPOSAL AREA LOCATION
OREGON INLET, NC	3,000	400	17	200	24	20	OCEAN NEARSHORE
MOREHEAD CITY HBR, NC	15,000	450	47	700	12	60	OCEAN
WILMINGTON HBR, NC	15,000	500	40	800	12	70	OCEAN
GEORGETOWN HBR, SC	94,500	400-600	27	600	24	60	OCEAN
CHARLESTON HBR, SC	138,860	500-700	44	600	18	60	OCEAN
PORT ROYAL HBR, SC	110,670	300-500	27	500	24	60	OCEAN
SAVANNAH HBR, GA	60,000	600	44	800	12	70	OCEAN
BRUNSWICK HBR, GA	54,000	500	32	1,000	12	80	OCEAN
FERNANDINA HBR/KINGS BAY, FL & GA	50,000	500	46	1,000	12	45	BEACH OCEAN NEARSHORE
JACKSONVILLE HBR, FL	10,000	800	38 & 42	500	24	50	BEACH UPLAND
ST AUGUSTINE HBR, FL	3,000	200	16	200	48	20	BEACH
PONCE DE LEON INLET, FL	6,000	200	16	300	24	30	BEACH NEARSHORE
CANAVERAL HBR, FL	30,000	400	44	800	12	60	OCEAN NEARSHORE

Table 3. Catch per unit effort (CPUE) based on number of trawls (number of turtles per trawl), trawl distance (number of turtles per nautical mile), and trawl time (number of turtles per hour) for monthly surveys from the Charleston Harbor Entrance Channel. Includes the mean water temperatures for each month surveyed.

Month	Total Turtles	Total Trawls	Total Trawl Time (min)	Total Trawl Distance (nm)	CPUE Per Trawl	CPUE Per Hour	CPUE Per Nautical Mile	Mean Water Temp. °C
Mar 92	3	30	684	35.83	0.1	0.263	0.0837	14.6
Apr 92	1	25	579	24.48	0.04	0.104	0.0408	16.4
May 92	5	27	675	31.47	0.185	0.444	0.1589	17.8
Jun 92	6	28	574	27.07	0.214	0.627	0.1847	23.0
Jul 92	5	27	612	29.05	0.185	0.490	0.1721	26.6
Aug 92	*	*	*	*	*	*	*	*
Sep 92	0	27	552	27.75	0	0	0	27.7
Oct 92	8	21	450	21.47	0.381	1.067	0.3726	21.3
Nov 92	2	26	518	25.99	0.077	0.232	0.077	20.4
Dec 92	1	27	569	27.71	0.037	0.105	0.0361	16.8
Jan 93	*	*	*	*	*	*	*	*
Feb 93	*	*	*	*	*	*	*	*
Total	31	238	5213	250.82	-	-	-	-

* No Monthly Survey

Data obtained from the USAE Waterways Experiment Station, Vicksburg, Mississippi.

Table 4. Catch per unit effort (CPUE) based on number of trawls (number of turtles per trawl), trawl distance (number of turtles per nautical mile), and trawl time (number of turtles per hour) for monthly surveys from the Savannah Harbor Entrance Channel. Includes the mean water temperatures for each month surveyed.

Month	Total Turtles	Total Trawls	Total Trawl Time (min)	Total Trawl Distance (nm)	CPUE Per Trawl	CPUE Per Hour	CPUE Per Nautical Mile	Mean Water Temp. °C
Jun 91	9	33	1486	74.75	0.273	0.363	0.120	27.2
Aug 91	27	138	4077	216.34	0.196	0.397	0.125	29.4
Oct 91	28	48	1488	72.89	0.583	1.129	0.384	26.2
Nov 91	31	56	1686	81.95	0.554	1.103	0.378	20.8
Dec 91	3	64	1933	96.47	0.047	0.093	0.031	14.5
Jan 92	0	67	1941	95.32	0	0	0	12.6
Feb 92	0	52	1582	82.08	0	0	0	10.9
Mar 92	0	59	1765	85.86	0	0	0	13.5
Apr 92	1	33	710	40.79	0.030	0.085	0.025	14.9
May 92	3	33	698	38.59	0.091	0.258	0.078	18.6
Jul 92	7	32	596	34.52	0.219	0.705	0.203	26.9
Sep 92	11	32	713	34.72	0.344	0.926	0.317	27.9
Oct 92	14	30	583	32.54	0.467	1.440	0.430	21.9
Nov 92	11	32	652	34.40	0.344	1.012	0.320	21.3
Dec 92	7	32	645	32.34	0.219	0.651	0.217	17.6
Jan 93	0	32	652	32.11	0	0	0	12.4
Mar 93	0	32	604	34.44	0	0	0	12.3
Total	152	805	21811	1120.11	-	-	-	-

Data obtained from the USAE Waterways Experiment Station, Vicksburg, Mississippi.

Table 5. Catch per unit effort (CPUE) based on number of trawls (number of turtles per trawl), trawl distance (number of turtles per nautical mile), and trawl time (number of turtles per hour) for monthly surveys from the Brunswick Harbor Entrance Channel. Includes the mean water temperatures for each month surveyed.

Month	Total Turtles	Total Trawls	Total Trawl Time (min)	Total Trawl Distance (nm)	CPUE Per Trawl	CPUE Per Hour	CPUE Per Nautical Mile	Mean Water Temp. °C
Jun 91	71	170	6846	372.48	0.418	0.622	0.191	25.1
Sep 91	22	58	1706	81.12	0.379	0.774	0.271	23.6
Oct 91	43	67	2012	97.03	0.642	1.282	0.443	24.0
Dec 91	4	58	1664	79.13	0.069	0.144	0.051	15.4
Jan 92	0	61	1817	91.68	0	0	0	12.5
Feb 92	0	51	1534	71.53	0	0	0	10.9
Mar 92	9	53	1562	72.72	0.17	0.346	0.124	16.4
Apr 92	11	63	1771	86.14	0.175	0.373	0.128	17.1
Total	160	581	18912	951.83	-	-	-	-

Data obtained from the USAE Waterways Experiment Station, Vicksburg, Mississippi.

Table 6. Catch per unit effort (CPUE) based on number of trawls (number of turtles per trawl), trawl distance (number of turtles per nautical mile), and trawl time (number of turtles per hour) for monthly surveys from the Fernandina Harbor/Kings Bay Entrance Channel. Includes the mean water temperatures for each month surveyed.

Month	Total Turtles	Total Trawls	Total Trawl Time (min)	Total Trawl Distance (nm)	CPUE Per Trawl	CPUE Per Hour	CPUE Per Nautical Mile	Mean Water Temp. °C
Mar 92	3	28	841	44.13	0.107	0.214	0.068	15.4
Apr 92	*	*	*	*	*	*	*	*
May 92	3	29	676	32.7	0.103	0.266	0.0917	19.6
Jun 92	3	28	566	30.57	0.107	0.318	0.0981	26.8
Jul 92	4	28	601	31.41	0.143	0.399	0.1273	NA
Aug 92	9	28	573	34.28	0.321	0.942	0.2625	NA
Sep 92	8	28	568	32.09	0.286	0.845	0.2493	30.4
Oct 92	11	28	601	32.19	0.393	1.100	0.3418	21.0
Nov 92	9	28	585	31.20	0.321	0.923	0.2885	19.0
Dec 92	0	28	612	31.45	0	0	0	14.7
Jan 93	0	28	579	30.72	0	0	0	15.2
Feb 93	0	27	582	29.69	0	0	0	13.5
Mar 93	2	28	608	30.37	0.071	0.197	0.066	17.6
Total	52	336	7392	390.80	-	-	-	-

* No Monthly Survey

Data obtained from the USAE Waterways Experiment Station, Vicksburg, Mississippi.

channels. Normal vessel speeds may be used at all times during daylight hours (sunrise to sunset). However, during the time of expected highest abundance in the area (currently thought to be 1 Dec through 31 Mar), dredge and attendant vessel speed will either be terminated or restricted to 5 knots or less at night, within the survey area (10 nautical miles of the project area) or where no aerial survey was performed that day in the survey area. The project area is defined as the area to be dredged, the boundaries of the disposal site, and the transit routes to be followed during the work. For those nights where a contractor is required to either terminate operations or restrict speeds to 5 knots or less, the contractor will be required to suspend work at night where weather conditions preclude safe steerage at speeds of 5 knots or less.

Daily aerial survey information shall be adequate to have a reasonable assurance of detecting a right whale within the survey area. Such surveys would be expected to be at least equivalent in whale detectability to a survey flown at an altitude of 750 feet at 100 knots on transacts 3 miles apart.

The Right Whale Early Warning System (RWEW), if in place, will be deemed to provide adequate information on the presence of whales during dredging contracts in and adjacent to the Southeast critical habitat area. This system will be used in place of contractor funded aerial surveys. The Corps agrees to abide by and incorporate into its dredging contracts within the critical habitat area all mutually agreed upon operating rules emanating from this RWEW system.

9. Proposed Plan of Action for Shortnose Sturgeon. When screens are monitored on a hopper dredge for other purposes such as for sea turtle take, the Corps will require that the screens also be monitored for shortnose sturgeon. Should a documented take of a shortnose sturgeon occur, CESAD will reinitiate consultation with NMFS.

10. Quality of Dredged Material. Disposal of dredged material in the ocean is regulated by the Marine Protection Research and Sanctuaries Act of 1972. Section 103 of the Act provides for transport of dredged material for the purpose of disposing of it in the ocean only after the material is evaluated using criteria established pursuant to Section 102 of the Act. Criteria for determining suitability of dredged material for ocean disposal based upon the biological testing requirements of the 1977 Ocean Dumping Regulations (40 CFR 220-228) are contained in the EPA/Corps jointly developed 1991 "Evaluation of Dredged Material Proposed For Ocean Disposal - Testing Manual, " commonly referred to as the "Green Book." Dredged material from the subject navigation channels is placed in an ocean disposal area only after it is found suitable for ocean disposal by the COE, with concurrence obtained from EPA. A waiver mechanism is available

(40 CFR 225.3 - 225.4), should EPA not concur in a suitability determination. This waiver process has never been pursued by any district in CESAD. Unforeseen delays in finalization of Section 103 evaluations which arise as a result of problems encountered during required testing programs may result in dredging delays which could force projects beyond agreed upon windows.

11. Affect Assessment.

a. Right Whale. The greatest threat to right whales during dredging is the potential for a collision with the dredge and attendant vessels. The greatest chance for a collision to occur, is during the calving season when the whales are present in the project areas. Implementing the precautionary measures discussed in section 7 of the BA will ensure that collisions do not occur. Provided that the above measures are implemented, the Corps has determined that dredging in the navigation channels identified in this BA will not effect the right whale.

b. Shortnose Sturgeon. While the possibility of an incidental take of shortnose sturgeon with dredging equipment does exist it is not considered likely to occur because of the mobility of these fish. The highest possibility of take would be in the upper reaches of harbors and riverine portions of navigation channels where juvenile shortnose sturgeon are likely to be present. These areas are generally not maintained with hopper dredges because of the long haul distance to the ODMDS. Because of the mobility of these fish, they are not likely to be entrained by pipeline or clamshell dredges. In the offshore navigation channels where hopper dredging is most likely to occur, shortnose sturgeon are least likely to be taken because of their relatively low abundance in these areas and because of their mobility. Accordingly, the Corps has concluded that dredging in the navigation channels identified in this BA will not affect the shortnose sturgeon.

c. Sea Turtles. Based on the population distribution and food habits of the hawksbill and leatherback sea turtles, encounters with these species during channel dredging operations along the southeastern United States are not expected. Also, as previously mentioned, these species have not been captured in any of the relative abundance or pre-dredging turtle surveys conducted by the Corps. Consequently, the Corps has determined that dredging in these channels will have no effect on hawksbill or leatherback sea turtles.

Since 1980 the number of documented turtle takes during hopper dredging operations has decreased significantly (refer to table 1). This is due primarily to the implementation of dredging windows and other management strategies developed to reduce the chance of encountering sea turtles. The plan of action proposed in section 6 of this BA will further insure that

the incidental take of sea turtles will be minimal. However, even with these precautions, it cannot be 100% guaranteed that turtles will not be taken. Therefore, the Corps has determined that hopper dredging may effect the loggerhead, green and Kemp's ridley sea turtles; however, it is not likely to jeopardize the continued existence of these species.

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