Endangered Species Act - Section 7 Consultation
Biological Opinion

Action Agency: United States Army Corps of Engineers (COE)

Activity Dredging of Gulf of Mexico Navigation Channels and Sand Mining ("Borrow") Areas Using Hopper Dredges by COE Galveston, New Orleans, Mobile, and Jacksonville Districts (Consultation Number F/SER/2000/01287)

Consulting Agency: National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southeast Regional Office, Protected Resources Division, St. Petersburg, Florida

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Contents

Consultation history 2
Description of the action area and proposed action 9
Status of listed species and critical habitat 20
Environmental baseline 32
Effects of the action 43
Cumulative effects 61
Conclusion 62
Incidental take statement 63
Reasonable and prudent measures 65
Conservation recommendations 78
Reinitiation of consultation 81
Appendices 82
Bibliography 93

Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. § 1531 *et seq.*), requires that each Federal agency shall ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species. When the action of a Federal agency may affect a protected species, that agency is required to consult with either the National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NOAA Fisheries) or the U.S. Fish and Wildlife Service (FWS), depending upon the protected species that may be affected.

This document represents NOAA Fisheries' biological opinion (Opinion) based on our review of the regular maintenance hopper dredging of navigation channels, and offshore sand mining for beach restoration/nourishment activities, in the U.S. Gulf of Mexico by the COE's Jacksonville, Mobile, New Orleans, and Galveston Districts, and its effects on green sea turtles *(Chelonia mydas)*, leatherback sea turtles (*Dermochelys coriacea*), hawksbill sea turtles *(Eretmochelys imbricata)*, loggerhead sea turtles (*Caretta caretta*), Kemp's ridley sea turtles *(Lepidochelys kempii)*, Gulf sturgeon (*Acipenser oxyrinchus desotoi*), and Gulf sturgeon critical habitat, in accordance with section 7 of the ESA.

Formal consultations are required when action agencies determine that a proposed action "may affect" listed species or designated critical habitat. Formal consultations on most listed marine species are conducted between the action agency and NOAA Fisheries. Consultations are concluded after NOAA Fisheries' issuance of an Opinion that identifies whether a proposed action is likely to jeopardize the continued existence of a listed species, or destroy or adversely modify critical habitat. The Opinion also states the amount or extent of incidental taking that may occur. Non-discretionary measures ("reasonable and prudent measures" - RPMs) to reduce the likelihood of takes are developed, and conservation recommendations are made. Notably, there are no reasonable and prudent measures associated with critical habitat, only reasonable and prudent alternatives.

This Opinion is based on dredging schedules and biological assessments provided by the various Gulf of Mexico COE Districts for channel dredging and beach nourishment projects involving the use of hopper dredges, meetings between NOAA Fisheries and the COE, annual take reports, dredge observer reports, dredging project completion reports, and annual dredging project summary reports provided by the COE Districts. Draft versions of this Opinion were provided to the COE Districts for input and comments, and resulted in significant revisions to the final draft.

1.0 Consultation History

This Opinion is a result of reinitiation of consultation on the September 22, 1995, Regional Biological Opinion (RBO) issued to the U.S. Army Corps of Engineers, New Orleans and Galveston Districts, on hopper dredging of channels in Texas and Louisiana. At the time that the Galveston and New Orleans Districts requested reinitiation of consultation on the RBO, NOAA Fisheries' Southeast Regional Office requested that the Mobile District and the Jacksonville District–the other two COE Districts that conduct hopper dredging operations in the Gulf of Mexico–also enter into formal ESA consultation with NOAA Fisheries and provide biological assessments (BA) on the effects of their Districts' maintenance dredging projects and beach nourishment projects on threatened and endangered species under NOAA Fisheries' purview in the Gulf of Mexico. This allowed NOAA Fisheries to prepare the present comprehensive regional biological opinion to cover all hopper dredging activities in the Gulf of Mexico which involve maintenance dredging or sand mining by or under the auspices of the U.S. Army Corps of Engineers.

The Galveston District's BA and request for reinitiation of formal consultation were submitted on October 11, 2000.

The New Orleans District's BA and request for reinitiation of formal consultation were received on April 9, 2001.

The COE's Mobile District provided information on hopper dredging projects within its area of jurisdiction on December 21, 2001, and additional information was provided at a meeting between NOAA Fisheries and COE representatives in Mobile on April 15, 2002. The Mobile District's BA was received on June 12, 2002.

The Jacksonville District submitted a BA dated April 29, 1999, on the Lee County Shore Protection Project, Estero Island Segment (Gasparilla Island) hopper dredging; additional information on this project was received on April 4, 2000. The Jacksonville District requested formal consultation and submitted a BA on their Florida west coast hopper dredging projects on November 28, 2000. On July 17, 2001, the Jacksonville District submitted a separate BA and request for formal consultation on the Lido Key Shore Protection Project. NOAA Fisheries requested additional information on the Lido Key project on August 9, 2001, which was provided by the COE on September 7, 2001. In their letter, the COE agreed to NOAA Fisheries' request to include the Lido Key project in the present Opinion. On August 22, 2001, the COE provided information on the Pinellas County Shore Protection Project; a BA and request for formal consultation was provided on October 30, 2002. That consultation is included in the present Opinion. In March 2002, NOAA Fisheries received a request for formal consultation from the COE on the Pensacola Beach Restoration Project and decided to include and evaluate the proposed action in the present Opinion, since the project called for hopper dredge use. Ultimately, the latter project was consulted on separately from the present Opinion, in a biological opinion issued in October 2002. On May 9, 2003, and again on August 8, 2003, NOAA Fisheries received a request for formal consultation on the proposed Sarasota County, Venice Beach Shoreline Protection Project since hopper dredging of offshore sand mining sites may be involved. That project is included in this Opinion.

The COE's Mobile District provided information on hopper dredging projects within its area of jurisdiction on December 21, 2001, and additional information was provided at a meeting between NOAA Fisheries and COE representatives in Mobile on April 15, 2002. The Mobile District's BA was received on June 12, 2002.

The Mobile District provided written comments on draft versions of this Opinion on September 6, 2002, and October 30, 2002.

The COE's South Atlantic Division provided comments on the draft Opinion on October 1, 2002, (e-mail, Barnett to Nitta) and on November 14, 2002 (e-mail, Small to Hawk).

The COE's Wilmington District provided comments on the draft Opinion on September 11 and 13, 2002 (e-mails, Adams to Hawk).

The COE's Jacksonville District provided comments on the draft Opinion on September 13, 2002 (Jordan to Adams). Additional comments (Haberer to Hawk) were received on April 29, 2003.

The COE's South Atlantic Division (SAD) compiled comments received from the COE's South Atlantic, Mississippi Valley, and Southwest Divisions, and the Jacksonville, Mobile, New Orleans, and Galveston Districts on the August 24, 2003, final draft Opinion, and provided these to NOAA Fisheries on September 9, 2003. NOAA Fisheries responded to these comments verbally to South Atlantic Division staff on September 25, 2003, made revisions to the final draft, and provided revised copies to the COE on October 15, 2003 for final comment. NOAA Fisheries requested that comments be submitted by October 21, 2002, although comments received through October 29, 2003 were considered.

A complete administrative record of this consultation is on file at the NOAA Fisheries' Southeast Regional Office, St. Petersburg, Florida.

Background to Proposed Action

<u>Consultation History of Channel Dredging in the United States</u>

The construction and maintenance of Federal navigation channels have been identified as a source of turtle mortality since turtle takes were first documented during hopper dredging operations in Canaveral Channel, Florida, in 1980. A total of 71 turtle takes by hopper dredge was documented in the Canaveral Channel over the period of July 11 through November 13, 1980 (NMFS 1991a). Hopper dredges, which are frequently used in ocean bar channels and sometimes in harbor channels and offshore sand mining areas, move relatively rapidly and can entrain and kill sea turtles, presumably as the drag arm of the moving dredge overtakes the slower moving turtle. In contrast to hopper dredges, pipeline dredges are relatively stationary, and therefore act on only small areas at any given time. In the 1980s, observer coverage was required by NOAA Fisheries at pipeline outflows during several dredging projects deploying pipeline dredges along the Atlantic coast. No turtles or turtle parts were observed in the outflow areas. Additionally, the COE's South Atlantic Division (SAD) office in Atlanta, Georgia, charged with overseeing the work of the individual COE Districts along the Eastern Seaboard from North Carolina through Florida, provided documentation of hundreds of hours of informal observation by COE inspectors during which no takes of listed species were observed. Additional monitoring by other agency personnel, conservation organizations, and the general public has never resulted in reports of turtle takes by pipeline dredges (NMFS 1991a).

U.S. Gulf of Mexico

Historically, section 7 consultations conducted on dredging impacts in the Gulf of Mexico were limited by the paucity of information available on the seasonal and spatial distribution of sea turtles; information was also lacking on adverse impacts of hopper dredging on local species under NOAA Fisheries' jurisdiction. Studies conducted by the COE (Dickerson et al. 1994) documented turtle distribution and abundance in 6 channels along the Atlantic seaboard but there was no evidence that indicated that sea turtles in Gulf channels aggregate like those along the southeast U.S. Atlantic coast.

A brief history (beginning 1990) of section 7 consultations conducted on dredging activities in the northern and western Gulf of Mexico follows. All of these consultations concluded that dredging was not likely to jeopardize listed species in the Gulf of Mexico.

New Orleans District

Beginning in 1991, the COE New Orleans District has held annual dredging conferences and has compiled a conference notebook requesting section 7 consultation on anticipated dredging projects for the upcoming fiscal year. Information on the proposed maintenance dredging dates, anticipated dredge types, and amount of material to be dredged is included within the conference notebook. The annual consultations resulting from the projects within the conference notebook were generally concluded informally, with a concurrence from NOAA Fisheries that hopper dredging in these channels was not likely to adversely affect any listed species or critical habitat. Since 1990, reporting conditions have been implemented that required precautionary measures to improve the information available on interactions between sea turtles and hopper dredge activities in the Gulf. The COE New Orleans District was asked to (1) advise inspectors, operators, and vessel captains about the prohibitions on taking, harming, or harassing sea turtles, and the civil penalties that apply; (2) instruct the captain of the hopper dredge to avoid any turtles encountered while traveling between the dredge site and offshore disposal area, and to immediately contact the COE if sea turtles were seen in the vicinity; and (3) notify NOAA Fisheries if sea turtles were observed in the dredging area in order to coordinate further precautions to avoid impacts to turtles.

A COE-funded research program was conducted during 1993 and 1994 to assess the occurrence of sea turtles in the vicinity of Calcasieu Pass, Louisiana. The COE New Orleans District suggested that ongoing research assessing sea turtle occurrence in the vicinity of the channel during the dredging period,

and observations by dredge workers and COE observers, were sufficient to preclude the need for NOAA Fisheries-approved observers.

The COE requested consultation in summer 1994 for FY 1995 channel dredging within the New Orleans District where a hopper dredge was likely to be used. Dredging areas included Calcasieu Pass, Mississippi River - Gulf Outlet (MR-GO), and the Mississippi River - Southwest Pass (MR-SWP). Preliminary studies of sea turtle occurrence in Calcasieu and Sabine passes suggested that sea turtles may congregate in the vicinity of some passes along the northern Gulf of Mexico at specific times of the year. Also, high levels of sea turtle strandings had been documented over the past few years on Louisiana beaches, despite the lack of a dedicated, organized stranding network.

In response to the COE New Orleans District's request for consultation, NOAA Fisheries issued a letter dated January 30, 1995, indicating that NOAA Fisheries-approved observers were necessary to verify the reported absence of dredging impact in these channels on listed sea turtle species. The letter also suggested that formal consultation would be required in 1995 incorporating the results of the Calcasieu sea turtle study and observer reports. NOAA Fisheries also suggested that the newly-developed rigid deflector draghead be immediately deployed on the dredges if possible.

During FY 1995, the COE New Orleans District determined that observers would not be deployed in the MR-SWP since the channel consisted primarily of fresh, high flow waters. Additionally, the complexity of dredging operations in MR-SWP results in up to seven hopper dredges operating at any time in any part of the MR-SWP, often with less than ten days notice, making deploying observers difficult. Dredging effort and location are dependant on weather, resultant flow, and siltation from up-river (International Dredging Review 1995). Variable dredging demands make it difficult to obtain 100% observer coverage at the appropriate extents of the MR-SWP.

However, NOAA Fisheries-approved observers were deployed on a hopper dredge operating in Calcasieu Pass during maintenance dredging operations between April 27 and July 8, 1995. No sea turtle takes were observed. Reports indicated that sufficient screening and observer effort were present to have observed a potential take. NOAA Fisheries-approved endangered species observers also attended maintenance dredging operations in the MR-GO between March 18 and May 10, 1995. No sea turtles were taken nor observed in the vicinity. Very little biological material was observed in the dredge spoil.

COE New Orleans District requested formal consultation in March 1995 on the effects of the proposed District-wide dredging and submitted a BA in July 1995. The resulting RBO on the use of hopper dredges to conduct maintenance dredging in Texas and Louisiana channels, issued on September 22, 1995 (NMFS 1995a), concluded that hopper dredging in the northern Gulf of Mexico was likely to adversely affect listed sea turtles, but was not likely to jeopardize the continued existence of sea turtle populations.

While the RBO authorized the New Orleans District an annual incidental take, lethal or injurious, by hopper dredge of 15 loggerhead, three green, seven Kemp's ridley, and one hawksbill sea turtle (NMFS 1995a), this take limit has not been reached for any species since the RBO was issued. In most years, New Orleans District takes have been <u>far</u> fewer than authorized (except in May 2002, when loggerhead takes in the MR-GO reached 75% of the authorized loggerhead limit). For example, from May 11, 1995, to September 13, 2003, June 1, 2003, a total of only 41 sea turtles (including 32 loggerheads, seven Kemp's ridleys, and two unidentified) has been reported lethally taken by hopper dredges in the New Orleans District. However, ten turtles, all loggerheads, were taken by the New Orleans District in FY2003, all in the MR-GO.

One of the measures implementing the RBO Incidental Take Statement (ITS) required observer presence in the seaward extent of MR-SWP between April 1 and November 30. A study proposed and conducted by COE New Orleans District in 1996 further characterized the habitat of the MR-SWP and helped identify the likelihood of turtle presence. Results indicated that the MR-SWP was an area not likely utilized by sea turtles. The 1996 sea turtle observer reports confirmed the absence of sea turtles, and the scarcity of sea turtle prey species found in hopper dredge inflow screens during dredging in the MR-SWP. On January 13, 1997, after reviewing their BA and MR-SWP habitat characterization study, NOAA Fisheries advised COE New Orleans District that further observer deployment in MR-SWP, as per the sea turtle observer monitoring requirements outlined in the ITS, was no longer required. There have been no documented takes of sea turtles in MR-SWP since the September 22, 1995, Opinion was issued.

Galveston District

Before the 1995 RBO, consultations had been conducted on a channel-by-channel basis within the COE's Galveston District. During a consultation conducted on the Sabine-Neches Waterway, NOAA Fisheries concurred on May 14, 1992, with COE Galveston District's finding that hopper dredging in the Waterway was not likely to adversely affect listed species. The conclusion for the Sabine-Neches Waterway was based on the lack of documented takes in the project area. However, NOAA Fisheries noted that the preliminary data collected in the project area suggested sea turtle presence in the channel area. As a precaution, NOAA Fisheries suggested that the COE Galveston District implement identical measures (1-3 above) as those required by the COE New Orleans District. These measures were followed on most hopper dredging projects conducted within the Galveston District between 1992 and May 1995.

Formal consultation conducted on hopper dredging in the Port Mansfield Channel resulted in an Opinion issued on September 12, 1992, restricting the use of hopper dredges during December through March. During these winter months, sea turtle observations by dredge personnel and COE dredge inspectors were required. The Opinion recommended the use of pipeline or bucket dredges during all months of the year as an alternative to hopper dredging in this channel. The Opinion also recommended that the COE adhere to National Park Service recommendations regarding dredge operations and disposal activities, and conduct studies to determine the seasonal abundance of sea turtles in the channel.

Informal consultation conducted on winter dredging of the Galveston Harbor and Channel in early 1995 indicated that formal consultation should be conducted for northern Gulf of Mexico hopper dredging projects between April and November due to new information collected by COE-funded research suggesting sea turtles were abundant in waters adjacent to channels. The need for formal consultation and requirements beyond COE observers was further demonstrated during take in a project within Brazos Pass, south Texas. Dredging began in February 1995, a time of year when historical information suggests that the relative abundance of sea turtles is low. On February 7 and 8, 1995, anterior portions of sea turtles were discovered on beaches adjacent to the Pass. Inquiries to the COE's Galveston District revealed two unreported observations by COE inspectors of live green turtles onboard the dredge the day after dredging began. Four additional strandings of green turtles with injuries indicative of dredging, and two lethal takes of green turtles were observed before dredging operations were halted on February 26. A Kemp's ridley lethal take was also observed. Total sea turtle take for the Brazos Pass project was 5 lethal and four non-lethal during 19 days, recording the first documentation of sea turtle takes by hopper dredges in Gulf of Mexico channels. The COE Galveston and New Orleans Districts were subsequently requested to initiate formal consultation as a result of both these documented takes and the new data describing the abundance of sea turtles near Gulf channels. Formal consultation was requested by Galveston on March 23, 1995, and by New Orleans on March 31, 1995, and a BA was submitted by the New Orleans District on July 20, 1995. The COE New Orleans District identified annual maintenance dredging needs and anticipated hopper dredge use for the lower Mississippi River, the bar channel of the

MR-GO, and the bar channel of the lower Calcasieu River. The COE Galveston District identified the Sabine-Neches Waterway, the Galveston Harbor Channel, Freeport Harbor, the Matagorda Ship Channel, the Corpus Christi Ship Channel, Port Mansfield, and the Brazos Island Harbor as maintenance dredging project areas requiring the use of hopper dredges.

September 22, 1995, Regional Biological Opinion (RBO)
NOAA Fisheries' RBO (NMFS 1995a) responded to both the New Orleans and Galveston Districts' consultation requests jointly and considered the effects of annual maintenance dredging by hopper dredges on listed sea turtles. Seasonal observers, screening, and deflector draghead requirements were instituted for most channel dredging. An incidental take level for each COE District by fiscal year was established. For the COE Galveston District, incidental take, by injury or mortality, was set at seven documented Kemp's ridleys, five green turtles, one hawksbill, and 15 loggerhead turtles. This take allotment represented a total allowable take per fiscal year for all channel dredging in the Galveston District. As noted previously, the RBO authorized the New Orleans District an annual incidental take, lethal or injurious, by hopper dredge of 15 loggerhead, three green, seven Kemp's ridley, and one hawksbill sea turtle. The Galveston District was allocated two additional green turtles in their incidental take statement due to their greater abundance in south Texas waters. Reasonable and prudent measures recommended were: (1) temporal windows for hopper dredge operation to reduce the probability of sea turtle interaction, (2) the use of shipboard endangered species observers to document incidental take when water temperatures were 12°C (53.6°F) or greater, (3) inflow and overflow screening of dredged materials to enable observers to identify take, and (4) use of the rigid turtle deflector dragheads in all channel areas of the Gulf of Mexico where take had either been documented or during periods of known sea turtle concentrations. After a Kemp's ridley was lethally taken on May 14, 2002, NOAA Fisheries reinitiated consultation with the New Orleans District COE and required that the sea turtle deflecting draghead be installed for Calcasieu River and Pass navigational channel dredging and during all hopper dredging projects in the New Orleans District, excepting MR-SWP (the COE had not previously been using the deflecting draghead at Calcasieu Pass).

Because relocation trawling had shown limited success in east coast channels (e.g., Canaveral and Brunswick) at temporarily reducing the abundance of sea turtles during periods in which dredging is required, a conservation recommendation was included in the RBO for the COE to consider conducting sea turtle relocation trawling in advance of hopper dredging in certain circumstances. Specifically, the RBO recommended that relocation trawling "should be considered if takes are documented early in a project that requires the use of a hopper dredge during a period in which large numbers of sea turtles may occur."

Since 1995, all Galveston and New Orleans District hopper dredging projects in the Gulf of Mexico, with the exception of the Houston-Galveston Navigation Channels (H-GNC) (which was the subject of a separate Opinion and corresponding ITS for widening and deepening of existing channels, and cutting of new channels), have been conducted under the authority and subject to the take limits of the RBO. Hopper dredging projects under the jurisdiction of the Mobile and Jacksonville Districts were consulted on by individual project requiring individual Opinions and ITS's (e.g., Tampa Bay and Charlotte Harbor, Florida); or in the case of the Mobile District, every five years under informal section 7 consultation procedures.

<u>COE Jacksonville District, Florida West Coast</u>
Informal consultation on the proposed dredging of 750,000 cubic yards (CY) of shoal material and biannual maintenance dredging of 265,000 CY of shoal material in Boca Grande Pass, Charlotte Harbor Entrance Channel (located about 60 miles south of Tampa Bay), was initiated on March 31, 1992, by the

Planning Division, Jacksonville District COE. A BA was transmitted pursuant to section 7 of the ESA. On April 29, 1992, NOAA Fisheries determined that the proposed maintenance dredging action by hopper, hydraulic pipeline, or mechanical dredge would not adversely affect listed species under NOAA Fisheries' purview.

On February 6, 1995, the COE Planning Division, Jacksonville District informed NOAA Fisheries that, as a result of positive testing results, the new turtle excluder "rigid deflector" draghead would be utilized both in Boca Grande Pass and on all other hopper dredging projects. The rigid deflector was developed under controlled conditions by the COE's Waterways Experimental Station (WES), now known as the Engineering Research and Development Center (ERDC).

NOAA Fisheries issued an Opinion to the COE on June 2, 1995, regarding the effects of hopper dredging of approximately 13.3 miles of channels leading into and within Tampa Bay. The Tampa Harbor Navigation Channel Opinion required the COE to (1) conduct pre-dredge trawling surveys for turtles prior to commencement of dredging operations, (2) utilize the newly developed turtle excluder rigid deflector on all dragheads, (3) provide 100% screening of the overflows, and the maximum possible screening of the inflows, (4) disengage dredging pumps when dragheads were not firmly on the bottom, and (5) provide NOAA Fisheries-approved observer monitoring of dredging operations at all (100%) times. The Opinion established an incidental take limit of two documented Kemp's ridley, hawksbill, leatherback or green turtles, in any combination, or three loggerheads, for maintenance hopper dredging of Egmont Bar Channel (Cut 1 and 2), Mullet Key Cut, and Cut A in the navigation channel to Tampa Bay.

The COE reinitiated formal consultation with NOAA Fisheries for the Tampa Harbor Navigation Channel hopper dredging project on April 2, 1996, following the lethal take of two Kemp's ridleys. The resultant Opinion, signed April 9, 1996, suggested additional conservation measures and established an additional incidental take level (in addition to the two Kemp's previously taken), and the deflecting draghead position was adjusted. Additional incidental take was designated as eight sea turtles, however no more than five sea turtles could be Kemp's ridley, hawksbill, leatherback, or green (i.e., up to eight loggerheads could be taken, but no more than five of the other four species combined, NMFS 1996c). Immediately after this new Opinion was issued, three sea turtles (two loggerheads and one Kemp's ridley) were lethally taken by the hopper dredge STUYVESANT during March 3-April 18, 1997 maintenance dredging of the Egmont Bar Channel. These takes occurred despite a pre-dredge trawl survey (conducted from February 13-18, encompassing approximately 30 hours of trawling) that captured, tagged, and relocated three Kemp's ridleys. Subsequent dragging (trawling) operations conducted from March 16 - April 26 during the dredging period resulted in three loggerhead sightings, but no sea turtle captures. In retrospect, it is likely that the pre-dredge trawling occurred too long before the actual hopper dredging to be of maximum benefit.

On October 30, 1998, a loggerhead sea turtle was taken by a hopper dredge conducting maintenance dredging of Charlotte Harbor Entrance Channel (Boca Grande Pass). On November 3, 1998, the COE requested formal consultation on periodic maintenance dredging of Charlotte Harbor Entrance Channel using a hopper dredge to remove approximately 265,000 CY of shoal material every two or three years. Maintenance dredging of Charlotte Harbor Entrance Channel, between October 20, 1998, and January 13, 1999, resulted in one loggerhead (non-lethal) take and three loggerhead surface sightings within 300 yards of the operating hopper dredge.

On June 8, 1999, during consultation on Charlotte Harbor Entrance Channel hopper dredging, NOAA Fisheries requested that the COE-Jacksonville District submit dredging schedules for all District projects

to be performed over the next five years, and suggested that the District request initiation of consultation for a Regional Biological Opinion (RBO) to include *all* potential dredging sites within the Jacksonville District, including Tampa Bay and the ongoing Charlotte Harbor consultation. Subsequently, an Opinion for maintenance dredging of Charlotte Harbor Entrance Channel was issued on October 26, 1999, authorizing the incidental take of two loggerheads or Kemp's ridleys or greens or hawksbill sea turtles, and one Gulf sturgeon, per biennial dredging cycle. The Charlotte Harbor Opinion, because of reported incidental take of Gulf sturgeon by gill net fishermen in Boca Grande Pass, was the first Gulf of Mexico hopper dredging Opinion to anticipate dredge interactions with Gulf sturgeon. Previously, NOAA Fisheries had addressed hopper dredging impacts on Gulf sturgeon in section 7 consultations for channel maintenance dredging, believing that the projects were not likely to adversely affect the species given either the project's limited scope and/or the unlikely presence of Gulf sturgeon. While no Gulf sturgeon takes by hopper dredges have been reported since, allopatric sturgeon species on the Atlantic Seaboard have been taken occasionally by hopper dredge. The existing SAD RBO for hopper dredging between North Carolina through Florida limits the incidental take of shortnose sturgeon to five. Recent reports confirm the take of five shortnose sturgeon by a hopper dredge operating in the Kennebec River, Maine (Julie Crocker, NMFS NER, October 15, 2003, pers. comm. to Stephania Bolden, NMFS SER). Thus, NOAA Fisheries considers it prudent to address potential Gulf sturgeon takes by hopper dredges operating in the Gulf of Mexico as we presume the species can be taken given the evidence from two morphologically and ecologically similar Atlantic sturgeon species.

On September 5, 2000, the COE requested consultation on maintenance dredging of St. Petersburg Harbor Entrance Channel, within Tampa Bay, using a hopper dredge. NOAA Fisheries concluded that the ITS and conclusions of the 1996 Tampa Harbor Navigation Channel Opinion remained valid and included this within-bay maintenance dredging. A pre-dredging assessment trawl survey from September 21-28 (approximately 29 hours of trawling) in the proposed dredging area resulted in the capture, tagging, and relocation of two adult loggerheads and one subadult green turtle. Subsequent dredging operations conducted from late September to October 2000, resulted in surface sightings of three turtles, but no captures.

2.0 Description of the Action Area and Proposed Action

The action area (defined in 50 CFR 402.02 as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action") for this action is the coastal waters, navigation channels, and sand mining areas in the U.S. Gulf of Mexico, from the Texas-Mexico marine border to Key West, Florida.

The proposed action includes:

1) Federal, federally-permitted, or federally-sponsored hopper dredging for maintenance of all U.S. Gulf of Mexico navigation channels within all of the COE's Gulf of Mexico Districts (Galveston, New Orleans, Mobile, and Jacksonville), including intracoastal waterways, maintenance dredging associated

with the Houston-Galveston navigation channels,[1] and maintenance dredging associated with the Corpus Christi Ship Channel Improvement Project.[2]

2) Federal, federally-permitted, or federally-sponsored hopper dredging of all U.S. Gulf of Mexico sand mining areas ("borrow sites") and virgin (previously unused) sand mining areas for beach nourishment, restoration, and protection projects, outside of designated Gulf sturgeon critical habitat, in state waters.

3) Hopper dredging projects including Federal civil works projects, Federal non-civil works projects authorized by COE regulatory permits, and non-Federal projects authorized by COE regulatory permits including privately-sponsored projects and cost-shared projects (part private, part Federal funding).

4) Maintenance (maintenance dredging is defined as keeping channels at specified depths and widths; improving means making them deeper or wider) hopper dredging of Gulf of Mexico navigation channels previously dredged by non-hopper type dredges.

5) Hopper dredging tests, in state waters, to determine a site's sand characteristics and suitability for future sand mining and beach restoration activities.

6) Emergency hopper dredging necessary due to disasters, storms, hurricanes, floods, etc., and national defense.

7) Disposal of hopper-dredged material in approved disposal areas. The COE has stated that economic concerns (e.g., time-of-transit to disposal sites versus time spent actually dredging) dictate that disposal of dredged materials occurs in the vicinity of the dredge sites, usually alongside or downdrift of the channels being dredged in designated placement areas or nearby designated ocean placement sites, often just off barrier island passes. Descriptions of dredged material disposal/placement sites are included herein by reference to charts and figures provided by the Gulf of Mexico COE Districts.

8) Hopper dredging of channels and turning basins <u>beyond</u> previously authorized depths and dimensions (i.e., "new material" dredging) <u>if</u> the action is described in the following project descriptions by COE District (e.g., Jacksonville District's Alafia River project) <u>and</u> only when the project is located outside of designated Gulf sturgeon critical habitat.

9) "New material" hopper dredging including widening, deepening, and extending of existing navigation channels and turning basins to previously authorized dimensions for channels and turning basins outside of designated Gulf sturgeon critical habitat.

10) Bed-leveler mechanical dredging of channels, turning basins, dredged material disposal areas, etc., located outside of designated Gulf sturgeon critical habitat using plows, I-beams, or other bed-leveling mechanical dredging devices used during or after hopper dredging or by themselves to lower high spots in the channel bottom or dredged material deposition areas.

[1] A separate Opinion for the Houston-Galveston navigation channels was previously issued to cover takes during widening, extending, and deepening.

[2] A separate Opinion was finalized in December 2002 on this project to cover takes during widening, extending, and deepening.

Except as noted in 8) and 9) above, "new material"dredging, i.e., hopper dredging to build, deepen, widen, or extend channels and turning basins, is not considered part of the proposed action evaluated in this Opinion and must be consulted on individually by the appropriate COE Districts.

This Opinion does NOT include:

1. Improvement (maintenance dredging is defined as keeping channels at specified depths and widths; improving means making them deeper or wider) of channels to depths or widths not previously authorized throughout the project area.

2. Dredging in areas within designated Gulf sturgeon critical habitat. Such dredging is limited to maintaining the current dimensions of channels at the time of this consultation (i.e., length, width, and depth) regardless of previous authorization. As addressed throughout the rule designating Gulf sturgeon critical habitat, dredging is an activity that may adversely modify critical habitat and therefore must be evaluated on a case-by-case basis.

3. Disposal in areas within designated Gulf sturgeon critical habitat. Such disposal is not authorized nor considered within this Opinion. As addressed throughout the rule designating Gulf sturgeon critical habitat, dredging is an activity that may destroy or adversely modify critical habitat and therefore must be evaluated on a case-by-case basis.

4. Hopper dredging permitted by other Federal agencies (e.g., Minerals Management Service - MMS) for characterizing or obtaining sand for beach renourishment projects in the Gulf of Mexico; although disposal of said sand obtained from outside state waters (i.e., from waters under the permitting purview of MMS, not the COE) is considered part of the proposed action, except for sand disposal within designated Gulf sturgeon critical habitat. Note: Although the COE may issue permits for the disposal in state waters of hopper dredged sand obtained from outside state waters (i.e., from Federal waters under MMS permitting authority), this Opinion does not consider (or hold the COE responsible for) any threatened or endangered species takes arising from non-COE permitted hopper dredging of sand sources outside of the COE's permitting authority.

New Orleans District

The COE New Orleans District has identified the following channels where regular maintenance dredging is required and use of hopper dredges is anticipated.

1. Mississippi River, Baton Rouge to the Gulf of Mexico, Southwest Pass - the lower Mississippi River (mile 4.0 above Head of Passes to mile 22.0 below Head of Passes, Southwest Pass): Maintenance dredging is required, conducted by private (contract) and government-owned hopper dredges for 8-12 months each year. Last dredged in 2002, the FY2004 dredging conference notebook indicates that maintenance dredging of the MR-SWP and the associated bar channel will be conducted by a cutterhead, hopper, and dustpan dredge beginning December 2003 continuing for approximately 8 months to remove approximately 18.8 million CY of material (25% sand, 50% silt, 25% clay). Authorized channel depth is 55 feet. Currently the channel is maintained to 45 feet. Disposal will occur in open water by agitation, placement in a designated ocean placement site, wetland creation and bank nourishment.

2. Mississippi River, Deep Draft Crossings - New Orleans Harbor to Baton Rouge: Maintenance dredging is required, conducted by government-owned hopper dredge and contract dustpan dredge for six months each year. The FY2004 dredging conference notebook, submitted in May 2003 indicates that maintenance dredging of the 45-ft deep x 500-ft wide channel will be conducted by both hopper and

dustpan dredge beginning June 2004 and continuing for approximately 6 months, to remove approximately 16.5 million CY of material (100% sand) between miles 230.7 and 114.8. Open water disposal is proposed in the deep water in vicinity of the crossings.

3. Mississippi River - Gulf Outlet: Maintenance dredging of the MR-GO channel involves non-continuous work from mile -66.0 to mile -9.0, and requires both hopper and cutterhead dredges. Routine maintenance dredging and disposal plans (non-emergency status) by cutterhead dredge can be performed throughout the entire project reach; hopper dredging is utilized in the bar channel reach only. Normally, the reach of the bar channel between mile -3.3 and -9.0 is maintained by hopper dredge. Maintenance dredging is conducted for approximately three months annually by both contract and government-owned hopper dredges. Last dredged in FY 2002, during FY2004 maintenance dredging on the MR-GO bar channel between mile -4.0 and -9.38 is anticipated to begin in September 2004 and continue for approximately 60 days, to remove approximately 1.5-2.5 million CY of material (33% sand, 57% silt, 10% clay). Open water dredged material placement is proposed between miles -4.0 and -9.38 in the ocean dredged material disposal site alongside the channel or on Breton Island. Additionally, hopper dredging work may occur between miles 23.0 and 12.0. Last dredged in 2002, approximately 2.0-6.0 million CY of material is proposed to be dredged, by cutterhead and hopper, starting in June 2004, for 90 days. Unconfined disposal is planned for wetland development behind South Jetty.

The COE New Orleans District requested on April 8, 2002, that hopper dredges be permitted to remove shoal material in the MR-GO navigational channel between mile 27.0 and -9.38 in the event that emergency maintenance dredging is required, only when cutterhead dredges are either unable to perform such work or are unable to provide project dimensions in a timely manner. On April 29, 2003, the District requested that hopper dredges be permitted to remove shoal material in the MR-GO navigational channel between mile 27.0 and -0 under the same conditions as previously noted. Conditions noted by the District that would precipitate emergency hopper dredge sidecasting of dredged material within authorized channel dimensions for later cutterhead dredge removal and disposal include: (a) extreme weather working conditions that prevent safe and timely operation of a cutterhead dredge to restore safe passage in the most expeditious manner, (b) lack of cutterhead dredge availability, (c) unacceptable cutterhead dredge mobilization/start-up response time, (d) excess project cost, and (e) inadequate estimated or actual cutterhead dredging production rates.

4. The Calcasieu River and Pass navigation channel and bar channel (miles 0.0 to -32.0, with the majority of dredging occurring between mile 0.0 to -10.0): Maintenance dredging is required for 2-3 months per year. During FY 2004, this project is scheduled to begin November 2003 and take approximately 60-90 days to remove eight million CY of material (9% sand, 45% silt, 46% clay) and maintain the 40-ft x 400-ft channel between jetties and the 42-ft x 800-ft channel to the 42-ft contour depth in the Gulf. The proposed disposal method is open water disposal at the ocean dredged material disposal sites located from mile 0 to mile -32.0 alongside the channel.

No sea turtle takes have ever been reported from the MR-SWP. A habitat characterization study conducted in 1996 by the New Orleans District COE, including endangered species observer deployment from April through November 1996, indicates that the strength and speed of the Mississippi River's current in Southwest Pass, which causes severe shoaling and resultant constant dredging demand, also preclude the establishment of benthic communities of sea turtle forage species. On January 17, 1997, NOAA Fisheries agreed with the New Orleans District COE's study assessment that sea turtles were not likely to occur within the Southwest Pass of the Mississippi River, and notified the new Orleans District COE that further deployment of sea turtle deflecting dragheads and sea turtle observers in Southwest Pass

was unnecessary as the habitat is believed to be unsuitable for sea turtles. NOAA Fisheries has no new evidence that would alter the conclusions of the previous assessment.

The Atchafalaya River and Bayous Chene, Boeuf, and Black are dredged for about 40 days each annually, usually by cutterhead, and between 2-3 million CY of mostly sand (80% sand; 20 % silt) is removed to maintain a channel 20 feet wide by 400 feet long. The project area includes both a bay and a bar channel. A hopper dredge was first used during 2002 (January 30-February 9) in an attempt to better remove "fluff." "Fluff" is fluid mud that returns to channel shortly after dredging and interferes with the passage of certain types of vessels. NOAA Fisheries is not aware of any previously documented take of either sea turtles or Gulf sturgeon during dredging in this channel. Hopper dredging may again occur at these locations in the future.

Galveston District

Hopper dredges are used for maintenance dredging in the Galveston District channels listed below. To date, all beach nourishment projects in the Galveston District have been with dredge materials associated with channel dredging (i.e., sand mining sites were not used) and Galveston District does not anticipate any change to this scenario (Hauch, e-mail comm. to Hawk, Nov. 15, 2000). Hopper dredges deployed since May 1995 have had 100% observer coverage, 100% inflow/overflow screening, rigid deflector dragheads, and dragarm operators have attempted to disengage dredge pumps when dragheads were suspended in the water column. Galveston District also attempts to schedule all hopper dredging during the December 1- March 31 recommended window. During FY02, four maintenance hopper dredging projects were completed: Port Mansfield Channel and Brazos Island Harbor, March; Freeport Harbor, July-August; and Sabine-Neches Waterway, July-August. During FY2003, maintenance dredging was accomplished at Brownsville Entrance Channel (December) and Aransas Pass (April-July).

The COE Galveston District has identified the following channels where maintenance dredging is or will be required and use of hopper dredges is anticipated.

1. The Sabine-Neches Waterway: Annual maintenance dredging is required in this channel, conducted by both contract and government-owned hopper dredges. In FY2003, the COE plans to commence dredging in May for about three months. The last reported takes in this waterway were a Kemp's ridley in March 1997, and a loggerhead in August 2002 during COE dredging of 2.88 million CY of material from July 27-August 13, 2002.

2. Galveston Harbor and Channel: This project was subsumed by the Houston-Galveston Navigation Channels (H-GNC) widening and deepening project which was the subject of a December 7, 1998, Opinion (F/SER/1998/00010). Although incidental take associated with *new material* dredging (i.e., non-maintenance type dredging such as widening and deepening) at H-GNC is covered by the Incidental Take Statement of the December 7, 1998, Opinion, regular maintenance dredging will be required at the Entrance Channel with Extension, Outer Bar Channel, Inner Bar Channel, Bolivar Roads Channel, and the Anchorage Basin and is included in the present Opinion. Authorized channel dimensions are: Entrance Channel (49 ft by 800-1,239 ft); Outer Bar Channel (47-49 ft by 800-1,239 ft); Inner Bar Channel (47 ft by 800-1,189 ft); Bolivar Roads Channel (47 ft by 800-1,000 ft); and Anchorage Basin (36 ft by 2,870-9,760 ft). The total length of these channels is 76,000 feet. Frequency of dredging along this project is expected to average approximately 1.5 years. Although it is not presently known what shoaling patterns will emerge, if the entire project were to be maintained under a single contract, approximately 3.5 million CY of material would need to be excavated requiring about six months of dredging. A more reasonable expectation would be that the project would be broken down into sections that would be dredged with varying frequencies. Maintenance operations will be performed by either contract or

government-owned hopper dredges. One Kemp's ridley and one green were taken during FY99 and one Kemp's ridley was taken in FY2003 in H-GNC dredging. The Houston-Galveston Entrance and Jetty Channel dredging work was scheduled to begin in June 2003 and continue for about three months. In addition, the Galveston District reinitiated consultation with NOAA Fisheries on December 3, 2002, on new material dredging for a proposed new barge channel within the H-GNC system but not considered by the December 7, 1998, Opinion. NOAA Fisheries completed consultation informally on the barge channel dredging (I/SER/2002/01438) on December 8, 2003, since non-hopper type dredges will be used.

3. Freeport Harbor: Dredging frequency has increased since the last consultation, from annual to biannual maintenance dredging by contract hopper requiring about two months of work. The average volume of material removed per contract has increased to about 1.6 million CY. A total of eight sea turtles (all loggerheads) has been taken at this site: one in October 1995, four in June-July 1996, one in October 1998, and two in August 2000. The COE dredged 2.0 million CY of material from July 13-September 24, 2002. FY03 dredging is scheduled to start in June 2003, for about four months.

4. Matagorda Ship Channel: Maintenance dredging is conducted for about 1.5 months every four years using contract hopper dredge. The last lethal take at this site was a loggerhead in October 1996.

5. Corpus Christi Ship Channel: Maintenance dredging is conducted every 1.5 years by contract or government-owned hopper dredge and requires approximately two months. One loggerhead was lethally taken during clean-up in the Port Aransas entrance channel area in September1995; three additional turtles (all loggerheads) were lethally taken in June 1999. Aransas Pass Entrance Channel dredging began in April 9, 2003 and was completed on July 7, 2003, after moving ca 1,153,000 CY of material. Four loggerheads and one Kemp's ridley turtle were taken by the dredge during the project; 71 turtles (55 loggerheads, 15 Kemp's ridleys, and one leatherback) were safely removed from the action area by relocation trawlers.

6. Corpus Christi Ship Channel Improvement Project: Deepening of the Corpus Christi Ship Channel and nearshore approaches to Corpus Christi Bay from about 6 miles offshore. The proposed deepening of the Corpus Christi Shipping Channel (CCSC) from Viola Basin in the Inner Harbor to the end of the jetties in the Gulf of Mexico to –52 ft from –45 ft mean low tide (MLT), plus advanced maintenance and allowable overdepth; deepening the remainder of the channel into the Gulf of Mexico to 54 ft (depths will be increased roughly 10,000 ft into the Gulf of Mexico to the –56 ft isobath); widening of the Upper bay and Lower Bay reaches (from Port Aransas to Harbor Bridge) to 530 ft (existing widths are 500 ft between Port Aransas and La Quinta Junction and 400 ft between La Quinta Junction and the Harbor Bridge); construction of 200-ft wide barge shelves (-12 ft MLT) on both sides of the ship channel from La Quinta Junction to the Harbor Bridge, across the Upper bay portion of the CCSC; and extending La Quinta Channel 7,200 ft to a depth of –40 ft MLT and a width of 400 ft and including a turning basin. It is estimated that approximately 40 million cubic yards of new work will require seven separate dredging contracts to complete. NOAA Fisheries completed formal consultation on this project, and issued an Incidental Take Statement, in December 2002. To date, no turtles have been taken. Any takes associated with future maintenance dredging associated with this project are included in the present Opinion's ITS.

7. Brazos Island Harbor (includes Brazos Santiago Pass - the Brownsville Entrance Channel): Maintenance dredging is conducted every two years by contract hopper dredge and requires approximately 1.5 months. Brazos was dredged in February 1995 and two green turtles and one Kemp's ridley were observed to be taken lethally. A Kemp's ridley and a loggerhead were lethally taken in late April and mid-June of 1997, respectively. Two greens were taken between mid-February and early March 1999. Two greens were taken in a 24-hour period between March 18-19, 2002, causing the COE to terminate the dredging before project completion. The dredge returned in December when waters

temperatures were slightly cooler. Two green turtles were taken between December 15-19, 2002, and work was again suspended due to the lethal takes.

8. Port Mansfield: Maintenance dredging is required every three years by hopper or pipeline dredge, except for the channel seaward of the jetties which requires approximately one month of hopper dredging during maintenance years. Dredging in FY02 occurred from March 4-20, 2002. The first ever reported takes at this site were March 19-20, 2002, when two green turtles were lethally taken within 24 hours. The COE decided to forego additional dredging during FY02 at this site since four of their five green turtles allotted for the COE fiscal year had been taken while two additional major navigation projects remain to be dredged (Freeport Harbor Entrance and Jetty Channels; Sabine Pass Outer Bar and Sabine Bank Channels).

Mobile District

The Mobile District COE has responsibility for civil works activities in the Florida Panhandle west of (but not including) the Aucilla River Basin (including the St. Marks River, Florida) to the Rigolets, Louisiana (up to but not including the Mississippi River). Hopper dredges are routinely used to maintain ocean bar and entrance pass channels leading from the Gulf of Mexico through passes between offshore barrier islands into Mobile Bay, Mississippi Sound, and Pensacola Bay. However, prior to the present Opinion, consultations with the Mobile District on hopper dredging activities were concluded informally every five years, as NOAA Fisheries did not believe until recently that protected species were likely to be impacted as COE observers aboard dredges in Mobile Bay in the early 1990s did not detect evidence of sea turtle entrainment (Henwood, pers. comm. 2002).

The COE Mobile District has identified the following channels in which regular maintenance dredging is required and use of hopper dredges is anticipated.

1. Gulfport Harbor, Mississippi: The Mississippi Sound portion of the project is maintained on a roughly 18-24 month basis. The Mississippi Sound portion of the channel (includes the Sound Channel, Gulfport Ship Channel, Commercial Small Craft Harbor Entrance Channel, and Anchorage Basin) is maintained by pipeline dredge, though the Anchorage Basin may be rarely dredged by hopper dredge. Average yearly dredged material removed from the Anchorage Basin has been about 376,000 CY. The Pass (Ship Island Pass bar channel) and the Gulf entrance channel are maintained on a 12-month basis. Prior to 1992, the majority of this material was removed by hopper dredge and placed in the ocean disposal sites; since 1992 the material from the bar channel has been removed by pipeline dredge and placed downdrift. About 400,000-450,000 CY are removed annually from each entrance channel (Pass and Gulf). The Gulf entrance channel is maintained by hopper dredge with the material placed in ocean sites located on either side of the entrance channel. Currently the Gulf Channel, Bar Channel, Sound Channel, and Gulfport Ship Channel are maintained at their authorized depths of 38, 38, 36, and 36 feet, respectively. The COE Mobile District has initiated a study to investigate potential improvements to the Gulfport Harbor project, including widening and deepening.

2. Pascagoula Harbor, Mississippi: The Mississippi Sound portion of this project is maintained on an 18-24 month basis, typically by pipeline dredge. On occasion, a hopper dredge is utilized within the Mississippi Sound, Bayou Casotte, and Pascagoula River portions of the navigation project, including Pascagoula Naval Station channels. The bar channels (includes the Gulf entrance channel and Horn Island Pass) are maintained on an approximate annual basis. The Pass portion of the project is maintained with a pipeline dredge; the Gulf entrance channel leading to the Pass, and the Horn Island impoundment basin, is usually maintained by hopper dredge with about 538,000 CY removed in each annual dredging cycle. Dredged material is typically disposed of in designated disposal areas alongside the entrance

channel within Mississippi Sound near the Pass, and just outside and southwest of the Pass in nearby designated offshore disposal areas.

3. Mobile Harbor, Alabama: Prior to 1986, all material from the Mobile Bay portion of the project (Mobile Harbor Channel) was dredged by pipeline and sidecast adjacent to the channel. Since 1986 this area (Mobile Bay Ship Channel) has been typically dredged annually by hopper dredge on a continuous basis. Theodore Ship Channel, located about mid-way down the Mobile Harbor Channel, is typically maintained by pipeline dredge but occasionally, when the required dredging is in the vicinity of the juncture with the Mobile Ship Channel, this area will be dredged by hopper dredge. Dredging of the entrance channel leading from the Gulf to Mobile Pass is typically on a 24-month basis. Due to the hydrodynamics of the Mobile Pass, very little dredging is required between Miles 30 and 34, which encompasses the Pass (bar channel) into Mobile Bay between Fort Morgan and Fort Gaines. However, required dredging in the southern portion of the project (Pass and Gulf entrance channel) is typically performed by deep-draft hopper dredges. Annually, an average of 6.1 million CY of material are dredged from Mobile Bay channels; 888,000 CY are dredged from the bar channel; and 1.2 million CY are dredged (by pipeline dredge) from Mobile River channels.

4. Orange Beach and Gulf Shores Beach Nourishment Project: The District has received a proposal from the cities of Orange Beach and Gulf Shores to nourish 11 miles of Gulf beaches, in four segments. The easternmost segment occupies 1.1 miles of Perdido Key from the Alabama/Florida state line westward to the Florida Point unit of Alabama Gulf State Park, Orange Beach, Alabama. The central segment occupies the western 3.6 miles of shoreline in Orange Beach and the eastern 1.9 miles of shoreline in the Gulf State Park, east of the park fishing pier. The western segment lies along 3.3 miles of west Gulf Shores, beginning approximately 0.25 mile west of the entrance to Little Lagoon. The final segment is approximately one mile in length and lies immediately west of the entrance to Little Lagoon in Gulf Shores. Segments 1, 2, and 3 will receive 50-100 cubic yards per linear foot of shoreline, which is expected to advance the shoreline over 200 feet seaward in most areas. Segment 4 is a dune restoration only; no more than 10 cubic yards of sand will be placed per linear foot of shoreline and all fill will be placed above the mean high tide line. A total of seven million cubic yards of sand would be dredged from four offshore sand mining sites. The sites are located approximately 1-3 miles offshore, between Gulf Highlands and Perdido Pass.

5. Pensacola Harbor, Florida: COE Mobile District is currently developing a long-term maintenance plan for civil works projects in Pensacola Bay. In the past COE Mobile District has not routinely maintained these civil works projects, instead they have typically acted as an agent for the U.S. Navy whose channel subsumes the Federal channel at Pensacola. Hopper dredge use is common in Pensacola Bay. The Pensacola Pass Channel (also called Perdido Key Pass) between Santa Rosa Island and Perdido Key has been dredged by pipeline and hopper dredge. Dredged materials are typically disposed of in a nearby designated disposal area just seaward and west of Pensacola Pass, alongside the entrance channel (Caucus Channel).

It is expected that occasional emergencies will arise necessitating limited hopper dredge use in Perdido Key Pass or Pensacola Harbor, including the Navy Channel, Inner Harbor Channel, and Approach Channels to accommodate national defense needs or to deal with unexpected, hazardous shoaling caused by major storms, floods, hurricanes, etc. An emergency hopper dredging project was required in Perdido Key Pass in 2000. NOAA Fisheries also consulted in February 2001 with the COE Jacksonville District, Regulatory Division on a U.S. Navy-requested emergency hopper dredging project to remove approximately 130,000 CY of sandy material from the entrance channel to the Pensacola Harbor and Pensacola Naval Air Station. Although this work requested by the U.S. Navy was under the regulatory responsibility of the Jacksonville District, it was actually performed by the Mobile District, which acted as the Navy's agent and was therefore responsible for obtaining all the required permits (e.g., a regulatory

permit from the Jacksonville District, and a permit from the state of Florida). NOAA Fisheries recently completed a formal consultation with the Mobile District on dredging of Pensacola Pass in the U.S. Gulf of Mexico and the deposition of the dredging spoil in the littoral zone off Perdido Key to the west of Pensacola Pass by hopper dredge (F/SER/2003/00053; August 4, 2003). The COE Jacksonville District was the permitting authority; the Mobile District COE, acting as an agent for the U.S. Navy (specifically, Naval Air Station Pensacola), contracted for the hopper dredging/relocation trawling work.

The Mobile District began voluntarily putting endangered species observers on civil works hopper dredging projects within the District in late-summer 2002, following meetings and numerous discussions with NOAA Fisheries. Prior to this, observers were not routinely placed aboard hopper dredges within the District. The Mobile District to date has not required hopper dredges in their District to operate with sea turtle deflectors on their dragheads ("deflector dragheads"), citing lack of evidence of significant sea turtle presence in District waters, and also stating their belief that to prove this it is necessary to dredge without deflecting dragheads in order to gather unbiased evidence that sea turtles are not present in District waters. Hopper dredges operating in the District are required to have hopper inflow screening (4-inch mesh).

Jacksonville District (Florida West Coast - Aucilla River Basin, Florida to Key West, Florida)
Jacksonville District's civil works boundaries generally follow river basins and drainage areas rather than state lines. Jacksonville District is responsible for all of Florida, with the following two exceptions: Mobile District is responsible for the area west of the Aucilla River basin in Florida's panhandle, and Savannah District maintains the St. Mary's River watershed in northeast Florida except for the Fernandina entrance channel that is maintained by Jacksonville District. In addition, Jacksonville District is also responsible for the watersheds of the Suwannee, Withlacoochee, and Alapaha rivers in southern Georgia. Jacksonville District also constructs civil works projects in Puerto Rico and the U.S. Virgin Islands.

Of the numerous navigation projects along the Gulf coast under the Jacksonville District's purview, only the navigation channels in Tampa Bay and Charlotte Harbor are likely to be dredged by hopper dredge; however, there are several beach nourishment projects along the Gulf coast in Pinellas, Collier, Manatee, Sarasota, Escambia, and Lee Counties where hopper dredges may be used. Hopper dredges may be used in the larger nourishment projects where offshore sand mining sites are involved, including but not limited to the Johns Pass, Pass-a-Grille, Egmont Shoal, Estero Island, Pensacola Beach, Venice Beach, Pinellas County, and Lido Key sand mining areas. It is likely that new sand mining sites will soon be required, located, and identified as beach nourishment needs grow and old sites are depleted.

The COE Jacksonville District has identified the following channels and beach restoration projects in which regular maintenance dredging is required and use of hopper dredges is anticipated.

1. Tampa Harbor Navigation Project: Egmont Key (Tampa Bay Entrance Channel) is typically dredged every ten years, and was last dredged in the spring of 1997. Since 1995, three Kemp's ridleys and two loggerheads have been taken by hopper dredges maintaining Tampa Bay navigation channels.

2. St. Petersburg Harbor and Entrance Channel: Last dredged in fall of 2000, a pre-dredging risk assessment trawl survey over eight days (approximately 29 hours of trawling) in the proposed dredging area resulted in capture, tagging, and relocation of two adult loggerheads and one subadult green turtle. Hopper dredging (September-October 2000) resulted in surface sightings of three turtles but no takes. Dredged material was used for renourishment of Egmont Key beaches.

3. Boca Grande Pass (Charlotte Harbor Entrance Channel): Since 1992, the Pass has been dredged every 2-3 years, with about 265,000 CY of shoal material removed during each dredging event. Maintenance dredging between October 20, 1998, and January 13, 1999, resulted in one loggerhead (non-lethal) take

and three loggerhead surface sightings within 300 yards of the operating hopper dredge. Dredged materials are typically used to renourish Gasparilla Island beaches.

The Jacksonville District COE has stated that the Boca Grande Pass will not likely require continued maintenance dredging. Although Florida Power and Light (FPL) previously maintained a coal-unloading pier on the southeast side of Gasparilla Island, which was used to offload coal-laden barges pulled by tugboats through the Pass, as a result of FPLs conversion from coal to natural gas, the dock is no longer utilized and therefore dredging is not required. Currently, the majority of boat traffic through the Pass consists of shallow draft recreational vessels. Nevertheless, economic and other considerations may at some point cause FPL to revert to coal, thus re-establishing COEs requirement to dredge the Pass for tugs and barge traffic.

4. Lido Key Shore Protection Project: Three proposed new sand mining areas located approximately 8-10 miles offshore have been identified for the project. Side scan sonar deployed near the sand mining areas provided some evidence of low-relief hardground communities. Sand mining areas will be designated to ensure that dredging will not occur within a minimum of 200 feet from any hardground area.

5. Lee County Shore Protection Project, Gasparilla and Estero Islands: The COE proposes to nourish 2.8 miles of shore on Gasparilla Island with approximately 803,000 CY of material from the Gasparilla Island sand mining area located in the Gulf approximately 3,000 feet offshore of the south end of Gasparilla Island; and 4.7 miles of shore on Estero Island with about 1,023,000 CY of material dredged from the Estero Island sand mining area located approximately 16 miles west of the island. Gasparilla Island would be renourished every seven years; Estero Island every three years.

6. Sarasota County, Manasota Key, Shore Protection Project: The Jacksonville District proposes to conduct a periodic renourishment of Venice Beach using sand taken from one or more of four sand mining sites located from 6-10 miles offshore of Venice Inlet. The proposed action, scheduled to commence in early-winter 2003 will last approximately 3-6 months and will involve placement of sand on 3.2 miles of shoreline using an estimated 800,000 to 1,000,000 cubic yards of material. Due to the distance to the mining sites, a hopper dredge may be used.

7. Pinellas County Shore Protection Project: This project has historically obtained beach quality fill from inlet borrow areas and the Egmont Channel Shoal for nourishment of Pinellas County beaches including, but not limited to, Sand Key, Long Key, and Treasure Island. To accommodate future nourishment needs, alternative mining sites which are closer to the beach fill sites have been identified. Nine new offshore mining sites located between 2-6 miles offshore of Pinellas County and four ebb-tidal shoals, as well as a segment of Egmont Channel Shoal and an area within Passe-a-Grille Channel, are being investigated.

8. Pensacola Beach Restoration Project: The COE Jacksonville District Regulatory Division initiated section 7 consultation with NOAA Fisheries and issued a regulatory permit to the Santa Rosa Island Authority to restore Pensacola Beach shoreline with approximately four million CY of sand dredged from an offshore (~3.5 miles) mining site with either a hopper or pipeline dredge, starting in winter 2002. A biological opinion (F/SER/2002/00091) issued by SERO on October 11, 2002, analyzed project effects and authorized potential takes associated with this project. The present Opinion only considers future periodic maintenance dredging requirements for the Pensacola Beach Restoration Project, <u>not</u> the placement of sand into designated critical habitat, once the initial restoration project is completed.

9. Alafia River Channel and Turning Basin Expansion (Hillsborough Harbor, Tampa Bay): The Alafia River Channel branches off from the main ship channel about 28 miles from the Gulf entrance, and

extends 3.6 miles easterly to terminals at the mouth of the Alafia River. It has an authorized depth of 32 feet Mean Lower Low Water (MLLW) over a bottom width of 200 feet. The turning basin has an authorized depth of 32 feet over a bottom area 700 feet wide and 1,200 feet long. The Tampa Port Authority desires to modify the existing project by deepening and widening the Federal channel and turning basin. In May 2002, the COE submitted an environmental assessment (EA) for a plan for expansion of the Alafia River channel and turning basin.

The preferred alternative in the EA involves widening the channel 50 feet to the south and deepening the channel to a project depth of 42 ft MLLW, and recommends that the turning basin be widened to provide a 1,200-ft diameter area at the channel depth of 42 feet. Disposal of dredged materials (approximately 5.5 million CY) would be at the designated Offshore Dredged Material Disposal site, with some material going into beneficial use areas. Although it is anticipated that material will be removed with a clamshell/scow operation, hopper dredge use is not excluded. Explosives will likely be used, therefore the COE will need to consult separately with NOAA Fisheries on that aspect of the project, since this Opinion only addresses use of hopper dredges.

10. Manatee Harbor (Port Manatee) Navigation and Berth Improvements (Phase 2): NOAA Fisheries received a draft EA on April 1, 2002, for the proposed work. The recommended plan includes construction of wideners along both the north and south sides of the channel at the intersection with the Tampa Harbor Channel, and construction of a 900-ft diameter turning basin at the eastern end of the Manatee Harbor Channel. The project features would be dredged to the existing authorized depth of 40 feet. NOAA Fisheries consulted with the COE on this project on December 22, 1999, concluding that no adverse effects were expected if hopper dredges were not used.

11. Stump Pass Channel Realignment and Beach Nourishment Project: The Charlotte County Board of County Commissioners, via regulatory permit from the COE's Jacksonville District, proposes to realign Stump Pass, at the southern tip of Manasota Key, from its current configuration to its 1980 configuration. The creation of a new channel will require dredging of approximately 500,000 CY of material of nearshore submerged areas in the Gulf of Mexico, beach dune, and inshore submerged areas in Lemon Bay. The newly-aligned channel will be 400 feet wide, 1 mile long. The 500,000 CY of spoil material will be placed on 2.7 miles of beach at two separate areas. The County proposes to periodically maintenance dredge Stump Pass' realigned channel (every 3-5 years) and deposit the spoil material on Don Pedro Island.

12. Naval Air Station Pensacola, Channel Maintenance Dredging: The Mobile District acted as an agent for the Navy to conduct maintenance hopper dredging operations in a portion of the Pensacola Channel in 2003, via regulatory permit issued by the COE's Jacksonville District. The hopper dredging activity was limited to a small area of the channel between Santa Rosa Island and Perdido Key, which is where the most shoaling has occurred. About 150,000-200,000 CY was dredged, with thin layer disposal in the littoral zone to the west of the Pensacola Pass and south of Perdido Key. NOAA Fisheries issued a biological opinion for this activity on August 4, 2003 (F/SER/2003/00053). Future maintenance dredging activities of this channel using hopper dredges are included in the present Opinion, but not dredge spoil deposition in Gulf sturgeon critical habitat.

Scheduling

The Galveston, New Orleans, Mobile, and Jacksonville Districts shall attempt to schedule hopper dredging operations between December 1 and March 31 ("hopper dredging window"), wherever feasible. A 1991 jeopardy Opinion to the COE's SAD on hopper dredging of southeastern U.S. channels first identified this window as necessary to minimize sea turtle interactions. Subsequent studies by the COE (Dickerson et al. 1994) in six southeastern channels suggested that the existing windows were accurate. Sea turtles are generally less abundant in coastal waters of both the Southeast and the Gulf of Mexico

during this time period compared to other times of the year since water temperatures are coolest. However, it is unlikely that the COE Districts can schedule all of their hopper-dredging projects during this time frame due to the lack of availability of the hopper dredge fleet, safety considerations, and unforseen emergencies such as those created by hurricanes and flooding which may cause sudden, hazardous shoaling of navigation channels; therefore, projects may need to occur outside of the window. Hopper dredging priorities are developed by COE Districts that utilize these dredges along both the Atlantic and Gulf coasts. Priorities are determined after considering the dredging requirements, and resident sea turtle populations within the Districts. Additionally, shoaling patterns in some channels and bays (e.g., Freeport Harbor, Mobile Bay, MR-GO, and MR-SWP) preclude the option of dredging only during the cooler months.

Inflow Screen Mesh

Since 1995, all maintenance hopper dredges working in the Galveston, New Orleans, and Jacksonville Districts, and South Atlantic Districts, have been equipped with 100% inflow/overflow screening. The standard mesh size used during maintenance dredging operations is 4-inch by 4-inch. One hundred percent inflow screening is required, unless waived by NOAA Fisheries because it would otherwise be impossible to implement and still carry out the project, and 100% overflow screening is recommended. If conditions prevent 100% inflow screening, inflow screening may be reduced, but 100% overflow screening is then required. Whenever the clay or debris content of dredged materials causes excessive clogging, as verified by onboard endangered species observers, the COE consults with NOAA Fisheries and inflow screening is usually waived (often, inflow screen mesh size is gradually increased) until the substrate changes and clogging is no longer a problem. Whenever the inflow screening is removed due to potential clogging difficulties, 100% overflow screening is mandatory. Due to differences in overflow screen design, some hopper dredge vessels have overflow screens which are more efficient (i.e., easier to sample, more effective at retaining fragments of dismembered protected species) than others; e.g., horizontal overflow screens are much more efficient than vertical overflow screens. On the hopper dredge EAGLE 1, vertical overflow screening makes sampling for protected species' remains difficult and inconclusive.

For the Galveston District's H-GNC Entrance and Jetty Channels deepening and widening project, new material with high clay concentrations would be dredged. Taking this potential clogging problem into consideration, NOAA Fisheries' December 7, 1998, Opinion allowed successive modifications (increasing mesh size) to be made to hopper inflow screens if the standard 4-inch screens proved unworkable due to excessive clogging. NOAA Fisheries agreed that if the dredge operator, in consultation with observers and any onboard COE or NOAA Fisheries' personnel, determined that the draghead was clogging and reducing production substantially, the inflow screen mesh size could be gradually increased, and even eliminated entirely if necessary.

Occasionally, inflow screens are damaged by the pressure of the dredge slurry on the clogged mesh, requiring screens to be either opened or removed for repairs. When screens are removed, effective monitoring for sea turtle and sturgeon parts is not possible. As a result, COE Galveston District has suggested that in the present regional Opinion, a graduated mesh option–as was previously authorized for the H-GNC deepening and widening project–be authorized Gulf-wide. Graduated mesh would be permitted when clogging of the smaller mesh becomes excessive. Mesh size could then be increased incrementally. This provision for graduated mesh would allow better, more effective monitoring (compared to screen opening or removal), particularly in Freeport and Galveston channels where clogging is a problem during maintenance dredging.

3.0 Status of Listed Species and Critical Habitat

Much of the information for this section, as well as additional detailed information relating to the species biology, habitat requirements, threats, and recovery objectives, can be found in the recovery plan for each species (see "References Cited" section). The following listed species under the jurisdiction of NOAA Fisheries are known to occur in the Gulf of Mexico:

Endangered

Green sea turtle[3]	*Chelonia mydas*
Leatherback sea turtle	*Dermochelys coriacea*
Hawksbill sea turtle	*Eretmochelys imbricata*
Kemp's ridley sea turtle	*Lepidochelys kempii*
Sperm whale	*Physeter catodon*
Humpback whale	*Megaptera novaeangliae*
Fin whale	*Balaenoptera physalus*
Blue whale	*Balaenoptera musculus*
Sei whale	*Balaenoptera borealis*
Northern right whale	*Eubalaena glacialis*
Smalltooth sawfish	*Pristis pectinata*

Threatened

Loggerhead sea turtle	*Caretta caretta*
Gulf sturgeon	*Acipenser oxyrinchus desotoi*

Critical Habitat

Within the Gulf of Mexico, critical habitat has only been designated for the Gulf sturgeon.

Species Not Likely to Be Affected

Leatherback sea turtles (*Dermochelys coriacea*) are generally found in deep, pelagic, offshore waters though they occasionally may come into shallow waters to feed on aggregations of jellyfish. Leatherbacks are unlikely to be found associated with ship channels and thus are unlikely to be impacted by hopper dredging activity. There has only been one reported instance of a take of a leatherback sea turtle by a relocation trawler in a shipping channel, approximately 1.5 miles offshore of Aransas Pass, Texas (April 28, 2003, pers. comm. T. Bargo to E. Hawk), and there has never been a reported take by a hopper dredge. The typical leatherback turtle would be as large or larger than the large, industry-standard California-type hopper dredge draghead. Leatherback sea turtles will not be considered further in this Opinion based on the unlikelihood of their presence nearshore and their non-benthic feeding habits which combine to produce a very low likelihood of hopper dredge entrainment.

Smalltooth sawfish (*Pristis pectinata*) are tropical marine and estuarine fish that have the northwestern terminus of their Atlantic range in the waters of the eastern U.S. Currently, their distribution has contracted to peninsular Florida and, within that area, they can only be found with any regularity off the extreme southern portion of the state. The current distribution is centered in the Everglades National Park, including Florida Bay. They have been historically caught as bycatch in commercial and recreational fisheries throughout their historic range; however, such bycatch is now rare due to population declines and population extirpations. Between 1990 and 1999, only four documented takes of smalltooth

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[3]Green turtles in U.S. waters are listed as threatened except for the Florida breeding population which is listed as endangered. Due to the inability to distinguish between these populations away from the nesting beach, green turtles are considered endangered wherever they occur in U.S. waters.

sawfish occurred in shrimp trawls in Florida (Simpendorfer 2000). After consultation with individuals with many years in the business of providing qualified observers to the hopper dredge industry to monitor incoming dredged material for endangered species remains (C. Slay, Coastwise Consulting, pers. comm. August 18, 2003) and a review of the available scientific literature, NOAA Fisheries has determined that there has never been a reported take of a smalltooth sawfish by a hopper dredge, and such take is unlikely to occur because of smalltooth sawfishes' affinity for shallow, estuarine systems. Only hopper dredging of Key West channels would have the potential to impact smalltooth sawfish but those channels are not considered in this Opinion. Therefore, NOAA Fisheries believes that smalltooth sawfish are rare in the action area, the likelihood of their entrainment is very low, and that the chances of the proposed action affecting them are discountable. This species will not be discussed further in this Opinion.

Sperm whales (*Physeter macrocephalus*) occur in the Gulf of Mexico but are rare in inshore waters. Other endangered whales, including North Atlantic right whales (*Eubalaena glacialis)* and humpback whales (*Megaptera novaeangliae*), have been observed occasionally in the Gulf of Mexico. The individuals observed have likely been inexperienced juveniles straying from the normal range of these stocks. NOAA Fisheries believes there are no resident stocks of these species in the Gulf of Mexico, and these species are not likely to be adversely affected by projects in the Gulf. NOAA Fisheries believes that blue, fin, or sei whales will not be adversely affected by hopper dredging operations; the possibility of dredge collisions is remote since these are deepwater species unlikely to be found near hopper dredging sites. There has never been a report of a whale taken by a hopper dredge. Based on the unlikelihood of their presence, feeding habits, and very low likelihood of hopper dredge interaction, the above-mentioned cetaceans are not considered further in this Opinion.

Species and Critical Habitat Likely to Be Affected

Of the above-listed threatened and endangered species of sea turtles, whales, and sturgeon potentially present in the action area, NOAA Fisheries believes that only loggerhead, green, hawksbill, and Kemp's ridley sea turtles, and Gulf sturgeon, are vulnerable to being taken as a result of the use of hopper dredges to maintain, or deepen and widen navigation channels and harbors, or to dredge sand mining areas for beach nourishment in the U.S. Gulf of Mexico. Hopper dredging activities also have the potential to destroy or adversely effect Gulf sturgeon critical habitat. Descriptions follow for each of these five species and for the designated critical habitat.

A. Species/critical habitat description

Loggerhead Sea Turtle

The loggerhead sea turtle was listed as a threatened species on July 28, 1978. This species inhabits the continental shelves and estuarine environments along the margins of the Atlantic, Pacific, and Indian Oceans, and within the continental United States it nests from Louisiana to Virginia. The major nesting areas include coastal islands of Georgia, South Carolina, and North Carolina, and the Atlantic and Gulf coasts of Florida, with the bulk of the nesting occurring on the Atlantic coast of Florida. Developmental habitat for small juveniles is the pelagic waters of the North Atlantic and the Mediterranean Sea (NMFS and USFWS 1991b).

Life history

In the western Atlantic, most loggerhead sea turtles nest from North Carolina to Florida and along the Gulf coast of Florida. There are five western Atlantic subpopulations, divided geographically as follows: (1) a northern nesting subpopulation, occurring from North Carolina to northeast Florida at about 29° N; (2) a south Florida nesting subpopulation, occurring from 29° N on the east coast to Sarasota on the west

coast; (3) a Florida Panhandle nesting subpopulation, occurring at Eglin Air Force Base and the beaches near Panama City, Florida; (4) a Yucatán nesting subpopulation, occurring on the eastern Yucatán Peninsula, Mexico (Márquez 1990 and TEWG 2000); and (5) a Dry Tortugas nesting subpopulation, occurring in the islands of the Dry Tortugas, near Key West, Florida (NMFS SEFSC 2001). The fidelity of nesting females to their nesting beach is the reason these subpopulations can be differentiated from one another. This nest beach fidelity will prevent recolonization of nesting beaches with turtles from other subpopulations.

Mating takes place in late March-early June, and eggs are laid throughout the summer, with a mean clutch size of 100-126 eggs in the southeastern United States Individual females nest multiple times during a nesting season, with a mean of 4.1 nests/individual (Murphy and Hopkins 1984). Nesting migrations for an individual female loggerhead are usually on an interval of 2-3 years, but can vary from 1-7 years (Dodd 1988). Generally loggerhead sea turtles originating from the western Atlantic nesting aggregations are believed to lead a pelagic existence in the North Atlantic Gyre for as long as 7-12 years or more. Stranding records indicate that when pelagic immature loggerheads reach 40-60 cm straight-line carapace length they begin to live in coastal inshore and nearshore waters of the continental shelf throughout the United States Atlantic and Gulf of Mexico. Benthic immature loggerheads (turtles that have come back to inshore and near shore waters), the life stage following the pelagic immature stage, have been found from Cape Cod, Massachusetts, to southern Texas, and occasionally strand on beaches in northeastern Mexico.

Past literature gave an estimated age at maturity of 21-35 years (Frazer and Ehrhart 1985; Frazer et al. 1994) with the benthic immature stage lasting at least 10-25 years. However, based on new data from tag returns, strandings, and nesting surveys NMFS SEFSC (2001) estimates ages of maturity ranging from 20-38 years and benthic immature stage lasting from 14-32 years.

Pelagic and benthic juveniles are omnivorous and forage on crabs, mollusks, jellyfish, and vegetation at or near the surface (Dodd 1988). Sub-adult and adult loggerheads are primarily coastal and typically prey on benthic invertebrates such as mollusks and decapod crustaceans in hard bottom habitats.

Population dynamics and status

A number of stock assessments (TEWG 1998, TEWG 2000, and NMFS SEFSC 2001) have examined the stock status of loggerheads in the waters of the United States, but have been unable to develop any reliable estimates of absolute population size. Based on nesting data, of the five western Atlantic subpopulations, the south Florida nesting subpopulation and the northern nesting subpopulation are the most abundant (TEWG 2000 and NMFS SEFSC 2001). The Turtle Expert Working Group (TEWG) (2000) was able to assess the status of these two better-studied populations and concluded that the south Florida subpopulation is increasing, while no trend is evident (at that time considered stable but possibly declining) for the northern subpopulation. Another consideration adding to the vulnerability of the northern subpopulation is that NOAA Fisheries' scientists estimate that the northern subpopulation produces 65% males (NMFS SEFSC 2001).

The latest and most extensive stock assessment (NMFS SEFSC 2001) was successful in assembling the best available information on loggerhead turtle life history and developing population models that can be used to predict the response of the loggerhead populations to changes in their mortality and survival. The new turtle excluder device rule (68 FR 8456, February 21, 2003) requiring larger openings is expected to reduce trawl related loggerhead mortality by 94% (Epperly et al. 2002). Based on the loggerhead population models in NMFS SEFSC (2001) this change in the mortality rate is expected to move the northern nesting population from stable to increasing.

The southeastern United States nesting aggregation is second in size only to the nesting aggregation on islands in the Arabian Sea off Oman (Ross 1979, Ehrhart 1989, NMFS and USFWS 1991b). The southeast United States nesting aggregation is especially important because the status of the Oman colony has not been evaluated recently. It is located in an area of the world where it is highly vulnerable to disruptive events such as political upheavals, wars, catastrophic oil spills, and lack of strong protections (Meylan et al. 1995).

Ongoing threats to the western Atlantic populations include incidental takes from dredging, commercial trawling, longline fisheries, and gill net fisheries; loss or degradation of nesting habitat from coastal development and beach armoring; disorientation of hatchlings by beachfront lighting; nest predation by native and non-native predators; degradation of foraging habitat; marine pollution and debris; watercraft strikes; and disease.

Green Sea Turtle

Federal listing of the green sea turtle occurred on July 28, 1978, with all populations listed as threatened except for the Florida and Pacific coast of Mexico breeding populations, which are endangered. The complete nesting range of the green turtle within the NOAA Fisheries' Southeast Region includes sandy beaches of mainland shores, barrier islands, coral islands, and volcanic islands between Texas and North Carolina and the Unite States Virgin Islands (U.S.V.I.) and Puerto Rico (NMFS and USFWS 1991a). Principal United States nesting areas for green turtles are in eastern Florida, predominantly Brevard through Broward Counties (Ehrhart and Witherington 1992). Green turtle nesting also occurs regularly on St. Croix, U.S.V.I., and on Vieques, Culebra, Mona, and the main island of Puerto Rico (Mackay and Rebholz 1996).

Life history

Green sea turtle mating occurs in the waters off the nesting beaches. Each female deposits 1-7 clutches (usually 2-3) during the breeding season at 12-14 day intervals. Mean clutch size is highly variable among populations, but averages 110-115 eggs/nest. Females usually have 2-4 or more years between breeding seasons, while males may mate every year (Balazs 1983). After hatching, green sea turtles go through a post-hatchling pelagic stage where they are associated with drift lines of algae and other debris.

Green turtle foraging areas in the southeastern United States include any coastal shallow waters having macroalgae or sea grasses near mainland coastlines, islands, reefs, or shelves, and any open-ocean surface waters, especially where advection from wind and currents concentrates pelagic organisms (Hirth 1997, NMFS and USFWS 1991a). Principal benthic foraging areas in the southeastern United States include Aransas Bay, Matagorda Bay, Laguna Madre, and the Gulf inlets of Texas (Doughty 1984, Hildebrand 1982, Shaver 1994), the Gulf of Mexico off Florida from Yankeetown to Tarpon Springs (Caldwell and Carr 1957, Carr 1984), Florida Bay and the Florida Keys (Schroeder and Foley 1995), the Indian River Lagoon System, Florida (Ehrhart 1983), and the Atlantic Ocean off Florida from Brevard through Broward counties (Wershoven and Wershoven 1992, Guseman and Ehrhart 1992). Adults of both sexes are presumed to migrate between nesting and foraging habitats along corridors adjacent to coastlines and reefs. Age at sexual maturity is estimated to be between 20-50 years (Balazs 1982, Frazer and Ehrhart 1985).

Green sea turtles are primarily herbivorous, feeding on algae and sea grasses, but also occasionally consume jellyfish and sponges. The post-hatchling, pelagic-stage individuals are assumed to be omnivorous, but few data are available.

Population dynamics and status

The vast majority of green turtle nesting within the southeastern United States occurs in Florida (Meylan et al. 1995, Johnson and Ehrhart 1994). Marine turtle populations have been monitored on Florida nesting beaches for nearly four decades. Currently, the Florida Wildlife Commission (FWC) coordinates the collection of nesting survey data on 180 survey areas comprising 1,300 km of nesting beach. Thirty-three of these beaches, chosen to represent the state geographically, participate in FWC's Index Nesting Beach Survey Program by following a standardized methodology for data collection that allows for statistically valid trend evaluation. It is unclear how greatly green turtle nesting in the whole of Florida has been reduced from historical levels (Dodd 1981). However, based on 1989-2002 nesting information, green turtle nesting in Florida has been increasing (Florida Marine Research Institute Statewide Nesting 2002, Database). Total nest counts and trends at index[4] beach sites during the past decade suggest that green turtles that nest within the southeastern United States are increasing.

There are no reliable estimates of the number of immature green turtles that inhabit coastal areas (where they come to forage) of the southeastern United States. However, information on incidental captures of immature green turtles at the St. Lucie Power Plant (average 215 green turtle captures per year since 1977) in St. Lucie County, Florida (on the Atlantic coast) indicates that the annual number of immature green turtles captured has increase significantly in the past 26 years (FPL 2002). At the power plant, the annual number of immature green turtle captures has increased significantly in the past 26 years. It is not known whether or not this increase is indicative of local or Florida east coast populations.

It is likely that immature green turtles foraging in the southeastern United States come from multiple genetic stocks; therefore, the status of immature green turtles in the southeastern United States might also be assessed from trends at all of the main regional nesting beaches, principally Florida, Yucatán, and Tortuguero. Trends at Florida beaches are presented above. Trends in nesting at Yucatán beaches cannot be assessed because of a lack of consistent beach surveys over time. Trends at Tortuguero (ca. 20,000-50,000 nests/year) show a significant increase in nesting during the period 1971-1996 (Bjorndal et al. 1999). Therefore, it seems reasonable that there is an increase in immature green turtles inhabiting coastal areas of the southeastern United States; however, the magnitude of this increase is unknown.

The principal cause of past declines and extirpations of green turtle assemblages has been the over-exploitation of green turtles for food and other products. Although intentional take of green turtles and their eggs is not extensive within the southeastern United States, green turtles that nest and forage in the region may spend large portions of their life history outside the region and outside United States jurisdiction, where exploitation is still a threat. However, there are still significant and ongoing threats to green turtles from human-related causes in the United States. These threats include beach armoring, erosion control, artificial lighting, beach disturbance (e.g., driving on the beach), pollution, foraging habitat loss as a result of direct destruction by dredging, siltation, boat damage, other human activities and fishing gear. There is also the increasing threat from occurrences of green turtle fibropapillomatosis disease. Presently, this disease is cosmopolitan and has been found to affect large numbers of animals in some areas, including Hawaii and Florida (Herbst 1994, Jacobson 1990, Jacobson et al. 1991).

<u>Kemp's Ridley Sea Turtle</u>

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[4]Indexed beaches are those where survey effort to monitor annual nesting has been standardized and is constant from year to year and therefore nesting trends may be determined with statistical confidence; at non-indexed beaches, survey effort may, and often does, vary from year to year.

The Kemp's ridley was listed as endangered on December 2, 1970. Internationally, the Kemp's ridley is considered the most endangered sea turtle (Zwinenberg 1977, Groombridge 1982, TEWG 2000). Kemp's ridleys nest primarily at Rancho Nuevo, a stretch of beach in Mexico, Tamaulipas State. The species occurs mainly in coastal areas of the Gulf of Mexico and the northwestern Atlantic Ocean. Occasional individuals reach European waters (Brongersma 1972). Adults of this species are usually confined to the Gulf of Mexico, although adult-sized individuals sometimes are found on the east coast of the United States.

Life history

Females return to their nesting beach about every two years (TEWG 1998). Nesting occurs from April into July and is essentially limited to the beaches of the western Gulf of Mexico, near Rancho Nuevo in southern Tamaulipas, Mexico. The mean clutch size for Kemp's ridleys is 100 eggs/nest, with an average of 2.5 nests/female/season.

Benthic immature Kemp's ridleys have been found along the east coast Seaboard of the United States and in the Gulf of Mexico. In the Atlantic, benthic immature turtles travel northward as the water warms to feed in the productive, coastal offshore waters (Georgia through New England), migrating southward with the onset of winter (Lutcavage and Musick 1985, Henwood and Ogren 1987, Ogren 1989). In the Gulf, studies suggest that benthic immature Kemp's ridleys stay in shallow, warm, nearshore waters in the northern Gulf of Mexico until cooling waters force them offshore or south along the Florida coast (Renaud 1995). Little is known of the movements of the post-hatching stage (pelagic stage) within the Gulf. Studies have shown the post-hatchling pelagic stage varies from 1-4 or more years, and the benthic immature stage lasts 7-9 years (Schmid and Witzell 1997). The TEWG (1998) estimates age at maturity from 7-15 years.

Stomach contents of Kemp's ridleys taken from the lower Texas coast consisted of mainly nearshore crabs and mollusks, as well as fish, shrimp, and other foods considered to be shrimp fishery discards (Shaver 1991). Pelagic stage Kemp's ridleys presumably feed on the available sargassum and associated infauna or other epipelagic species found in the Gulf of Mexico.

Population dynamics and status

Of the seven extant species of sea turtles in the world, the Kemp's ridley has declined to the lowest population level. Most of the population of adult females nest on the Rancho Nuevo beaches (Pritchard 1969). When nesting aggregations at Rancho Nuevo were discovered in 1947, adult female populations were estimated to be in excess of 40,000 individuals (Hildebrand 1963). By the mid-1980s nesting numbers were below 1,000 (with a low of 702 nests in 1985). However, recent observations of increased nesting (with 6,277 nests recorded in 2000) suggest that the decline in the ridley population has stopped and the population is now increasing (USFWS 2000).

A period of steady increase in benthic immature Kemp's ridleys has been occurring since 1990 and appears to be due to increased hatchling production and an apparent increase in survival rates of immature turtles beginning in 1990. The increased survivorship of immature turtles is due in part to the introduction of turtle excluder devices (TEDs) in the United States and Mexican shrimping fleets. As demonstrated by nesting increases at the main nesting sites in Mexico adult Kemp's ridley numbers have grown. The population model used by TEWG (2000) projected that Kemp's ridleys could reach the intermediate recovery goal identified in the Recovery Plan, of 10,000 nesters by the year 2015.

The largest contributor to the decline of the Kemp's ridley in the past was commercial and local exploitation, especially poaching of nests at the Rancho Nuevo site, as well as the Gulf of Mexico shrimp

trawl fisheries. The advent of TED regulations for trawlers and protections for the nesting beaches have allowed the species to begin to rebound. Many threats to the future of the species remain, including interactions with fishery gear, marine pollution, foraging habitat destruction, illegal poaching of nests and potential threats to the nesting beaches from such sources as global climate change, development, and tourism pressures.

Hawksbill Sea Turtle

The hawksbill turtle was listed as endangered on June 2, 1970, and is considered Critically Endangered by the International Union for the Conservation of Nature (IUCN). The hawksbill is a medium-sized sea turtle with adults in the Caribbean ranging in size from approximately 62.5 to 94.0 cm straight carapace length. The species occurs in all ocean basins although it is relatively rare in the Eastern Atlantic and Eastern Pacific, and absent from the Mediterranean Sea. Hawksbills are the most tropical of the marine turtles, ranging from approximately 30°N to 30°S. They are closely associated with coral reefs and other hard-bottom habitats, but they are also found in other habitats including inlets, bays and coastal lagoons (NMFS and USFWS 1993).

Life History

There are five regional nesting populations with more than 1,000 females nesting annually. These populations are in the Seychelles, Mexico, Indonesia, and two in Australia (Meylan and Donnelly 1999). Reproductive females undertake periodic (usually non-annual) migrations to their natal beach to nest. Movements of reproductive males are less well known, but are presumed to involve migrations to the nesting beach or to courtship stations along the migratory corridor (Meylan 1999b). Females nest an average of 3-5 times per season (Meylan and Donnelly 1999, Richardson et al. 1999). Clutch size is higher on average (up to 250 eggs) than that of other turtles (Hirth 1980). Reproductive females may exhibit a high degree of fidelity to their nest sites.

The life history of hawksbills consists of a pelagic stage that lasts from the time they leave the nesting beach as hatchlings until they are approximately 22-25 cm in straight carapace length (Meylan 1988, Meylan and Donnelly 1999), followed by residency in developmental habitats (foraging areas where immatures reside and grow) in coastal waters. Adult foraging habitat, which may or may not overlap with developmental habitat, is typically coral reefs, although other hard-bottom communities and occasionally mangrove-fringed bays may be occupied. Hawksbills show fidelity to their foraging areas over periods of time as great as several years (van Dam and Díez 1998).

Their diet is highly specialized and consists primarily of sponges (Meylan 1988) although other food items, notably corallimorphs and zooanthids, have been documented to be important in some areas of the Caribbean (van Dam and Díez 1997, Mayor et al. 1998, Leon and Díez 2000).

Population Dynamics, Status, and Distribution

There has been a global population decline of over 80% during the last three generations (105 years) (Meylan and Donnelly 1999).

In the Western Atlantic, the largest hawksbill nesting population occurs in the Yucatán Península of Mexico, where several thousand nests are recorded annually in the states of Campeche, Yucatán, and Quintana Roo (Garduño-Andrade et al. 1999). Important but significantly smaller nesting aggregations are documented elsewhere in the region in Puerto Rico, the U.S. Virgin Islands, Antigua, Barbados, Costa Rica, Cuba, and Jamaica (Meylan 1999a). Estimates of the annual number of nests for each of these areas are of the order of hundreds to a few thousand. Nesting within the southeastern U.S. and U.S. Caribbean

is restricted to Puerto Rico (>650 nests/yr), the U.S. Virgin Islands (~400 nests/yr), and, rarely, Florida (0-4 nests/yr)(Eckert 1995, Meylan 1999a, Florida Statewide Nesting Beach Survey database 2002). At the two principal nesting beaches in the U.S. Caribbean where long-term monitoring has been carried out, populations appear to be increasing (Mona Island, Puerto Rico) or stable (Buck Island Reef National Monument, St. Croix, USVI) (Meylan 1999a).

Gulf Sturgeon

NOAA Fisheries and the FWS listed the Gulf sturgeon, also known as the Gulf of Mexico sturgeon, as a threatened species on September 30, 1991 (56 CFR 49653). The present range of the Gulf sturgeon extends from Lake Pontchartrain and the Pearl River system in Louisiana and Mississippi east to the Suwannee River in Florida. Sporadic occurrences have been recorded as far west as the Rio Grande River between Texas and Mexico, and as far east and south as Florida Bay (Wooley and Crateau 1985, Reynolds 1993).

Life history

The Gulf sturgeon is an anadromous fish; adults spawn in freshwater then migrate to feed and grow in estuarine/marine habitats. After spawning in the upper river reaches, both adult and subadult Gulf sturgeon migrate from the estuaries, bays, and the Gulf of Mexico to the coastal rivers in early spring (i.e., March through May) when river water temperatures range from 16 to 23°C (Huff 1975, Carr 1983, Wooley and Crateau 1985, Odenkirk 1989, Clugston et al. 1995, Foster and Clugston 1997, Fox and Hightower 1998, Sulak and Clugston, 1999, Fox et al. 2000). Fall downstream migration from the river into the estuary/Gulf of Mexico begins in September (at water temperatures around 23°C) and continues through November (Huff 1975, Wooley and Crateau 1985, Foster and Clugston 1997).

Most subadult and adult Gulf sturgeon spend cool months (October or November through March or April) in estuarine areas, bays, or in the Gulf of Mexico (Odenkirk 1989, Foster 1993, Clugston et al. 1995, and Fox et al. 2002). Research indicates that in the estuary/marine environment both subadult and adult Gulf sturgeon show a preference for sandy shoreline habitats with water depths less than 3.5 m and salinity less than 6.3 parts per thousand (Fox and Hightower 1998, Parauka et al. in press). The majority of tagged fish have been located in areas lacking seagrass (Fox et al. 2002, Parauka et al. in press), in shallow shoals 1.5 to 2.1 m and deep holes near passes (Craft et al. 2001), and in unvegetated, fine to medium-grain sand habitats, such as sandbars, and intertidal and subtidal energy zones (Menzel 1971, Abele and Kim 1986). These shifting, predominantly sandy, areas support a variety of potential prey items including estuarine crustaceans, small bivalve mollusks, ghost shrimp, small crabs, various polychaete worms, and lancelets (Menzel 1971, Abele and Kim 1986, AFS 1989, and M. Brim, USFWS pers. comm. 2002).

Once subadult and adult Gulf sturgeon migrate from the river to the estuarine/marine environment, having spent at least 6 months in the river fasting, it is presumed that they immediately begin foraging. Upon exiting the rivers, Gulf sturgeon are found in high concentrations near their natal river mouths; these lakes and bays at the mouth of the river are important because they offer the first opportunity for Gulf sturgeon to forage. Specifics regarding Gulf sturgeon diet items and foraging are discussed within Section IV (Effects of the Action) of this Opinion.

Gulf sturgeon are long-lived, with some individuals reaching at least 42 years in age (Huff 1975). Age at sexual maturity for females ranges from 8 to 17 years, and for males from 7 to 21 years (Huff 1975). Chapman et al. (1993) estimated that mature female Gulf sturgeon weighing between 29 and 51 kg produce an average of 400,000 eggs.

Based on the fact that male Gulf sturgeon are capable of annual spawning, and females require more than one year between spawning events (Huff 1975, Fox et al. 2000), we assume that the Gulf sturgeon are similar to Atlantic sturgeon (*A. o. oxyrhinchus*); that is, they exhibit a long inter-spawning period, with females spawning at intervals ranging from every 3 to 5 years, and males every 1 to 5 years (Smith 1985).

Spawning occurs in the upper river reaches in the spring when water temperature is around 15° to 20°C. While Sulak and Clugston (1999) suggested that sturgeon spawning activity is related to moon phase, other researchers have found little evidence of spawning associated with lunar cycles (Slack et al. 1999, Fox et al. 2000). Fertilization is external; females deposit their eggs on the river bottom and males fertilize them. Gulf sturgeon eggs are demersal, adhesive, and vary in color from gray to brown to black (Vladykov and Greeley 1963, Huff 1975, Parauka et al. 1991).

Genetic studies conclude that Gulf sturgeon exhibit river-specific fidelity. Stabile et al. (1996) analyzed tissue taken from Gulf sturgeon in eight drainages along the Gulf of Mexico for genetic diversity; they noted significant differences among Gulf sturgeon stocks, and suggested region-specific affinities and likely river-specific fidelity. Five regional or river-specific stocks (from west to east) have been identified: (1) Lake Pontchartrain and Pearl River, (2) Pascagoula River, (3) Escambia and Yellow Rivers, (4) Choctawhatchee River, and (5) Apalachicola, Ochlockonee, and Suwannee Rivers (Stabile et al. 1996).

Tagging studies also indicate that Gulf sturgeon exhibit a high degree of river fidelity (Carr 1983). Of 4,100 fish tagged, 21% (860/4100 fish) were later recaptured in the river of their initial collection, eight fish (0.009%) moved between river systems, and the remaining fish (78%) have not yet been recaptured (USFWS et al. 1995). There is no information documenting the presence of spawning adults in non-natal rivers. However, there is some evidence of inter-riverine (from natal rivers into non-natal) movements by both male and female Gulf sturgeon (n=22) (Wooley and Crateau 1985, Carr et al. 1996, Craft et al. 2001, Ross et al. 2001b, Fox et al. 2002). It is important to note that gene flow is low in Gulf sturgeon stocks, with each stock exchanging less than one mature female per generation (Waldman and Wirgin 1998).

A full discussion of the life history of this subspecies may be found in the September 30, 1991, final rule listing the Gulf sturgeon as a threatened species (56 FR 49653), the Recovery/Management Plan approved by NOAA Fisheries and the U.S. Fish and Wildlife Service in September 1995, and the final rule designating Gulf sturgeon critical habitat (68 FR 13370).

Population dynamics and status

Gulf sturgeon occur in most major tributaries of the northeastern Gulf of Mexico, from the Mississippi River east to Florida's Suwannee River, and in the central and eastern nearshore Gulf waters as far south as Charlotte Harbor (Wooley and Crateau 1985). In Florida, Gulf sturgeon are present in the Escambia, Yellow, Blackwater, Choctawhatchee, Apalachicola, Ochlockonee, and Suwannee Rivers (Reynolds 1993). While little is known about the abundance of Gulf sturgeon throughout most of its range, population estimates have been calculated for the Apalachicola, Choctawhatchee, and Suwannee Rivers. The USFWS calculated an average (from 1984-1993) of 115 individuals (> 45 cm TL) over-summering in the Apalachicola River below Jim Woodruff Lock and Dam (USFWS et al. 1995). Preliminary estimates of the Gulf sturgeon subpopulation in the Choctawhatchee River system are 2,000 to 3,000 fish over 61 cm TL. The Suwannee River Gulf sturgeon population (i.e., fish > 60 cm TL and older than age 2) has recently been calculated at approximately 7,650 individuals (Sulak and Clugston 1999). Although the size of the Suwannee River population is considered stable, the population structure is highly dynamic as indicated by length frequency histograms (Sulak and Clugston 1999). Strong and weak year classes coupled with the regular removal of larger fish (by natural mortality) limits the growth of the Suwannee River population but stabilizes the average population size (Sulak and Clugston 1999).

Gulf Sturgeon Critical Habitat

Gulf sturgeon critical habitat was jointly designated by the NOAA Fisheries and FWS in 2003 (68 FR 13370). Critical habitat is defined in section 3(5)(A) of the ESA as (i) the specific areas within the geographic area occupied by a species, at the time it is listed in accordance with the Act, on which are found those physical or biological features (I) essential to the conservation of the species and (II) that may require special management considerations or protection; and (ii) specific areas outside the geographic area occupied by a species at the time it is listed, upon a determination that such areas are essential for the conservation of the species. "Conservation" is defined in section 3(3) of the ESA as the use of all methods and procedures that are necessary to bring any endangered or threatened species to the point at which listing under the ESA is no longer necessary.

Gulf sturgeon critical habitat includes areas within the major river systems that support the seven currently reproducing subpopulations (USFWS et al. 1995) and associated estuarine and marine habitats. Gulf sturgeon use the rivers for spawning, larval and juvenile feeding, adult resting, and staging, and to move between the areas that support these components. Gulf sturgeon use the lower riverine, estuarine, and marine environment during winter months primarily for feeding and, more rarely, for inter-river migrations. Estuaries and bays adjacent to the riverine units protect unobstructed passage of sturgeon from feeding areas to spawning grounds.

Fourteen areas (units) are designated as Gulf sturgeon critical habitat. Critical habitat units encompass approximately 2,783 river kilometers (rkm) and 6,042 km^2 of estuarine and marine habitats and include portions of the following Gulf of Mexico rivers, tributaries, estuarine and marine areas:

Unit 1 = Pearl and Bogue Chitto Rivers in Louisiana and Mississippi
Unit 2 = Pascagoula, Leaf, Bowie, Big Black Creek and Chickasawhay Rivers in Mississippi
Unit 3 = Escambia, Conecuh, and Sepulga Rivers in Alabama and Florida
Unit 4 = Yellow, Blackwater, and Shoal Rivers in Alabama and Florida
Unit 5 = Choctawhatchee and Pea Rivers in Florida and Alabama
Unit 6 = Apalachicola and Brothers Rivers in Florida
Unit 7 = Suwannee and Withlacoochee River in Florida
Unit 8 = Lake Pontchartrain (east of causeway), Lake Catherine, Little Lake, the Rigolets, Lake Borgne, Pascagoula Bay and Mississippi Sound systems in Louisiana and Mississippi, and sections of the state waters within the Gulf of Mexico
Unit 9 = the Pensacola Bay system in Florida
Unit 10 = Santa Rosa Sound in Florida
Unit 11 = Nearshore Gulf of Mexico in Florida
Unit 12 = Choctawhatchee Bay system in Florida
Unit 13 = Apalachicola Bay system in Florida, and
Unit 14 = Suwannee Sound in Florida

Critical habitat determinations focus on those physical and biological features (primary constituent elements = PCEs) that are essential to the conservation of the species (50 CFR 424.12). Federal agencies must insure that their activities are not likely to result in the destruction or adverse modification of the PCEs within defined critical habitats. Therefore, proposed actions that may impact designated critical habitat require an analysis of potential impacts to each PCE.

PCEs identified as essential for the conservation of the Gulf sturgeon consist of :

(1) Abundant food items, such as detritus, aquatic insects, worms, and/or molluscs, within riverine habitats for larval and juvenile life stages; and abundant prey items, such as amphipods, lancelets, polychaetes, gastropods, ghost shrimp, isopods,

molluscs and/or crustaceans, within estuarine and marine habitats and substrates for subadult and adult life stages;

(2) Riverine spawning sites with substrates suitable for egg deposition and development, such as limestone outcrops and cut limestone banks, bedrock, large gravel or cobble beds, marl, soapstone, or hard clay;

(3) Riverine aggregation areas, also referred to as resting, holding, and staging areas, used by adult, subadult, and/or juveniles, generally, but not always, located in holes below normal riverbed depths, believed necessary for minimizing energy expenditures during fresh water residency and possibly for osmoregulatory functions;

(4) A flow regime (i.e., the magnitude, frequency, duration, seasonality, and rate-of-change of fresh water discharge over time) necessary for normal behavior, growth, and survival of all life stages in the riverine environment, including migration, breeding site selection, courtship, egg fertilization, resting, and staging, and for maintaining spawning sites in suitable condition for egg attachment, egg sheltering, resting, and larval staging;

(5) Water quality, including temperature, salinity, pH, hardness, turbidity, oxygen content, and other chemical characteristics, necessary for normal behavior, growth, and viability of all life stages;

(6) Sediment quality, including texture and other chemical characteristics, necessary for normal behavior, growth, and viability of all life stages; and

(7) Safe and unobstructed migratory pathways necessary for passage within and between riverine, estuarine, and marine habitats (e.g., an unobstructed river or a dammed river that still allows for passage).

As stated in the final rule designating Gulf sturgeon critical habitat, the following activities, among others, when authorized, funded or carried out by a Federal agency, may destroy or adversely modify critical habitat:

(1) Actions that would appreciably reduce the abundance of riverine prey for larval and juvenile sturgeon, or of estuarine and marine prey for juvenile and adult Gulf sturgeon, within a designated critical habitat unit, such as dredging; dredged material disposal; channelization; in-stream mining; and land uses that cause excessive turbidity or sedimentation;

(2) Actions that would appreciably reduce the suitability of Gulf sturgeon spawning sites for egg deposition and development within a designated critical habitat unit, such as impoundment; hard-bottom removal for navigation channel deepening; dredged material disposal; in-stream mining; and land uses that cause excessive sedimentation;

(3) Actions that would appreciably reduce the suitability of Gulf sturgeon riverine aggregation areas, also referred to as resting, holding, and staging areas, used by adult, subadult, and/or juveniles, believed necessary for minimizing energy expenditures and possibly for osmoregulatory functions, such as dredged material disposal upstream or directly within such areas; and other land uses that cause excessive sedimentation;

(4) Actions that would alter the flow regime (the magnitude, frequency, duration, seasonality, and rate-of-change of fresh water discharge over time) of a riverine critical habitat unit such that it is appreciably impaired for the purposes of Gulf sturgeon migration, resting, staging, breeding site selection, courtship, egg fertilization, egg deposition, and egg development, such as impoundment; water diversion; and dam operations;

(5) Actions that would alter water quality within a designated critical habitat unit, including temperature, salinity, pH, hardness, turbidity, oxygen content, and other chemical characteristics, such that it is appreciably impaired for normal Gulf sturgeon

behavior, reproduction, growth, or viability, such as dredging; dredged material disposal; channelization; impoundment; in-stream mining; water diversion; dam operations; land uses that cause excessive turbidity; and release of chemicals, biological pollutants, or heated effluents into surface water or connected groundwater via point sources or dispersed non-point sources;

(6) Actions that would alter sediment quality within a designated critical habitat unit such that it is appreciably impaired for normal Gulf sturgeon behavior, reproduction, growth, or viability, such as dredged material disposal; channelization; impoundment; in-stream mining; land uses that cause excessive sedimentation; and release of chemical or biological pollutants that accumulate in sediments;

(7) Actions that would obstruct migratory pathways within and between adjacent riverine, estuarine, and marine critical habitat units, such as dams, dredging, point-source-pollutant discharges, and other physical or chemical alterations of channels and passes that restrict Gulf sturgeon movement (68 FR 13399).

4.0 Environmental Baseline

This section is an analysis of the effects of past and ongoing human and natural factors leading to the current status of the species, its habitat (including designated critical habitat), and ecosystem, within the action area. The environmental baseline is a "snapshot" of a species' health at a specified point in time and includes state, tribal, local, and private actions already affecting the species or that will occur contemporaneously with the consultation in progress. Unrelated Federal actions affecting the same species or critical habitat that have completed formal or informal consultation are also part of the environmental baseline, as are Federal and other actions within the action area that may benefit listed species or critical habitat.

Status of Species and Critical Habitat Within the Action Area

Sea Turtles

The species of sea turtles that occur in the action area and that might be affected by the proposed action are all highly migratory. The nearshore and inshore waters of the northern and eastern Gulf, including the upper Texas and Florida coast and estuaries such as Galveston Bay and Apalachee Bay, may be used by these species as post-hatchling developmental habitat or foraging habitat. NOAA Fisheries believes that no individual members of any of the species are likely to be permanent residents of the action area, although some individuals may be present at any given time, with minimum local abundance in winter and maximum local abundance in summer. These same individuals will migrate into offshore waters, as well as other areas of the Gulf of Mexico, Caribbean Sea, and North Atlantic Ocean when water temperatures drop and thus be impacted by activities occurring there; therefore, the species status is considered to be range-wide and supported by the species accounts in Section 2.0. Because they travel widely throughout the Atlantic, Gulf of Mexico, and Caribbean Sea, individuals in the action area are impacted by activities that occur in other areas within their geographic range.

Gulf Sturgeon

The Gulf sturgeon is found in the Gulf of Mexico primarily from Tampa Bay, Florida west to the mouth of the Mississippi River. The action area includes the entire geographic range of the species, all five genetically distinct Gulf sturgeon river-specific stocks, and winter habitat for all known (seven) reproducing riverine populations.

Gulf sturgeon will be present in the project area from about September through May; they are not likely to be present in the project area in the summer (approximately May to September) when they are upstream at spawning areas. Upstream migration from the estuarine/marine area to riverine spawning areas occurs in early spring (i.e., March through May) when river water temperatures range from 16° to 23°C (Huff 1975, Carr 1983, Wooley and Crateau 1985, Odenkirk 1989, Clugston et al. 1995, Foster and Clugston 1997, Fox and Hightower 1998, Sulak and Clugston 1999, Fox et al. 2000). Fall downstream migration from the river into the estuary/marine environment is cued by water temperature (around 23°C), generally beginning in September and continuing through November (Huff 1975, Wooley and Crateau 1985, Foster and Clugston 1997).

Gulf sturgeon use the lower riverine, estuarine, and marine environment from about September through May for feeding and migration. Following a period of fasting in the river, the Gulf sturgeon are presumed to begin foraging as soon as they enter suitable brackish and marine habitat; they have been located in seagrass and sand in depths of 1.5 to 5. 9 m (Fox and Hightower 1998, Craft et al. 2001, Parauka et al. in press) which supports a variety of potential prey items including estuarine crustaceans, small bivalve mollusks, and lancelets (Menzel 1971, Abele 1986, AFS 1989). In the estuarine/marine environment, Gulf sturgeon must consume sufficient prey to not only regain the body weight lost during the summer in the riverine environment, they must also obtain enough energy necessary for growth and reproduction (Fox et al. 2002, Murie and Parkyn pers. comm.). In addition to foraging, the Gulf sturgeon are migrating within the project area between habitats and, more rarely, between rivers.

Gulf Sturgeon Critical Habitat

NOAA Fisheries and FWS have designated 14 units as Gulf sturgeon critical habitat. Discussion in this Opinion will be limited to the marine/estuarine habitats (units #8-14) that are under the purview of NOAA Fisheries. The defining boundary between the riverine (FWS) and estuarine (NOAA Fisheries) units is rkm 0 (68 FR 13454). Regulatory jurisdiction in coastal areas extends to the line on the shore reached by the plane of the mean (average) high water (MHW) (33 CFR 329.12(a)(2)). All bays and estuaries within units #8-14, therefore, lie below the MHW lines. The term "72 COLREGS" delineates those waters where mariners shall comply with the International Regulations for Preventing Collisions at Sea, 1972 and those waters where mariners shall comply with the Inland Navigation Rules (33 CFR 80.01). The waters inside (landward) of these lines are Inland Rules waters and the waters outside (seaward) of the lines are COLREGS (International Rules) waters. These lines are defined in 33 CFR 80, and have been used for identification purposes to delineate boundary lines of the estuarine and marine habitat unit's 8, 9, 11, and 12. The following table, taken from the Gulf sturgeon critical habitat final rule (68 FR 13390), details areal coverage within each unit under NOAA purview.

Table 1. Approximate Area of the Estuarine and Marine Critical Habitat Units for the Gulf Sturgeon.

Critical Habitat Unit Estuarine and Marine Systems	State	Kilometers^2	Miles^2
# 8. Lake Borgne	Louisiana/	718	277
	Mississippi/	8	3
Little Lake	Alabama	763	295
Lake Pontchartrain		26	10
Lake St. Catherine		13	5
The Rigolets		1,879	725
Mississippi Sound		160	62
MS near shore Gulf			
#9. Pensacola Bay	Florida	381	147

Critical Habitat Unit Estuarine and Marine Systems	State	Kilometers^2	Miles^2
#10. Santa Rosa Sound	Florida	102	39
#11. Near shore Gulf of Mexico	Florida	442	171
#12. Choctawhatchee Bay	Florida	321	124
#13. Apalachicola Bay	Florida	683	264
#14. Suwannee Sound	Florida	546	211
Total		6,042	2,333

Individual critical habitat unit (#8-14 only) boundaries are summarized below and a functional description is provided.

Unit #8 (Lake Pontchartrain, Lake St. Catherine, The Rigolets, Little Lake, Lake Borgne, and Mississippi Sound) encompasses Lake Pontchartrain east of the Lake Pontchartrain Causeway, all of Little Lake, The Rigolets, Lake St. Catherine, and Lake Borgne, including Heron Bay, and the Mississippi Sound. Critical habitat follows the shorelines around the perimeters of each included lake. The Mississippi Sound includes adjacent open bays including Pascagoula Bay, Point aux Chenes Bay, Grand Bay, Sandy Bay, and barrier island passes, including Ship Island Pass, Dog Keys Pass, Horn Island Pass, and Petit Bois Pass. The northern boundary of the Mississippi Sound is the shoreline of the mainland between Heron Bay Point, Mississippi and Point aux Pins, Alabama. Critical habitat excludes St. Louis Bay, north of the railroad bridge across its mouth; Biloxi Bay, north of the U.S. Highway 90 bridge; and Back Bay of Biloxi. The southern boundary follows along the broken shoreline of Lake Borgne created by low swamp islands from Malheureux Point to Isle au Pitre. From the northeast point of Isle au Pitre, the boundary continues in a straight north-northeast line to the point one nautical mile (nmi) seaward of the western most extremity of Cat Island (30°13'N, 89°10'W). The southern boundary continues one nmi offshore of the barrier islands and offshore of the 72 COLREGS lines at barrier island passes (defined at 33 CFR 80.815 c)), (d) and (e)) to the eastern boundary. Between Cat Island and Ship Island there is no 72 COLREGS line. NOAA Fisheries has therefore defined that section of the unit southern boundary as one nmi offshore of a straight line drawn from the southern tip of Cat Island to the western tip of Ship Island. The eastern boundary is the line of longitude 88°18.8'W from its intersection with the shore (Point aux Pins) to its intersection with the southern boundary. The lateral extent of unit #8 is the MHW line on each shoreline of the included water bodies or the entrance to rivers, bayous, and creeks. Pascagoula Channel, a major shipping channel, as identified on standard navigation charts and marked by buoys, is excluded.

Unit #8 provides juvenile, subadult and adult feeding, resting, and passage habitat for Gulf sturgeon from the Pascagoula and the Pearl River subpopulations; fish are consistently located both inshore and around/between the barrier islands (i.e., Cat, Ship, Horn, and Petit Bois) within this unit (Reynolds 1993, Ross et al. 2001a, and Rogillio et al. 2002). Gulf sturgeon have also been documented within one nmi off the barrier islands of Mississippi Sound. Substrate in this unit range from sand to silt, all of which contain known Gulf sturgeon prey items, including lancelets (Menzel 1971, Abele and Kim 1986, American Fisheries Society 1989, Heise et al.1999b, Ross et al. 2001a, and Rogillio et al.2002). Four PCEs are present in critical habitat unit #8: abundant prey items for subadults and adults, water quality, sediment quality, and safe and unobstructed migratory pathways.

Unit #9 (Pensacola Bay) includes Pensacola Bay and its adjacent main bays and coves. These include Big Lagoon, Escambia Bay, East Bay, Blackwater Bay, Bayou Grande, Macky Bay, Saultsmar Cove, Bass Hole Cove, and Catfish Basin. The western boundary is the Florida State Highway 292 Bridge crossing Big Lagoon to Perdido Key. The southern boundary is the 72 COLREGS line between Perdido Key and Santa Rosa Island (defined at 33 CFR 80.810 (g)). The eastern boundary is the Florida State Highway 399 Bridge at Gulf Breeze, Florida. The lateral extent of unit #9 is the MHW line on each shoreline of the included waterbodies.

Unit #9 includes five interconnected bays, including Escambia Bay, Pensacola Bay, Blackwater Bay, East Bay, and the Santa Rosa Sound. The Santa Rosa Sound is addressed separately in unit #10. The Escambia River and its distributaries (Little White River, Dead River, and Simpson River) empty into Escambia Bay, including Bass Hole Cove, Saultsmar Cove, and Macky Bay. The Yellow River empties into Blackwater Bay. The entire system discharges into the Gulf of Mexico, primarily through a narrow pass at the mouth of Pensacola Bay.

Unit #9 provides winter feeding and migration habitat for Gulf sturgeon from the Escambia River and Yellow River subpopulations. Migratory movement is generally along the shoreline area of Pensacola Bay. During midwinter, sturgeon are commonly found in deep holes located north of the barrier island at Ft. Pickens, south of the Pensacola Naval Air Station, and at the entrance of Pensacola Pass; the depth in these areas ranges from 6-12.1 m. Four PCEs are present in critical habitat unit #9: abundant prey items for subadults and adults, water quality, sediment quality, and safe and unobstructed migratory pathways.

Unit #10 (Santa Rosa Sound) includes the Santa Rosa Sound, bounded on the west by the Florida State Highway 399 bridge in Gulf Breeze, Florida and the east by U.S. Highway 98 bridge in Fort Walton Beach, Florida. The northern and southern boundaries of unit #10 are formed by the shorelines to the MHW line or by the entrance to rivers, bayous, and creeks.

Unit #10 provides a continuous migratory pathway for Gulf sturgeon between Choctawhatchee Bay, Pensacola Bay and the Gulf of Mexico for feeding and genetic exchange (Wakeford 2001, Fox et al. 2002, and F. Parauka pers. comm. 2002). Gulf sturgeon from the Choctawhatchee, Escambia, and Yellow Rivers utilize unit #10 for migration and foraging. Four PCEs are present in critical habitat unit #10: abundant prey items for subadults and adults, water quality, sediment quality, and safe and unobstructed migratory pathways.

Unit #11 (Nearshore Gulf of Mexico): The western boundary is the line of longitude 87°20.0'W (approximately one nmi west of Pensacola Pass) from its intersection with the shore to its intersection with the southern boundary. The northern boundary is the mean high water (MHW) line of the mainland shoreline and the 72 COLREGS lines at passes as defined at 30 CFR 80.810 (a-g). The southern boundary of the unit is one nmi offshore of the northern boundary; the eastern boundary is the line of longitude 85°17.0'W from its intersection with the shore (near Money Bayou between Cape San Blas and Indian Peninsula) to its intersection with the southern boundary. Pensacola Channel, a major shipping channel, as identified on standard navigation charts and marked by buoys, is excluded.

Unit #11 includes winter feeding and migration habitat for Gulf sturgeon from the Yellow, Escambia, Blackwater, Choctawhatchee, and Apalachicola River subpopulations; the unit includes nearshore (1.6 km) waters from just west of Pensacola Pass to Money Bayou, Florida. Four PCEs are present in critical habitat unit #11: abundant prey items for subadults and adults, water quality, sediment quality, and safe and unobstructed migratory pathways.

Unit #12 (Choctawhatchee Bay): includes the main body of Choctawhatchee Bay, Hogtown Bayou, Jolly Bay, Bunker Cove, and Grassy Cove. The western unit boundary is the U.S. Highway 98 bridge at Fort

Walton Beach, Florida; the southern boundary is the 72 COLREGS line across East (Destin) Pass as defined at 33 CFR 80.810 (f). The lateral extent of unit #12 is the MHW line on each shoreline of the included water bodies.

Unit #12 provides important habitat for overwintering subadults and adults from the Yellow, Escambia, Blackwater and Choctawhatchee Rivers (USFWS 1997 and 1998, Fox et al. 2002, Parauka et al. in press). Four PCEs are present in critical habitat unit #12: abundant prey items for subadults and adults, water quality, sediment quality, and safe and unobstructed migratory pathways.

Unit #13 (Apalachicola Bay): includes the main body of Apalachicola Bay and its adjacent sounds, bays, and the nearshore waters of the Gulf of Mexico. The southern unit boundary includes water extending into the Gulf of Mexico one nmi from the MHW line of the barrier islands and from 72 COLREGS lines between the barrier islands (defined at 33 CFR 80.805 (e-h)); the western boundary is the line of longitude 85°17.0'W from its intersection with the shore (near Money Bayou between Cape San Blas and Indian Peninsula) to its intersection with the southern boundary. The eastern boundary of the unit is formed by a straight line drawn from the shoreline of Lanark Village at 29°53.1'N, 84°35.0'W to a point that is one nmi offshore from the northeastern extremity of Dog Island at 29°49.6'N, 84°33.2'W. The lateral extent of unit #13 is the MHW line on each shoreline of the included water bodies or the entrance of excluded rivers, bayous, and creeks.

Unit #13 provides winter feeding migration habitat for the Apalachicola River Gulf sturgeon subpopulation. Gulf sturgeon are believed to migrate from Apalachicola Bay into the Gulf of Mexico following prevailing currents and exiting primarily through the two most western passes (Indian and West) (Odenkirk, 1989). Four PCEs are present in critical habitat unit #13: abundant prey items for subadults and adults, water quality, sediment quality, and safe and unobstructed migratory pathways.

Unit #14 (Suwannee Sound): includes Suwannee Sound and a portion of adjacent Gulf of Mexico waters extending nine nmi from shore out to the State territorial water boundary. Its northern boundary is formed by a straight line from the northern tip of Big Pine Island (at approximately 29°23'N, 83°12'W) to the Federal-State boundary at 29°17'N, 83°21'W; the southern boundary is formed by a straight line from the southern tip of Richards Island (at approximately 29°11'N, 83°04'W) to the Federal-State boundary at 29°04'N, 83°15'W. The lateral extent of unit #14 is the MHW line along the shorelines and the mouths of the Suwannee River (East and West Pass), its tributaries and other rivers, creeks, or water bodies.

Unit #14 provides foraging habitat for Gulf sturgeon from the Suwannee River and a pathway for the fish to migrate from the river to the estuarine/marine environment. Four PCEs are present in critical habitat unit #14: abundant prey items for subadults and adults, water quality, sediment quality, and safe and unobstructed migratory pathways.

For the complete, legal description of Gulf sturgeon critical habitat unit boundaries, and a synopsis of biological information per unit, please refer to the final rule designating Gulf sturgeon critical habitat (68 FR 13370).

Factors Affecting the Species Environment Within the Action Area

As previously explained, sea turtles found in the action area are not year-round residents of the area, and may travel widely throughout the Atlantic, Gulf of Mexico, and Caribbean Sea. Therefore, individuals found in the action area can potentially be affected by activities anywhere else within their wide range of distribution.

Gulf sturgeon are present seasonally in a large portion of the project area; they are anadromous and spend the summer upriver at spawning habitat and the winter (about September through May) in estuarine/marine areas foraging and migrating. The action area includes the entire geographic range of the Gulf sturgeon and all habitats utilized for winter foraging and migration.

Gulf sturgeon critical habitat is found within the project area (from the Mississippi River east through the Suwannee Sound): seven of the 14 critical habitat units are within the project area and four of the seven PCEs may be impacted by the action. Upland activities could impact water quality in the unit.

1. Federal Actions

Sea Turtles

In recent years, NOAA Fisheries has undertaken several ESA section 7 consultations to address the effects of federally-permitted fisheries and other Federal actions on threatened and endangered sea turtles. Each of those consultations sought to develop ways of reducing the probability of adverse effects of the action on sea turtles. Similarly, recovery actions NOAA Fisheries has undertaken under the ESA are addressing the problem of takes of sea turtles in both the fishing and oil and gas industries, and vessel operations. The following summary of anticipated sources of incidental takes of turtles includes only those Federal actions which have undergone formal section 7 consultation. The incidental takes authorized in the biological opinions completed on the following actions are described in Table 2.

Adverse effects on threatened and endangered species from several types of fishing gear occur in the action area. Efforts to reduce the adverse effects of commercial fisheries are addressed through the ESA section 7 process. Gillnet, longline, trawl gear, and pot fisheries have all been documented as interacting with sea turtles. For all of these fisheries for which there is a Federal fishery management plan (FMP) or for which any Federal action is taken to manage that fishery, impacts have been evaluated under section 7. Several formal consultations have been conducted on the following fisheries that NOAA Fisheries has determined are likely to adversely affect threatened and endangered species: American lobster, calico scallop trawl fishery, monkfish, dogfish, southeastern shrimp trawl fishery, northeast multispecies, Atlantic pelagic swordfish/tuna/shark, and summer flounder/scup/black sea bass fisheries.

The southeastern shrimp trawl fishery affects more turtles than all other activities combined (NRC 1990). On December 2, 2002, NOAA Fisheries completed the Opinion for shrimp trawling in the southeastern United States under proposed revisions to the TED regulations (68 FR 8456, February 21, 2003). This Opinion determined that the shrimp trawl fishery under the revised TED regulations would not jeopardize the continued existence of any sea turtle species. This determination is based, in part, on the Opinion's analysis that shows the revised TED regulations are expected to reduce shrimp trawl-related mortality by 94% for loggerheads and 97% for leatherbacks compared to trawl-related mortality under previous TED regulations, and on the fact that nesting in the southeastern United States for all species of sea turtles (and Rancho Nuevo, Mexico in the case of Kemp's ridleys), with the exception of the northern nesting population of loggerhead turtles, has been increasing. However, NMFS (SEFSC 2001) population projection models indicate that a 30% decrease in benthic loggerhead mortality from an expanded TED rule will cause an increase in the northern nesting population. The shrimp trawling Opinion can be found at the following Web site:

http://www.nmfs.noaa.gov/prot_res/readingrm/ESAsec7/Biop_shrimp_trawling.PDF

On June 14, 2001, NOAA Fisheries issued a jeopardy opinion for the Highly Migratory Species (HMS) fisheries off the eastern United States. The HMS Opinion found that the continued prosecution of the pelagic longline fishery in the manner described in the HMS FMP was likely to jeopardize the continued existence of loggerhead and leatherback sea turtles. This determination was made by analyzing the effects of the fishery on sea turtles in conjunction with the environmental baseline and cumulative effects (for loggerheads this determination was based on the effects on the northern nesting population). The environmental baseline section of the HMS Opinion is incorporated herein by reference and can be found at the following NOAA Fisheries Web site:

http://www.nmfs.noaa.gov/prot_res/readingrm/ESAsec7/HMS060801final.pdf

NOAA Fisheries has implemented a reasonable and prudent alternative (RPA) in the HMS fishery which would allow the continuation of the pelagic longline fishery without jeopardizing the continued existence of loggerhead and leatherback sea turtles. The provisions of this RPA include the closure of the Grand Banks region off the northeastern United States and gear restrictions that are expected to reduce the bycatch of loggerheads by as much as 76% and of leatherbacks by as much as 65% compared to previously existing conditions. Further, NOAA Fisheries has implemented a major research project to develop measures aimed at further reducing longline bycatch. The implementation of this RPA reduces the negative effects that the HMS fishery has on the environmental baseline. The conclusions of the June 14, 2001, HMS Opinion and the subsequent implementation of the RPA are hereby incorporated into the environmental baseline section of this Opinion.

The environmental baseline for the June 14, 2001, HMS Opinion also considered the impacts from the North Carolina offshore spring monkfish gillnet fishery and the inshore fall southern flounder gillnet fishery, both of which were responsible for large numbers of sea turtle mortalities in 1999 and 2000, especially loggerhead sea turtles. However, during the 2001 season NOAA Fisheries implemented an observer program that observed 100% of the effort in the monkfish fishery, and then in 2002 a rule was enacted creating a seasonal monkfish gillnet closure along the Atlantic coast, based upon sea surface temperature data and turtle migration patterns. In 2001, NOAA Fisheries also issued an ESA section 10 permit to North Carolina with mitigative measures for the southern flounder fishery. Subsequently, the sea turtle mortalities in these fisheries were drastically reduced. Reinitiation of consultation for the summer flounder fishery has also begun. The reduction of turtle mortalities in these fisheries reduces the negative effects these fisheries have on the environmental baseline.

Potential adverse effects from Federal vessel operations in the action area and throughout the range of sea turtles include operations of the Navy (USN) and Coast Guard (USCG), the Environmental Protection Agency, the National Oceanic and Atmospheric Administration (NOAA), and the COE. NOAA Fisheries has conducted formal consultations with the USCG, the USN, and NOAA on their vessel operations. Through the section 7 process, where applicable, NOAA Fisheries has, and will continue to, establish conservation measures for all these agency vessel operations to avoid or minimize adverse effects to listed species. At the present time, however, they present the potential for some level of interaction.

In addition to vessel operations, other military activities including training exercises and ordnance detonation also affect sea turtles. Consultations on individual activities have been completed, but no formal consultation on overall USCG or USN activities in any region has been completed at this time.

Federally-funded and permitted projects to construct and maintain navigation channels have also been identified as a source of turtle mortality. Hopper dredges move relatively rapidly (compared to sea turtle swimming speeds) and can entrain and kill sea turtles, presumably as the drag arm of the moving dredge

overtakes the slower moving turtle. Regional biological opinions (RBOs) for the COE have been completed for southeastern Atlantic waters (North Carolina through Florida), and Gulf of Mexico northern and western waters (Louisiana and Texas). The current Gulf-wide Opinion supersedes the latter RBO.

The COE and the Minerals Management Service of the Department of Interior (MMS) issue permits for oil and gas exploration, well development, production, and abandonment/rig removal activities that also may adversely affect turtles. Both these agencies have consulted with NOAA Fisheries on these activities which include the use of seismic arrays for oil and gas exploration in the Gulf of Mexico, the impacts of which have been addressed in Opinions for individual and multi-lease sales. Impacts are expected to result from vessel strikes, noise, marine debris, and the use of explosives to remove oil and gas structures.

Another action with Federal oversight (by the Federal Energy Regulatory Commission [FERC] or the Nuclear Regulatory Agency) which has impacts on sea turtles is the operation of electrical generating plants. Sea turtles entering coastal or inshore areas have been affected by entrainment in the cooling-water systems of electrical generating plants. Biological opinions have already been written for a number of electrical generating plants, and others are currently undergoing section 7 consultation.

Below is a table summarizing formal ESA section 7 consultations completed for Federal actions taking place in the southeastern United States that affect sea turtles:

Table 2. Summary of annual incidental take levels anticipated under the incidental take statements associated with NMFS' existing biological opinions in the U.S. Atlantic and Gulf of Mexico.

Federal Action	**Annual Anticipated Incidental Take Level (lethal)[1]**				
	Loggerhead	**Leatherback**	**Green**	**Kemp's**	**Hawksbill**
Coast Guard Vessel Operation	1(1)[2]	1(1)[2]	1(1)[2]	1(1)[2]	1(1)[2]
Navy-SE Ops Area[3]	91(91)	17(17)[2]	16(16)[2]	16(16)[2]	4(4)[2]
Navy-NE Ops Area	10(10)	0	1(1)[2]	1(1)[2]	0
Shipshock-Seawolf/Winston Churchill[4]	276(58)[2]	276(58)[2]	276(58)[2]	276(58)[2]	276(58)[2]
COE Dredging-NE Atlantic	27(27)	1(1)	6(6)[2]	5(5)[2]	0
COE Dredging-S. Atlantic	35(35)	0	7(7)	7(7)	2(2)
COE Dredging-N&W Gulf of Mexico	30(30)	0	8(8)	14(14)	2(2)
COE Dredging-E Gulf of Mexico	8 (8) [5]	5(5)[5]	5(5)[5]	5(5)[5]	5(5)[5]
COE Rig Removal, Gulf of Mexico	1(1)[2]	1(1)[2]	1(1)[2]	1(1)[2]	1(1)[2]
MMS Destin Dome Lease Sales	1(1)[2;6]	1(1)[2;6]	1(1)[2;6]	1(1)[2;6]	1(1)[2;6]

MMS 181 Lease Sales	1(1)[2;6]	1(1)[2;6]	1(1)[2;6]	1(1)[2;6]	1(1)[2;6]
MMS Rig Removal, Gulf of Mexico	10(10)[7]	5(5)[2;7]	5(5)[2;7]	5(5)[2;7]	5(5)[2;7]
NE Multispecies Sink Gillnet Fishery	10(10)	4(4)	4(4)	2(2)	0
ASMFC Lobster Plan	10 (10)	4(4)	0	0	0
Bluefish	6(3)	0	0	6(6)	
Herring	6(3)	1(1)	1(1)	1(1)	0
Mackerel, Squid, Butterfish	6(3)	1(1)	2(2)	2(2)	0
Monkfish Fishery[7]	6(3)	1(1)	1(1)	1(1)	0
Dogfish Fishery	6(3)	1(1)	1(1)	1(1)	0
Sargassum	30(30)[8]	1(1)[2]	1(1)[2]	1(1)[2]	1(1)[2]
Summer Flounder, Scup & Black Sea Bass	15(5)	3(3)[2]	3(3)[2]	3(3)[2]	3(3)[2]
Shrimp Fishery[9]	163,160 (3,948)	3,090 (80)	18,757 (514)	155,503 (4,208)	NA(640)[13]
Weakfish	20(20)	0	0	2(2)	0
HMS - Pelagic Longline Fishery[10]	468(7)	358(6)	46(2)	23(1)	46(2)
HMS - Shark gillnet Fishery[11]	20(20)	2(2)	2(2)	2(2)	2(2)
HMS - Bottom Longline Fishery[11]	12(12)	2(2)	2(2)	2(2)	2(2)
NRC – St. Lucie, FL[12]	1000[2] (10)[2]	1000[2] (1)	1000[2] (10)[2]	1000[2] (1)	1000[2] (1)
NRC – Brunswick, NC	50[2] (6)[2]	50[2]	50[2] (3)[2]	50[2] (2)[2]	50[2]
NRC – Crystal River, FL	55[2] (1)[2]	55[2] (1)[2]	55[2] (1)[2]	55[2] (1)[2]	55[2] (1)[2]
Total	**165,370 (4,346)**	**4,880 (197)**	**20,252 (656)**	**156,986 (4,348)**	**1,456 (835)**

[1]Anticipated Take level represents **'observed'** unless otherwise noted. Number in parenthesis represents lethal take and is a subset of the total anticipated take; numbers less than whole are rounded up.
[2] The anticipated take level may represent any combination of species and thus is tallied under each column.
[3] Includes Navy Operations along the Atlantic Coasts and Gulf of Mexico, Mine warfare center, Eglin AFB, Moody AFB
[4] Total **estimated** take includes acoustic harassment
[5]Up to 8 turtles total, of which, no more than 5 may be leatherbacks, greens, Kemp's or hawksbill, in combination.
[6]Total anticipated take is 3 turtles of any combination over a 30-year period
[7] Not to exceed 25 turtles, in total.
[8] Anticipated take for post-hatchlings for total period June 21, 1999 through January 2001
[9]Represents **estimated** take (interactions between turtles and trawls). Lethal take in parentheses.
[10] Represents **estimated** total take and **observed** lethal take in parentheses
[11] Represents **estimated** total and lethal take
[12] Annual incidental capture of up to 1,000 turtles, in any combination of the five species found in the action area. NMFS anticipates 1% of the total number of green and loggerhead turtles (combined) captured (i.e., if there are 900 total green and loggerhead turtles captured in one year, then 9 turtles in any combination of greens and loggerheads are expected to be injured or killed as a result. In cases where 1% of the total is not a whole number, then the total allowable incidental take due to injury or death will be rounded to the next higher whole number) will be injured or killed each year over the next 10 years as a result of this incidental capture. NMFS also anticipates two Kemp's ridley turtles will be killed each year and one hawksbill or leatherback turtle will be injured or killed every 2 years for the next 10 years.
[13] Actual mortalities of hawksbills, as a result of turtle/trawl interactions, is expected to be much lower than this number. This number represents the estimated total number of mortalities of hawksbill turtles from all sources in areas where shrimp fishing takes place.

Gulf Sturgeon and Gulf Sturgeon Critical Habitat

Incidental catch of Gulf sturgeon in both federally- and state-regulated fisheries has been documented. There have been incidental captures of Gulf sturgeon in the shrimp and gillnet fisheries in Apalachicola Bay (Swift et al. 1977, Wooley and Crateau 1985). Similar incidental catches have been reported in Mobile Bay, Tampa Bay, and Charlotte Harbor. Louisiana Department of Wildlife and Fisheries (LDWF) reported 177 Gulf sturgeon were incidentally captured by commercial fishermen in southeast Louisiana during 1992. Rogillio (September 20, 2002, pers. comm. to Eric Hawk, Gulf Sturgeon Workshop, University of Southern Mississippi, Hattiesburg, September 19-20, 2002) noted several recent instances of Gulf sturgeon takes by shrimpers operating off barrier island passes in Mississippi.

The operation of hydropower plants is a Federal action by FERC that has impacts on Gulf sturgeon. Sturgeon migrating up or down rivers and entering coastal and inshore areas can be affected by entrainment in the cooling-water systems; larvae may be adversely affected by heated water discharges. Dredging impacts associated with maintenance of hydropower and nuclear plants may affect both the Gulf sturgeon and its critical habitat.

The recent joint designation of Gulf sturgeon critical habitat by NOAA Fisheries and USFWS will benefit the species, primarily through the ESA section 7 consultation process. When critical habitat is designated, other Federal agencies are required to consult with NOAA Fisheries on actions they carry out, fund, or authorize, to ensure that their actions will not destroy or adversely modify critical habitat. In this way, a critical habitat designation will protect areas that are necessary for the conservation of the species. Designation of critical habitat may also enhance awareness within Federal agencies and the general public of the importance of Gulf sturgeon habitat and the need for special management considerations.

A designation of critical habitat also clarifies the section 7 consultation responsibilities for the Federal action agencies, particularly for projects where the action would not result in direct mortality, injury, or harm to individuals of the species. When critical habitat is designated, the action agency must consult - regardless of the seasonal presence or absence of the species - on actions that may affect critical habitat. Furthermore, the critical habitat designation describes the essential features of the habitat. Identifying the physical and biological features of each particular critical habitat area that are essential for species

conservation assists agencies in identifying particular activities conducted outside the designated area that require section 7 consultation. For example, disposal of waste material in water adjacent to a critical habitat area may affect an essential feature (water quality) of the designated habitat and is therefore subject to the provisions of section 7.

Critical habitat designation also assists Federal agencies in planning future actions because it identifies, in advance, those habitats that will be given an additional review in section 7 consultations. This is particularly true in cases where two project areas exist and only one provides for the conservation of the species. With a designation of critical habitat, potential conflicts between Federal actions and listed species can be identified and possibly avoided early in the agency's process.

Federal agencies that consult on potential impacts to both Gulf sturgeon and its critical habitat include the Department of Defense (DOD), the COE, and the EPA. Dredging and dredged material disposal, and military activities including training exercises and ordnance detonation, have the potential to impact both the species and designated critical habitat. Numerous formal opinions have investigated project impacts to Gulf sturgeon; there has been a single formal opinion investigating impacts of dredge disposal on Gulf sturgeon critical habitat (NAS Pensacola). Numerous informal consultations with the DOD, COE, and EPA analyzing potential impacts to both Gulf sturgeon and its designated critical habitat have been conducted.

Federally-regulated stormwater and industrial discharges, and chemically treated discharges from sewage treatment systems, may impact Gulf sturgeon critical habitat. NOAA Fisheries and FWS continue to consult with EPA to minimize the effects of these activities on both listed species and designated critical habitat. In addition, other federally-permitted construction activities, such as beach restoration, have the potential to impact Gulf sturgeon critical habitat.

2. State or private actions

Sea Turtles

Commercial vessel traffic and recreational vessel pursuits can have an adverse effect on sea turtles through propeller and boat strike damage. Private vessels participate in high speed marine events concentrated in the southeastern United States and are a threat to sea turtles and marine mammals. The magnitude of these marine events is not currently known. NOAA Fisheries and the USCG (which permits these events) are in early consultation on these events, but a thorough analysis of impacts has not been completed.

Various fishing methods used in state fisheries, including trawling, pot fisheries, fly nets, and gillnets are known to cause interactions with sea turtles. Georgia and South Carolina prohibit gillnets for all but the shad fishery. Florida and Texas have banned all but very small nets in state waters. Louisiana, Mississippi, and Alabama have also placed restrictions on gillnet fisheries within state waters. Very little commercial gillnetting takes place in southeastern U.S. waters, with the exception of North Carolina. Most pot fisheries (turtles can get entangled in the lines in these fisheries) in the Southeast are prosecuted in areas frequented by sea turtles. Recreational angling, including bottom fishing for snapper, grouper, and other species in the Gulf of Mexico and southeastern waters, and fishing from private and public docks and piers, are known to occasionally take sea turtles by hooking and entanglement. NOAA Fisheries has consulted on potential sea turtle takes by fishermen on several federally-permitted public piers in Florida.

Gulf Sturgeon and Gulf Sturgeon Critical Habitat

A number of activities that may indirectly affect Gulf sturgeon and its critical habitat include discharges from wastewater systems, dredging, ocean dumping and disposal, and aquaculture. The impacts from these activities are difficult to measure. Where possible, however, conservation actions through the ESA section 7 process, ESA section 10 permitting, and state permitting programs, are being implemented to monitor or study impacts from these sources.

Increasing coastal development and ongoing beach erosion will result in increased demands by coastal communities, especially beach resort towns, for periodic privately-funded or federally-sponsored beach renourishment projects. These activities may affect Gulf sturgeon and its critical habitat by burying macroinvertebrates that occur in nearshore habitats that serve as foraging areas, in addition to the potential direct effect to the species by entrainment in dredge suction dragheads at the sand mining sites.

Increased groundwater withdrawal for irrigation in southwest Georgia may result in a 30% reduction of discharge to streams and thereby affect water quality and quantity. Reducing discharge decreases cool water habitats which are thought to offer sturgeon refugia from warm riverine water; recent droughts in the Apalachicola River basin have aggravated the loss of cool-water refugia; and spring-water intrusion into the Suwannee River during drought conditions changes ionic conductivity and water temperature unfavorably for embryonic development and larval success (Sulak and Clugston 1999).

3. Conservation and recovery actions shaping the environmental baseline

NOAA Fisheries has implemented a series of regulations aimed at reducing potential for incidental mortality of sea turtles in commercial fisheries. In particular, NOAA Fisheries has required the use of TEDs in southeastern U.S. shrimp trawls since 1989 and in summer flounder trawls in the mid-Atlantic area (south of Cape Charles, Virginia) since 1992. It has been estimated that TEDs are 97% efficient at excluding (releasing alive) turtles caught in such trawls. These regulations have been refined over the years to ensure that TED effectiveness is maximized through proper placement and installation, configuration (e.g., width of bar spacing), floatation, and more widespread use. Recent analyses by Epperly and Teas (2002) indicate that the minimum requirements for the escape opening dimensions were too small, and that as many as 47% of the loggerheads stranding annually along the Atlantic Seaboard and Gulf of Mexico were too large to fit through existing openings. NOAA Fisheries recently published a final rule to require larger escape openings in TEDs used in the southeastern shrimp trawl fishery (68 FR 8456; February 21, 2003). Based upon the analyses in Epperly and Teas (2002), leatherback and loggerhead sea turtles will greatly benefit from the new regulations, with expected reductions of 97% and 94% (over the reduction expected with the old TEDs), respectively, in mortality from shrimp trawling.

In 1993 (with a final rule implemented in 1995), NOAA Fisheries established a Leatherback Conservation Zone to restrict shrimp trawl activities from the coast of Cape Canaveral, Florida, to the North Carolina/Virginia border. This provided for short-term closures when high concentrations of normally pelagic leatherbacks are recorded in near coastal waters where the shrimp fleet operates. This measure was necessary because, due to their size, adult leatherbacks were larger than the escape openings of most NOAA Fisheries-approved TEDs. With the implementation of the new TED rule requiring larger opening sizes on all TEDs, the reactive emergency closures within the Leatherback Conservation Zone are no longer necessary.

NOAA Fisheries is also working to develop a TED which can be effectively used in a type of trawl known as a fly net, which is sometimes used in the mid-Atlantic and northeastern fisheries to target sciaenids and

bluefish. Limited observer data indicate that takes can be quite high in this fishery. A prototype design has been developed, and testing has been underway since December 2002.

In addition, NOAA Fisheries has been active in public outreach efforts to educate fishermen regarding sea turtle handling and resuscitation techniques. NOAA Fisheries recently conducted a number of workshops with longline fishermen to discuss bycatch issues including protected species, and to educate them regarding handling and release guidelines. NOAA Fisheries intends to continue these outreach efforts and hopes to reach all fishermen participating in the pelagic longline fishery over the next one to two years. An extensive network of Sea Turtle Stranding and Salvage Network participants along the Atlantic and Gulf of Mexico not only collect data on dead sea turtles, but also rescue and rehabilitate any live stranded turtles.

Commercial harvesting of Gulf sturgeon has been banned by all coastal states where the species is likely present (i.e., Florida, Mississippi, and Alabama). State actions eliminating or limiting gillnetting also benefit the Gulf sturgeon.

Federal Essential Fish Habitat consultation requirements pursuant to the Magnuson-Stevens Fishery Management and Conservation Act also minimize and mitigate for losses of wetlands, and preserve valuable foraging and developmental habitat for Gulf sturgeon.

5.0 Effects of the Action

A. Hopper Dredging Effects on Sea Turtles

It has been previously documented in NOAA Fisheries' biological opinions and the present Opinion that maintenance hopper dredging in three of the four COE Districts in the action area occasionally results in sea turtle entrainment and death, even with seasonal dredging windows, turtle deflector dragheads in place, and concurrent relocation trawling. For example, in the western Gulf of Mexico from February 1995 through September 2002, a total of 29 lethal takes was documented (six Kemp's ridleys, 15 loggerheads, and eight greens) by Galveston District hopper maintenance dredging activities (Appendix I).

In the northern Gulf of Mexico from May 1995 to mid-July 2003, a total of 39 lethal sea turtles takes (including 27 loggerheads, eight Kemp's ridleys, and four unidentified) was reported by the New Orleans District as taken by hopper dredges during maintenance dredging. Thirty-six of the takes (22 loggerheads) occurred in the MR-GO dredging area; three takes (two Kemp's ridleys) occurred in the Calcasieu Channel. 2001 was a year of unusually high loggerhead sea turtle abundance in the MR-GO based on take records since 1995; ten of the 11 turtle takes that occurred between April 24 and June 10, 2001 were loggerheads. Since October 2002, hopper dredging in the MR-GO has resulted in ten lethal loggerhead entrainments.

In the Jacksonville District (Florida west coast) since 1995, six turtles have been documented as entrained: three lethal Kemp's ridley takes, and three loggerhead takes (one non-lethal) during Tampa Bay and Charlotte Harbor dredging.

No sea turtle takes have yet been documented by the Mobile District in its hopper dredging projects; however, until late-summer of 2002, the District did not require observers or screening on its hopper dredges.

It can be expected that future hopper dredging in the Gulf of Mexico action area will occasionally take sea turtles, principally loggerheads, Kemp's ridleys, and greens, and may rarely take a hawksbill turtle, based upon this data on hopper dredging takes and on the information below regarding sea turtle distribution.

Satellite telemetry work funded by COE and conducted by NOAA Fisheries' Galveston Laboratory, demonstrates the nearshore occurrence of Kemp's ridleys near northern Gulf channels. Kemp's ridleys remained within ten nmi of shore for greater than 95% of the observed time, with 90% of the observed locations within five nmi (M. Renaud, NOAA Fisheries' Galveston Laboratory, pers. comm.). Movements out of northern Gulf waters in response to cooling temperatures occurred during December, and Kemp's ridleys returned with warming waters in March.

Seasonal abundance of sea turtles utilizing nearshore waters of the northwest Gulf of Mexico varies with species and location. Green turtles within subtropical habitats of the Laguna Madre are the regions's only year-round, inshore occupant. Other species, especially the Kemp's ridley, are transient users of the coastal zone that venture toward tidal passes and into bays during May-August when food sources and other environmental factors are favorable. The May-August period has yielded over 80% of the sea turtles captures (n=516) recorded by Texas A&M researchers (Landry et al. 1997). Based on strandings, reported incidental captures, observer data (Gulf and South Atlantic Foundation, and NMFS) aerial surveys (SETS, Pascagoula Oil Platform Association data, Gulf Of Mexico red drum surveys of 1987, 1995, and 1999, CETAP, SEAS92 and SECAS95, MATS95, GulfCet I, GulfCet II, and GoMex surveys), and telemetry tracks, loggerheads are distributed ubiquitously in the Gulf Area, generally occurring in all areas, inshore and offshore, and at all times when shrimp trawl activity is likely to occur. Shrimping occurs essentially year-round. (NOAA Fisheries' unpublished data, December 2002: Environmental Assessment/Regulatory Impact Review of Technical Changes to the Turtle Excluder Device (TED) Regulations to Enhance Turtle Protection in the Southeastern United States).

Anticipated Increase in Beach Restoration Activities

The COE has indicated that beach restoration activities, and consequent offshore sand mining often using hopper dredges, are likely to increase this decade in Gulf of Mexico coastal states. Sand mining sites are to some extent selected by the COE based on their absence of, or safe distance from, hardbottoms which in addition to attracting sea turtles may damage the dragheads, reduce production, and may also not provide sand with characteristics suitable for beach restoration efforts. NOAA Fisheries believes that sea turtles and Gulf sturgeon will occasionally be found at some sand mining sites (or dredged material disposal sites) in the Gulf of Mexico (e.g., Pinellas County, Lido Key, Lee County, and Sarasota County Shore Protection Projects), probably attracted to nearby nesting beaches, hardbottoms, artificial reefs, or other structures which contain foraging habitat for sea turtles, or passes between barrier islands where Gulf sturgeon are known to congregate and forage in winter (e.g., Horn Island Pass, Mississippi; Perdido Pass, Alabama; Pensacola Pass, Boca Grande Pass, and Stump Pass, Florida). NOAA Fisheries believes that dredging of sand at designated sites, proposed sites, or currently undiscovered mining sites near hardbottoms, or disposal of dredged materials near navigation channels and passes, may adversely affect listed species by hopper dredge entrainment and damage (by degradation or destruction) to foraging habitat in or in proximity to disposal or mining sites.

Disorientation Effects of Hopper Dredge and Pumpout Barge Deck Lighting

NOAA Fisheries believes that female sea turtles approaching nesting beaches and neonates (i.e., hatchlings) emerging from nests and exiting their natal beaches, may be adversely affected by bright offshore lights from hopper dredges or hopper dredge pumpout barges operating in the nearshore (0-3 nmi) environment. Females approaching the beach to nest could be deterred from nesting by bright lights in the nearshore environment. Hatchlings emerging from their nests could be attracted away from the shortest path to the water and instead crawl or swim toward the bright lights of a nearshore hopper dredge or anchored pumpout barge (instead of crawling or swimming seaward toward the open horizon), thus increasing their exposure time to predation. NOAA Fisheries recently received a report (M. Nicholas pers. comm. to E. Hawk, September 29, 2003) from a National Park Service biologist at Gulf Islands National Seashore) who

relocated a clutch of 97 Perdido Key hatchlings on September 28, 2003. The biologist felt that the hatchlings were in danger of being attracted to a nearby operating, brightly lit hopper dredge which was dredging ½ to 1 mile offshore in Pensacola Entrance Channel. NOAA Fisheries considers it prudent that hopper dredges and hopper dredge pumpout barges operating within three nmi of sea turtle nesting beaches during sea turtle nesting and sea turtle hatchling emergence season (May 1-October 31, yearly), should shield essential deck lighting and reduce or extinguish non-essential deck lighting to the maximum extent possible consistent with vessel personnel safety and U.S. Coast Guard navigation requirements, to reduce potential disorientation effects, potential reduced or aborted nesting, and potential increased hatchling mortality from increased exposure to predators. This is consistent with U.S. Fish and Wildlife Service biological opinion requirements and Florida Wildlife Commission requirements for beach nourishment projects where nesting sea turtles may be present, and was jointly developed by these agencies, Florida Department of Environmental Protection, and the U.S. Army Corps of Engineers, Jacksonville District (Robbin Trindell, pers. comm. to Eric Hawk, September 30, 2003).

Sedimentation Effects

Efforts to reduce potential sedimentation damage to habitats adjacent to sand mining sites were incorporated into the 1995 SAD RBO, which recommended "water column sediment load deposition rates of no more than 200 $mg/cm^2/day$, averaged over a 7-day period, to protect coral reefs and hard bottom communities..." That measure will be carried forward in the Conservation Recommendations of the present Opinion. To reduce the possibility of listed species takes during sand mining activities, the terms and conditions of this Opinion will require that hopper dredges operating at offshore sand mining sites maintain a minimum distance of 400 feet from hardgrounds since these areas may attract sea turtles.

Notably, this Opinion includes only the hopper dredging of the aforementioned sand mining sites that do not occur within designated Gulf sturgeon critical habitat. This Opinion does not include any new sand mining site in designated critical habitat, nor the placement of sand in any littoral zone within designated critical habitat.

Sea Turtle Takes Associated with Sand Mining

Historically, sea turtle takes associated with sand mining activities for beach restoration, conducted using hopper dredges, have been few compared to channel dredging. In the South Atlantic, 11 loggerheads were taken from 1997-1999 at sand mining sites off Myrtle Beach, South Carolina (all of these takes occurred outside of the December 1-March 31 window). In North Carolina, two Kemp's ridleys and two loggerheads were taken in a single day at the Bogue Banks Restoration Project borrow site on December 21, 2001, apparently attracted to remains of an artificial, tire reef, and another Kemp's ridley was taken on April 11, 2002. In Florida's Brevard County, a loggerhead was taken at the Canaveral Shoals sand mining site on March 31, 2001, and another loggerhead was taken on February 19, 2002, at a nearby mining site. On March 19, 2003, a loggerhead sea turtle was taken during sand mining for the Bogue Banks Restoration Project (a relocation trawler moved five turtles out of the area between March 13-28). No other instances of hopper dredge takes at sand mining sites are known. There are no instances of takes yet recorded for sand mining activities in the Gulf of Mexico; these activities have been limited, sometimes have not been reported to NOAA Fisheries, and it is not known if observers have been present. However, NOAA Fisheries expects that future takes will occur in association with hopper dredge sand mining activities in the Gulf of Mexico.

Use of Bed-leveling Mechanical Dredging Devices

Bed-leveling is often associated with hopper dredging (and other types of dredging) operations. Bed-leveling "dredges" do not use suction and redistribute sediments, rather than removing them. Plows, I-beams, or other seabed-leveling mechanical dredging devices are often used to lower high spots left in

channel bottoms and dredged material deposition areas by hopper dredges or other type dredges. Some evidence indicates that they may be responsible for occasional sea turtle mortalities (Mark Dodd, GADNR, unpublished data; July 2003 BA for Brunswick Harbor Deepening, Savannah District COE). Sea turtles may be crushed as the leveling device–which weighs about 30 to 50 tons and is typically fixed with cables to a derrick mounted on a barge pushed or pulled by a tugboat at about one to two knots–passes over and crushes a turtle which failed to move out of the way and is not pushed out of the way by the sediment wedge "wave" which generated by and moving ahead of the device. Sea turtles at Brunswick Harbor, Georgia may have been crushed and killed by recent bed-leveling "clean-up dredging" which commenced after the hopper dredge finished its work in a particular area. Brunswick Harbor is also one of the sites where sea turtles captured by relocation trawlers sometimes show evidence of brumating (over-wintering) in the muddy channel bottom, which could explain why, if they were crushed by bed-level type dredges, they failed to react quickly enough to avoid the bed-leveler. Use of bed-levelers for cleanup operations, however, is probably preferable to use of hopper dredges since turtles which are foraging/resting/brumating on irregular bottoms are probably more likely to be entrained by suction dragheads because sea turtle deflector dragheads are less effective on uneven bottoms, hopper dredges move considerably faster than bed-leveler "dredges," and bed-levelers do not use suction.

B. <u>Hopper Dredging Effects on Gulf Sturgeon</u>

Dredge entrainment of Gulf sturgeon by hopper dredging has previously been assessed by NOAA Fisheries in section 7 consultations for channel maintenance. NOAA Fisheries had determined that the hopper dredge projects were not likely to adversely affect the species given either the projects' limited scope and/or the unlikely seasonal presence of Gulf sturgeon. While no Gulf sturgeon take by hopper dredges have been reported to date, allopatric sturgeon species on the Atlantic Seaboard have been taken occasionally by hopper dredge. Similarly, the existing RBO to the COE's South Atlantic Division for hopper dredging between North Carolina through Florida limits the incidental take to five shortnose sturgeon (*A. brevirostrum*). While NOAA Fisheries is unaware of any instances to date of Gulf sturgeon take by a hopper dredge, Atlantic sturgeon and shortnose sturgeon are occasionally taken by hopper dredges operating on the Atlantic seaboard (C. Slay, Coastwise Consulting, pers. comm. to E. Hawk; J. Crocker, October 15, 2003, pers. comm. to S. Bolden). Therefore, NOAA Fisheries considers it prudent to address potential Gulf sturgeon takes by hopper dredges operating in the Gulf of Mexico as we presume the species can be taken given the evidence from two morphologically and ecologically similar Atlantic sturgeon species.

While the probability of sea turtle take by hopper dredge is lessened by winter-time dredging (particularly when water temperatures are below 11°C), Gulf sturgeon are more likely to be present in estuarine and coastal waters, and passes between the barrier islands, during that period. Nevertheless, Gulf sturgeon may be more sensitive to vibrations transmitted along the bottom (by a noisy, approaching hopper dredge draghead) than turtles and other fishes due to their physostomus (pneumatic duct connects gas bladder and gut to allow gas to be taken in and emitted vs. psysoclistous fishes that lose the connection in adults) swim bladder; are not known to bury themselves and "hibernate" in the soft bottom mud of ship channels (but they are known to remain for long periods in low areas) as are some turtles (e.g., in Kings Bay and Brunswick Harbor, Georgia); and are mobile and are not likely to be entrained, even by a rapidly (approximately 3-5 knots) approaching hopper dredge deflector draghead. Although no take of a Gulf sturgeon by hopper dredge (or any other type of dredge) operating in the Gulf of Mexico has ever been reported to NOAA Fisheries, Atlantic sturgeon have been documented as taken by hopper dredges. Shortnose sturgeon have also been lethally taken by hydraulic pipeline dredging in the Delaware River since 1996. A shortnose sturgeon was taken by a mechanical clam shell bucket dredge in the Northeast (J. Crocker, June 10, 2003, pers. comm. to S. Bolden) and recently five shortnose were taken by a hopper

dredge in the Kennebec River, Maine during emergency dredging operations there (J. Crocker, October 15, 2003, pers. comm. to S. Bolden). NOAA Fisheries believes that Gulf sturgeon can be lethally taken by hopper dredges, and it is most likely to occur in the northern or eastern Gulf of Mexico during dredging of barrier island passes or nearby sand sources during winter months.

Gulf Sturgeon Takes Associated with Sand Mining

NOAA Fisheries knows of no Gulf sturgeon takes associated with mining of sand from nearshore or offshore mining sites by hopper dredge or any other type of dredge. Gulf sturgeon presence would be unlikely at these sites, unless mining sites were near barrier island pass foraging sites or along migratory pathways (which are primarily inshore).

C. Dredging Effects on Gulf Sturgeon Critical Habitat

This Opinion identifies specific projects that will impact Gulf sturgeon critical habitat units #8 and #11 and four (of the seven) PCEs (food availability, water quality, sediment quality and migratory pathways) within both of those units (Table 3).

Table 3. Summary of COE projects within this Opinion that occur within designated Gulf sturgeon critical habitat or may impact Gulf sturgeon.

District/Project	Genetic stock*	Critical Habitat Unit	Riverine Pop Impacted
GALVESTON			
None			
NEW ORLEANS			
Lower Mississippi R.	Lake Pontchartrain Pearl River	None	Mississippi
Mississippi River - New Orleans Harbor	Lake Pontchartrain Pearl River	None	Mississippi
Mississippi River - Gulf Outlet	Lake Pontchartrain Pearl River	None	Mississippi
Mississippi River - Southwest Pass	Lake Pontchartrain Pearl River	None	Mississippi
MOBILE			
Gulfport Harbor	Pascagoula River	#8	Pascagoula/Pearl
Pascagoula Harbor	Pascagoula River	#8	Pascagoula/Pearl
Mobile Harbor	Pascagoula River	None	Mobile
Pensacola Harbor	Escambia/Yellow Rivers	#11	Yellow, Choctawhatchee and Apalachicola

JACKSONVILLE			
Pensacola Beach	Escambia/Yellow Rivers	#11	Yellow, Choctawhatchee and Apalachicola
NAS Pensacola Channel	Escambia/Yellow Rivers	#11	Yellow, Choctawhatchee and Apalachicola
Tampa Harbor	?	None	?
Charlotte Harbor	?	None	?

*Five regional or river-specific stocks (from west to east) have been identified: (1) Lake Pontchartrain and Pearl River, (2) Pascagoula River, (3) Escambia and Yellow Rivers, (4) Choctawhatchee River, and (5) Apalachicola, Ochlockonee, and Suwannee Rivers (Stabile et al. 1996). Because of small sample size, genetic stocks could not be determined for fish in the southeast (i.e., Tampa Area) as indicated by the "?."

Maintenance dredging is a repetitive activity in coastal Gulf of Mexico; some channels are dredged continuously to keep them navigable, others require dredging cycles of 2-10 years. Maintenance dredging removes sediments from navigation channel beds that have been transported there naturally (e.g., longshore transport). Materials removed during maintenance dredging are usually variable in quantity and consist of soft, uncompacted soil. For the purpose of this Opinion, NOAA Fisheries assumes that the sediments removed from the channel beds during maintenance dredging are similar to those that will remain in the channel beds after dredging (e.g., removal of sand and sand remaining) and therefore no alteration in habitat composition is occurring. Therefore, NOAA Fisheries assumes that channel beds provide similar habitat pre- and post-dredging.

NOAA Fisheries considered and analyzed the following factors to determine direct and indirect effects of dredging to current depth, width and length (no improvements regardless of prior authorization) within critical habitat on the four PCEs in units #8 and #11:

1. Food availability
2. Water quality
3. Sediment quality, and
4. Migratory pathways

1. Food Availability

Numerous reports have been published in the scientific literature describing the in situ effects of dredging and dredged material placement on birds, lobsters, fish, aquatic plants, benthic communities, turbidity, primary productivity, bioavailability of sediment trace metals, etc. (Lewis et al. 2001). Environmental impacts observed in these studies included reduction in number of benthic species (both species diversity and species abundance), increased turbidity, reduction of primary productivity and mobilization, and increased bioavailability of sediment trace metals.

Of particular concern is the potential impacts of dredging on Gulf sturgeon prey availability. Ontogenetic changes in Gulf sturgeon diet and foraging area have been documented. Young-of-year forage in freshwater on aquatic invertebrates and detritus (Mason and Clugston 1993, Sulak and Clugston 1999); juveniles forage throughout the river on aquatic insects (e.g., mayflies and caddisflies), worms

(oligochaete), and bivalves (Huff 1975, Mason and Clugston 1993); adults forage sparingly in freshwater and depend almost entirely on estuarine and marine prey for their growth (Gu et al. 2001). Both adult and subadult Gulf sturgeon are known to lose up to 30% of their total body weight while in fresh water, and subsequently compensate the loss during winter feeding in marine areas (Carr 1983, Wooley and Crateau 1985, Clugston et al 1995, Morrow et al. 1998, Heise et al. 1999, Sulak and Clugston 1999, Ross et al. 2000). Therefore, once Gulf sturgeon leave the river having spent at least six months in the river fasting, it is presumed that they immediately begin feeding. Upon exiting the rivers, Gulf sturgeon initially concentrate around the mouths of their natal rivers in lakes and bays; they then disperse into nearshore areas (including Passes) and continue to forage. Therefore, the nearshore foraging and migratory areas are very important for the Gulf sturgeon as they offer not only the first foraging opportunity for the Gulf sturgeon exiting the rivers, but also migratory pathways to winter habitat and, more rarely, to other rivers.

Few data have been collected on the food habits of Gulf sturgeon; their threatened status limits sampling efforts and gastric lavaging has only recently become successful (anal lavaging is being investigated). Gulf sturgeon have been described as opportunistic and indiscriminate benthivores; their guts generally contain benthic marine invertebrates including amphiopods, lancelets, polychaetes, gastropods, shrimp, isopods, molluscs, and crustaceans (Huff 1975, Mason and Clugston 1993, Carr et al. 1996, Fox et al. 2000, Fox et al. 2002). During the early fall and winter, immediately following downstream migration, Gulf sturgeon are most often located in nearshore (depth less than 20 feet) sandy areas that support burrowing macroinvertebrates, presumably foraging (Craft et al. 2001, Ross et al. 2001a, Fox et al. 2002, Parauka et al. in press).

Short-term (one month) impacts on benthic macroinvertebrates following dredging were investigated by comparing community structure in a Florida bayou pre- and post-dredging: a significant reduction in both density (of species and individuals) and diversity was recorded (Lewis et al. 2001); of particular interest was the predominance of polychaetes (relative abundance of 68% pre- to 23% post-disposal) prior to dredging being replaced by harpacticoid copepods (from 6% to 69%) (Lewis et al. 2001). Comparison of mollusks from dredged and non-dredged areas in Boga Ciega Bay, Florida indicated a much smaller number and diversity of species in the dredged canals that in non-dredged areas (Sykes and Hall 1970).

2. Water Quality

Water quality impacts as a result of dredging are expected to be temporary, with suspended particles settling out within a short time frame. These sediment disturbance impacts will be minimal in nature and will not have a measurable effect on water quality (or on sea turtles or Gulf sturgeon directly). Additionally, past sampling of water column and elutriate chemistry in various locations within the project area demonstrated that dredging is not likely to significantly impact water quality. Potential changes in salinity and tidal amplitude are expected to be minimal. NOAA Fisheries does not expect measurable impacts to Gulf sturgeon critical habitat as a result of water quality impacts related to this project.

3. Sediment Quality

Potential impacts to sediment quality as a direct result of dredging channel beds were considered in this Opinion. The composition of dredged material removed from the channel beds is expected to be the same as that remaining. Because this Opinion is only authorizing dredging to maintain channels at depths existing at the time of this consultation, regardless of depth previously authorized, the sediments removed from the channel beds should be similar to those in the surrounding area given that shoaling is a result of transport from nearby areas (consisting of soft materials). Therefore, it is unlikely that the materials removed from the channels considered in this Opinion are different in composition from those that would remain in the channel beds following dredging. The COE shall contact NOAA Fisheries if they believe or have evidence indicating, for any of the projects considered within this Opinion, that dredged material is not

compatible to that remaining in the channel beds in terms of grain size, color and composition. Therefore, NOAA Fisheries does not expect measurable impacts to Gulf sturgeon critical habitat as a result of sediment quality impacts related to these projects.

4. Migratory Pathways

Effects on migratory pathways as a PCE for units #8 and #11 were considered in this Opinion. These two units are known to support migratory pathways for Gulf sturgeon from at least three genetic subpopulations (Lake Pontchartain/Pearl River, Pascagoula River and Escambia/Yellow Rivers) and at least seven riverine subpopulations (Mississippi, Pascagoula, Pearl, Mobile, Choctawhatchee, Yellow, and Apalachicola Rivers) as groups of individuals from these subpopulations have been located by telemetry on numerous occasions within units #8 and #11 (Rogillio 1993, Ross et al. 2000, Ross et al. 2001b, Parauka et al. in press, F. Parauka USFWS pers. comm. 2002, Rogillio et al. in prep). Gulf sturgeon move through these two units for two main reasons: migration between winter and summer habitats (foraging along the way), and, more rarely, for inter-riverine movements. Because the hopper dredging associated with the project located in Gulf sturgeon critical habitat (Table 3) will be localized and not span the length/width of a unit, NOAA Fisheries concluded that the dredging events will not preclude passage through the migratory pathways by the Gulf sturgeon and therefore adequate area for migration will be available.

D. Effects of Relocation Trawling (Capture, Tag, and Release) in Association with Hopper Dredging

Relocation trawling has been successful at temporarily displacing Kemp's ridley, loggerhead, leatherback, and green sea turtles from channels and nearshore mining areas in the Atlantic and Gulf of Mexico (e.g., Thimble Shoals Channel, Virginia Beach, Virginia; Morehead City, Wilmington, and Bogue Banks, North Carolina; Charleston, South Carolina; Kings Bay, Georgia; Canaveral Entrance Channel, Tampa Bay, Charlotte Harbor, and St. Petersburg Harbor, Florida; MR-GO, Louisiana; Freeport Harbor, Aransas Pass, and Sabine-Neches Waterway, Texas) during periods when hopper dredging was imminent or ongoing. Some turtles captured during relocation trawling operations return to the dredge site and are subsequently recaptured. Sea turtle relocation studies by Standora et al. (1993) at Canaveral Channel relocated 34 turtles to six release sites of varying distances north and south of the channel. Ten turtles returned from southern release sites, and seven from northern sites, suggesting that there was no significant difference between directions. Return times observed suggested that there was a direct correlation between relocation distance and likelihood of return or length of return time to the channel when sea turtles were relocated to the south. No correlation was observed between the northern release sites and the time or likelihood of return. The study found that relocation of turtles to the site 70 km (43 miles) south of the channel would result in a return time of over 30 days.

REMSA, a private company contracted to conduct relocation trawling captured, tagged, and relocated 69 turtles in a 7-day period at Canaveral Channel in October 2002, with no recaptures; turtles were relocated a minimum of 3-4 miles away (Trish Bargo, REMSA, June 2, 2003 pers. comm. to Eric Hawk). Twenty-four hour per day relocation trawling conducted by REMSA at Aransas Pass Entrance Channel (Corpus Christi Ship Channel) from April 15, 2003, to July 7, 2003, relocated 71 turtles from ca 1.5-5 miles from the dredge site, with three recaptures (Trish Bargo, July 24, 2003 pers. comm. to Eric Hawk). One turtle released on June 14, 2003, around 1.5 miles from the dredge site, was recaptured four days later; another turtle released captured June 9, 2003, released about three miles from the dredge site was recaptured nine days later. Subsequent releases occurred five miles away. Of these 68 subsequent capture/releases, one turtle released on June 22, 2003 was recaptured 13 days later (REMSA Final Report, Sea Turtle Relocation Trawling, Aransas Pass, Texas, April-July 2003).

Prior to 1997, most relocation trawling in association with hopper dredging was performed by the Corps of Engineers under a NOAA Fisheries ESA section 10 incidental take/research permit. Since then, however, relocation trawling has primarily been conducted by private companies. In the last three years, Coastwise Consulting, Inc., has conducted over 132 days of relocation trawling at Morehead City, North Carolina; Charleston, South Carolina; and Kings Bay, Georgia (e-mail, C. Slay to E. Hawk, October 25, 2002). During the course of this work, at least 43 loggerheads, ten Kemp's ridleys, and one green turtle were successfully captured, tagged, and released. No dead or injured turtles were encountered and no captured turtles were recaptured during this work. Since around 1998, Coastwise Consulting has captured, tagged, and released approximately 80-90 turtles, with no evidence of injury or mortality (Pers. comm., C. Slay to E. Hawk, December 6, 2002). On the Atlantic coast, REMSA has also successfully tagged and relocated over 140 turtles in the last several years, most notably, 69 turtles (55 loggerheads and 14 greens) in a 7-day period at Canaveral Channel in October 2002, with no significant injuries. Other sea turtle relocation contractors (R. Metzger in 2001; C. Oravetz in 2002) have also successfully and non-injuriously trawl-captured and released sea turtles out of the path of oncoming hopper dredges. More recently in the Gulf of Mexico, REMSA captured, tagged, and relocated 71 turtles at Aransas Pass with no apparent long-term ill effects to the turtles. Three injured turtles captured were subsequently transported to University of Texas Marine Science Institute rehabilitation facilities for treatment (two had old, non-trawl related injuries or wounds; the third turtle may have sustained an injury to its flipper, apparently from the door chain of the trawl, during capture). Three of the 71 captures were recaptures–released around 1.5, three, and five miles, respectively, from the dredge site–and exhibited no evidence that their capture, tag, release, and subsequent recapture, was in any way detrimental.

The effects of this harassment of the turtles during capture and handling can result in raised levels of stressor hormones, and can cause some discomfort during tagging procedures. Based on past observations obtained during similar research-trawling for turtles, these effects are expected to dissipate within a day (Stabenau and Vietti 1991). Since turtle recaptures are rare, and recaptures that do occur typically happen several days to weeks after initial capture, cumulative adverse effects of recapture are not expected.

Rarely, even properly conducted relocation trawling can result in accidental sea turtle deaths. Henwood (pers. comm. to E. Hawk, December 6, 2002) noted that trawl-captured loggerhead sea turtles died on several occasions during handling on deck during winter trawling in Canaveral Channel in the early 1980s, after short (approximately 30-minute) tow times. However, Henwood also noted that a significant number of the loggerheads captured at Canaveral during winter months appeared to be physically stressed and in "bad shape" compared to loggerheads captured in the summer months from the same site, which appeared much healthier and robust. Stressed turtles or unhealthy turtles or turtles exposed to repeated forced submergences are more likely to be injured or killed during relocation trawling than healthy turtles.

In November 2002, during relocation trawling conducted in York Spit, Virginia, a Kemp's ridley sea turtle was likely struck by one of the heavy trawl doors or it may have been struck and killed by another vessel shortly before trawl net capture. The hopper dredge was not working in the area at the time (pers. comms. and e-mails, P. Bargo to E. Hawk, December 6 and 9, 2002).

NOAA Fisheries typically limits tow times for relocation trawling to 42 minutes or less measured from the time the trawl doors enter the water when setting the net to the time the trawl doors exit the water during haulback ("doors in - doors out"). The National Research Council report "Decline of the Sea Turtles: Causes and Prevention" (NRC 1990) suggested that limiting tow durations to 40 minutes in summer and 60 minutes in winter would yield sea turtle survival rates that approximate those required for the approval of new TED designs, i.e., 97%. The NRC report also concluded that mortality of turtles caught in shrimp trawls increases markedly for tow times greater than 60 minutes. Current NOAA Fisheries' TED

regulations allow, under very specific circumstances, for shrimpers with no mechanical-advantage trawl retrieval devices on board, to be exempt from Federal TED requirements if they limit tow times to 55 minutes during April through October and 75 minutes from November through March. The presumption is that these tow time limits will result in turtle survivability comparable to having TEDs installed.

The Gulf and South Atlantic Fisheries Development Foundation's August 31, 1998, "Alternatives to TEDs: Final Report," presents data on 641 South Atlantic shallow tows (only one tow was in water over 15 fathoms [27.4 m]), all conducted under restricted tow times (55 minutes during April through October and 75 minutes from November through March), and 584 Gulf of Mexico nearshore tows conducted under the same tow time restrictions. Offshore effort in the Gulf of Mexico consisted of 581 non-time restricted tows which averaged 7.8 hours per tow. All totaled, 323 turtle observations were documented: 293 in the nearshore South Atlantic efforts, and 30 in the Gulf efforts (24 nearshore and six offshore). Of the 293 South Atlantic turtles (219 loggerhead, 68 Kemp' ridley, five green, and one leatherback), only 274 were used in the analyses (201 loggerhead, 67 Kemp's ridley, five green, and one leatherback) because 12 escaped from the nets after being seen and seven were caught in try nets. Of the 274 South Atlantic turtles captured using restricted tow times, only five loggerheads and one Kemp's ridley died because of the interaction. For the Gulf efforts, 26 turtles (eight loggerhead, 16 Kemp's ridley, two green) were captured, resulting in three mortalities (one loggerhead inshore, one loggerhead and one green offshore). Excluding all six offshore tows and both offshore mortalities (because of the prolonged, non-restricted tow times), we are left with 1,225 time-restricted tows (584 + 641) resulting in 298 trawl-captured turtles (274 + 24) resulting in seven mortalities, i.e., 2.3% of the interactions resulted in death.

In summary, NOAA Fisheries believes that properly conducted and supervised relocation trawling (i.e., observing trawl speed and tow-time limits, and taking adequate precautions to release captured animals) and tagging is unlikely to result in adverse effects to sea turtles. NOAA Fisheries estimates that, overall, sea turtle trawling and relocation efforts will result in considerably less than 0.5% mortality of captured turtles, primarily due to their being previously stressed or diseased or if struck by trawl doors or accidents on deck. On the other hand, hopper dredge entrainments invariably result in injury, and are almost always fatal. In the present Opinion, NOAA Fisheries requires relocation trawling and tagging as methods of reducing sea turtle entrainment in hopper dredges and to document the effects of relocation trawling, according to criteria defined in the ITS.

<u>Effects and desirability of tagging relocated animals:</u>
Tagging prior to release will help us learn more about the habits and identity of these trawl-captured animals after they are released; and if they are recaptured will enable improvements in relocation trawling design to further reduce the effect of the take. External and internal flipper tagging (e.g., with Inconel and PIT tags) are not considered dangerous procedures by the sea turtle research community; are routinely done by thousands of volunteers in the United States and abroad; and can be safely accomplished with minimal training. NOAA Fisheries knows of no instance where flipper tagging has resulted in mortality or serious injury to a trawl-captured sea turtle. Such an occurrence would be extremely unlikely because the technique of applying a flipper tag is minimally traumatic and relatively non-invasive; in addition, these tags are attached using sterile techniques. Important growth, life history, and migratory behavior data may be obtained from turtles captured and subsequently relocated. Therefore, these turtles should not be released without tagging (and scanning for pre-existing tags).

Collection of tissue samples: Tissue sampling is performed to determine the genetic origins of captured sea turtles, and learn more about their nesting beach/population origins. This is important information because some populations, e.g., the northern subpopulation of loggerheads nesting in the Southeast Region, may be declining. For all tissue sample collections, a sterile 4- to 6-mm punch sampler is used. Researchers who

examined turtles caught two to three weeks after sample collection noted that the sample collection site was almost completely healed (Witzell, pers. comm.). NOAA Fisheries does not expect that the collection of a tissue sample from each captured turtle will cause any additional stress or discomfort to the turtle beyond that experienced during capture, collection of measurements, and tagging. Tissue sampling procedures are specified in the terms and conditions of this Opinion.

E. Effects of Dredged Material Disposal on Sea Turtles, Gulf Sturgeon, and Critical Habitat

NOAA Fisheries has reviewed the maintenance dredging projects that occur in the Gulf of Mexico on a recurring basis (see Proposed Action section for by-District project descriptions) and the disposal sites and methods which the COE uses to dispose of dredged material. Typically, dredged materials from channel maintenance dredging activities are disposed of down current of the navigation channels being maintained (by agitation dredging and sidecasting), or in designated disposal areas which are adjacent to and run approximately parallel to the navigation channels, or in nearby designated offshore disposal areas (to minimize transit time of the hopper dredge to and from the dredging site). Alternatively, they are used beneficially for barrier island restoration and creation of island, wetland, marsh, and shallow-water habitats, or to renourish eroded mainland beaches. With the exception of disposal of dredged materials within designated Gulf sturgeon critical habitat (which is not considered in this Opinion and must be consulted on individually by each COE District for projects under their respective permitting authority), NOAA Fisheries believes that disposal activities currently being conducted, and proposed to be continued, by the Galveston District, New Orleans District, Mobile District, and Jacksonville District are unlikely to adversely affect sea turtles or Gulf sturgeon. These species are highly mobile and should be able to easily avoid a descending sediment plume discharged at the surface by a hopper dredge opening its hopper doors, or pumping its sediment load over the side. This Opinion does not allow disposal actions within foraging habitat areas designated as Gulf sturgeon critical habitat. NOAA Fisheries also believes that foraging habitat for sea turtles is not likely a limiting factor in the Gulf of Mexico COE Districts and thus the temporary removal of relatively small areas (compared to remaining foraging habitat) of potential foraging habitat by burial with dredged material sediment will not measurably adversely affect sea turtles. Furthermore, large portions of areas routinely dredged by the New Orleans District in the MR-SWP and associated disposal sites are not suitable foraging habitat for sea turtles because of high freshwater flows. As well, typical nearshore areas of the Gulf of Mexico that are routinely renourished (e.g., west Florida beaches of Pinellas, Sarasota, Lee Counties), or might be renourished, or are being considered for renourishment (e.g., Orange Beach/Gulf Shores, Alabama) are not considered by NOAA Fisheries to be of particularly significant or essential foraging value to sea turtles. Turtles will typically forage further offshore where non-ephemeral limestone ledges supporting algal/sponge growth are located. These ledges are not routinely covered by shifting sands, as they are prone to in the high wave-energy nearshore environment. Foraging habitat for Gulf sturgeon, recognized with the designation of critical habitat, will not be adversely affected by this action. Furthermore, beach renourishment projects typically affect yearly only a minute portion of the many hundreds of miles of Gulf of Mexico nearshore beach environment available for foraging sea turtles.

COE District disposal activities (principally, Jacksonville District COE) which involve renourishing beaches where sea turtles nest are consulted on by the U.S. Fish and Wildlife Service because sea turtles on land fall under the purview of that agency. NOAA Fisheries believes that deposition of dredged materials on the beach or in the littoral nearshore environment for beach renourishment and creation of island, wetland, marsh, and shallow-water habitats in the Gulf of Mexico by any of the COE Districts during beach restoration or habitat restoration projects (excepting disposal in designated Gulf sturgeon critical habitat) described in the Proposed Action section of this Opinion, and similar actions, will not adversely affect sea turtles or Gulf sturgeon and may ultimately be of benefit to them if restoration efforts are successful. Nearshore habitats for foraging sea turtles and Gulf sturgeon are present in sufficient quantities such that

removal of relatively small portions of potential foraging habitat will not cause measurable adverse effects on sea turtles or Gulf sturgeon.

Disposal Effects on Benthos

Sediment composition is a cardinal factor in controlling the settlement and viability of many marine invertebrates (Thorson 1956). In addition, benthic recovery is dependent on time of year. Placement of materials similar to ambient sediments (e.g., sand on sand or mud on mud) has been shown to produce less severe impacts in contrast to placement of dissimilar sediments, which generally results in more severe, long-term impact (Maurer et al. 1978, 1986). Deposition of relatively thin layers of dredged material (<10 cm; 4 in) can minimize impacts by allowing many populations of small, shallow-burrowing infauna with characteristically high reproductive rates and wide dispersal capabilities to recover quickly. Deposits greater than 20-30 cm (8-12 in) generally eliminate all but the largest and most vigorous burrowers (Maurer et al. 1978).

Observed rates of benthic community recovery after dredged material placement range from a few months to several years. The relatively species-poor benthic assemblages associated with low salinity estuarine sediments can recover in periods of time ranging from a few months to approximately one year (Leathem et al. 1973, McCauley et al. 1976, 1977, Van Dolah et al. 1979, 1984, Clarke and Miller-Way 1992), while the more diverse communities of high salinity estuarine sediments may require a year or longer (e.g., Jones 1986, Ray and Clarke 1999). Recovery rates for sandy inshore marine sites, should be similar to those reported for high salinity estuarine sites (Oliver et al. 1977, Richardson et al. 1977, Haskin et al. 1978, Van Dolah et al. 1984) if the overburden is comprised of similar sediments.

Most of what is known about the species specific recovery/recolonization of benthic communities following dredge material placement in the Gulf of Mexico is the result of work by Rakocinski et al. (1991, 1993, 1996); others (e.g., Dixon and Pilkey 1991, Nelson 1993) have focused on benthic recovery following beach restoration. Generally recovery/recolonization is dependent upon sediment-type, time, depth of overburden, depth, proximity to beach. One long-term (two year) study monitored recovery and concluded that while recolonization occurred, the macrobenthic community structure was different and wide fluctuations between stations was present two years post-event (Rakocinski et al. 1996).

NOAA Fisheries concludes that the effects of dredged material disposal on benthic communities is unlikely to adversely affect sea turtles or Gulf sturgeon.

Disposal Effects on Gulf Sturgeon Critical Habitat

No disposal within Gulf sturgeon critical habitat is authorized in this Opinion (see section entitled "Description of the Action Area and Proposed Action"). Therefore, NOAA Fisheries concludes that there are no disposal effects on Gulf sturgeon critical habitat.

F. Anticipated Incidental Take Levels Predicted for Each COE District:

While it is impossible to ascertain the exact number of future take of sea turtles and Gulf sturgeon, NOAA Fisheries bases the estimated anticipated take levels on the following data:

1. Previous sea turtle takes associated with hopper dredging during Gulf of Mexico maintenance dredging and sand mining operations by the COE's New Orleans, Galveston, and Jacksonville Districts (Mobile District has previously not had observers on hopper dredges so the historic level of incidental take, if any, is unknown);

2. The level of take anticipated in previous Opinions;

3. The distribution and abundance of sea turtles and Gulf sturgeon in the Gulf of Mexico;

4. COE adherence to dredging windows;

5. The magnitude of, and operational measures (including relocation trawling) employed by, individual dredging projects;

6. Documented sturgeon take by dredges on the Atlantic coast;

7. The number and description of the hopper dredging projects provided by each District; and

8. The proportion of known reproducing populations of Gulf sturgeon (total = 7) geographically located within each District.

Fresh Takes vs. Decomposed Takes

The incidental level of both sea turtle and Gulf sturgeon take is anticipated to consist of "fresh dead" animals. However, NOAA Fisheries realizes that dredging may produce an additional unquantifiable number of "previously dead" sea turtles or turtle parts. While decomposed animals taken in Federal operations are considered to be takes (the possession of a listed species is considered a take), NOAA Fisheries recognizes that decomposed sea turtles whose deaths were not necessarily related to the present activity may be entrained by the dredge. Theoretically, if dredging operations are conducted properly, no takes of sea turtles should occur since the turtle draghead defector should push the turtles to the side and the suction pumps should be turned off whenever the dredge draghead is away from the substrate. However, due to certain environmental and other conditions (e.g., rocky bottom, uneven substrate, sea swells, draghead operator error, clogged dragheads, etc.), the dredge dragheads may periodically lift off the bottom and draw in any other previously dead sea turtles or turtle parts it may encounter. Reviews of observer records reveal that entrainment of old turtle bones during hopper dredging operations occasionally occurs. Therefore, takes of decomposed listed species shall be evaluated on a case-by-case basis by NOAA Fisheries; these takes, depending upon the circumstances, may or may not be ascribed to the ongoing dredging operation and may or may not be counted towards the anticipated take level.

NOAA Fisheries relies heavily on the unbiased reports of the onboard endangered species observer and other sources of information (such as commercial fisheries operating in the area) when determining take of a listed species. Provided that NOAA Fisheries concurs with the COE's determination regarding the stage of decomposition, condition of the specimen, and ultimately the likely cause of mortality, the take may or may not be attributed to the incidental take level for a project. Similarly, sometimes parts of one dismembered turtle are taken in separate loads, sometimes several days apart; if the parts are a good "match" and appear to be from the same animal, NOAA Fisheries will likely determine that only a single turtle was taken. Also, turtles or sturgeon may strand near dredging operations, bearing marks or damage which could be construed as evidence of hopper dredge entrainment. NOAA Fisheries shall study these situations carefully in consultation with the affected COE Districts and Sea Turtle Stranding and Salvage Network (STSSN) personnel before reaching a determination on whether or not to count these as takes.

Take levels for the Galveston and New Orleans Districts are expected to remain identical to those established in the September 22, 1995, RBO, except that Gulf sturgeon takes will now be authorized for the New Orleans District. Since the RBO was issued, neither District has met or exceeded the established annual incidental take level (although the New Orleans District in July 2001 reinitiated consultation with

NOAA Fisheries when high turtle take levels in the MR-GO resulted in the District reaching 75% of its authorized take level of loggerhead sea turtles). NOAA Fisheries believes that the previously established anticipated take levels are still valid; however, one Gulf sturgeon will be added to the New Orleans District take limit where previously there was none, because NOAA Fisheries believes that there is a significant possibility that a Gulf sturgeon will be taken by a New Orleans District hopper dredge in the future. No Gulf sturgeon takes will be added to the Galveston District's take limit because Gulf sturgeon are not known to occur in the Galveston District.

Sea turtles and Gulf sturgeon may occur within the Mobile District's navigation channels and sand mining areas. Hopper dredge use by the Mobile District has occurred regularly in the past, but without observers to document potential sea turtle or Gulf sturgeon entrainment. Currently, a NOAA Fisheries' biological opinion does not exist to authorize potential takes during Mobile District hopper dredging activities. Although no take of listed turtles or sturgeon in the Mobile District have been reported to NOAA Fisheries, this is believed to be a reflection of the lack of observers present to monitor incoming dredged material for turtle and sturgeon parts. The present Opinion anticipates a limited amount of take for sea turtles and Gulf sturgeon by the Mobile District.

The Jacksonville District may incidentally take sea turtles and Gulf sturgeon in their hopper dredging operations west and north of Key West, Florida (takes in Key West channels are covered by the existing September 25, 1997, RBO to the COE's SAD); therefore, a take limit must be set for the Jacksonville District's Florida West Coast hopper dredging projects (Key West [excluding Key West navigation channels] to Aucilla River Basin [including the Aucilla River], Florida). The biennial incidental take level established for sea turtles and Gulf sturgeon in the October 1999 Charlotte Harbor Opinion will be subsumed into the Jacksonville District's Florida West Coast take level established in the present Opinion.

Anticipated Gulf-wide Take of Sea Turtles and Gulf Sturgeon by Hopper Dredges:

For the entire Gulf of Mexico from the U.S.-Mexico border to Key West, the annual documented COE incidental take per fiscal year, by injury or mortality, is expected to consist of twenty (20) Kemp's ridley turtles, fourteen (14) green turtles, four (4) hawksbill turtles, forty (40) loggerhead turtles, and four (4) Gulf sturgeon. This take level represents a total take per fiscal year for all channel dredging and sand mining by hopper dredges in the Gulf of Mexico by the COE's Galveston, New Orleans, Mobile, and Jacksonville Districts collectively.

Galveston District
For the Galveston District, the annual documented incidental take, by injury or mortality, is expected to consist of seven (7) Kemp's ridleys, five (5) green turtles, one (1) hawksbill, and fifteen (15) loggerhead turtles per fiscal year for all channel dredging and sand mining by hopper dredge in the Galveston District. This level of take represents the same level of take authorized by the previous Opinion.

New Orleans District
For the New Orleans District, the documented annual incidental take, by injury or mortality, is expected to consist of seven (7) Kemp's ridleys, three (3) green turtles, one (1) hawksbill, and fifteen (15) loggerhead turtles, and one (1) Gulf sturgeon per fiscal year for all channel dredging and sand mining by hopper dredge in the New Orleans District. As in the previous Opinion, a greater number of green turtles is included in the incidental take level predicted for the Galveston District due to the greater abundance of green turtles in south Texas waters.

Mobile District (Florida Panhandle west of Aucilla River Basin to, but not including, the Mississippi River)
For the Mobile District, the documented annual incidental take, by injury or mortality, is expected to consist of three (3) Kemp's ridley, three (3) green turtles, one (1) hawksbill, five (5) loggerhead turtles, and two (2) Gulf sturgeon per fiscal year for all channel dredging and sand mining by hopper dredge in the Mobile District. A greater number of Gulf sturgeon is included in the incidental take level predicted for the Mobile District than the New Orleans District due to the larger proportion of reproducing populations of of Gulf sturgeon in the former District.

Jacksonville District (Florida West Coast: Aucilla River Basin to, but not including, Key West)
For the Jacksonville District, the documented annual incidental take, by injury or mortality, is expected to consist of three (3) Kemp's ridleys, three (3) green turtles, one (1) hawksbill, five (5) loggerhead turtles, and one (1) Gulf sturgeon per fiscal year for all channel dredging and sand mining by hopper dredge in the Jacksonville District west of Key West (hopper dredging of Key West navigation channels is covered under the existing regional hopper dredging RBO to the COE's SAD).

Anticipated Takes of Sea Turtles and Gulf Sturgeon through Relocation Trawling:

Though not included by the COE as an integral part of the proposed action, this Opinion will require the use of relocation trawling as a reasonable and prudent measure (RPM) to reduce the effect of take of turtles by hopper dredges. Even though relocation trawling involves directed take of turtles, it constitutes a legitimate RPM because it reduces the level of almost certain lethal and injurious take of sea turtles by hopper dredges, and allows the turtles captured non-injuriously by trawl to be relocated out of the path of the dredges. The Consultation Handbook (for Procedures for Conducting Consultation and Conference Activities Under Section 7 of the Endangered Species Act, U.S. Fish and Wildlife Service and National Marine Fisheries Service, March 1998) expressly authorizes such directed take as an RPM at page 4-54. Therefore, NOAA Fisheries will in this section evaluate the expected level of turtle take through required relocation trawling, so that these levels can be included in the evaluation of whether the proposed action will jeopardize the continued existence of the species.

Between October 1, 2002, and the present, approximately 80 sea turtles have been relocated in association with Gulf of Mexico hopper dredging projects, including projects at Aransas Pass, Brownsville Entrance Channel, and the MR-GO, by contract trawlers. Although 2002 was the first year the Galveston District conducted relocation trawling in association with some of its hopper dredging projects, henceforth the District will require mandatory 24-hr/day relocation trawling in association with all dredging projects within the District (Rob. Hauch, pers. comm. to E. Hawk, July 22, 2003).

NOAA Fisheries estimates that yearly relocation trawling in all of the navigation channels and sand mining areas of the Gulf of Mexico will take no more than 300 loggerhead, green, hawksbill, and Kemp's ridley sea turtles, and eight (8) Gulf sturgeon. This number is based on past recent history of relocation trawler takes in the Gulf of Mexico, information on Gulf sturgeon takes by shrimp trawlers at Gulf of Mexico barrier island passes (H. Rogillio, pers. comm. to Eric Hawk), the possibility that the events at Aransas Pass (where 70+ turtles were captured in 10 weeks during 2003) will repeat in other places in the Gulf of Mexico (perhaps simultaneously), increased presence of sea turtles in coastal waters as turtle populations recover and new TED regulations take effect leading to increased trawl capture rates, increased relocation trawling efforts in the Gulf of Mexico spurred in part by this summer's trawling success at Aransas Pass and MR-GO, the Galveston District's stated intent to conduct relocation trawling during on all their future District dredging projects (Rob Hauch, pers. comm. to Eric Hawk), probable increases in Gulf of Mexico summertime dredging when water temperatures are warmer and sea turtles are more abundant, and predicted relocation trawling captures by COE Districts in the Gulf of Mexico that have never before done

so (i.e., Mobile District). As stated in the Reasonable and Prudent Measures, and Terms and Conditions of this ITS, relocation trawling is required under specific circumstances. This relocation trawling may result in sea turtle and Gulf sturgeon takes, but these takes are not expected to be injurious or lethal due to the short duration of the tow times (15 to 30 minutes per tow; not more than 42 minutes, as per Term and Condition No. 15) and required safe-handling procedures.

Estimated turtle take is derived as follows: In FY03, Shoreline Consulting captured 1-2 turtles at Aransas Pass, REMSA captured 71 turtles at Aransas Pass, relocation trawling at Brownsville Entrance Channel captured at least five more, and relocation trawling at the MR-GO captured seven in 2 ½ weeks, for a FY03 total of 85 turtles. However, if Galveston District dredged two large projects simultaneously in the summer, they could conceivably more than double the numbers taken this year. The three remaining COE Districts in the Gulf of Mexico would also be likely to be simultaneously conducting relocation trawling on some of their projects. Also, some major navigation projects have not been dredged in years and are due (e.g., Tampa Bay), as are minor projects known to take sea turtles (e.g., St. Petersburg Harbor). NOAA Fisheries arrived at the estimate of 300 potential sea turtle trawl captures yearly by Gulf of Mexico relocation trawlers by doubling the amount taken this year at Aransas Pass on the assumption that two large projects in the summer would take twice as many as one (73 x 2 = 146), then doubling it again to account for all the other uncertainties including increasing turtle populations, increased effectiveness of the larger TED escape openings, increased acceptance and use of relocation trawling, increased summer time trawling, increasing number of beach renourishment projects in the Gulf of Mexico.(146 x 2= 294), then rounding to 300 to allow an extra margin for error.

Sturgeon takes are estimates based on reports of Gulf sturgeon take by trawlers operating near Gulf of Mexico barrier island passes (H. Rogillio, pers. comm. to E. Hawk, 2002) and reports of gillnet interactions with Gulf sturgeon near passes where Gulf sturgeon are known to congregate in winter.

G. Summary of Effects of the Proposed Action on Sea Turtles, Gulf Sturgeon, and Gulf Sturgeon Critical Habitat

Stranding information indicates that sea turtle aggregations are found in the vicinity of Gulf of Mexico navigation channels and that sea turtles are present in nearshore Gulf coastal waters year-round. The previous NOAA Fisheries Opinion governing hopper dredging in the northern and western Gulf of Mexico (NMFS 1995) noted that shallow, warm, nearshore waters in the northern Gulf of Mexico provide prime Kemp's ridley habitat until cooling waters force turtles offshore or south along the Florida and southwest Texas coast. Generally, Kemp's ridleys were observed in water depths of less than 18 m and surface water temperatures greater than 12°C. Based on the year-round presence of sea turtles, seasonal presence of Gulf sturgeon in navigation channels and barrier island passes, sea turtles' potential presence at sand mining sites in proximity to hardgrounds, and the documented takes of sea turtles at sand mining sites in North Carolina, South Carolina, and Florida, it can be expected that future maintenance dredging and dredging for beach renourishment purposes with hopper dredges in the action area will occasionally capture and entrain sea turtles and Gulf sturgeon incidental to the proposed dredging activities. Most of these entrainments can be expected to result in death of the individuals overtaken by the draghead.

In addition to hopper dredge takes, NOAA Fisheries anticipates that sea turtles may be taken by bed-leveler type dredges. The Brunswick Harbor report received in July 2003 is the first report that NOAA Fisheries received indicating a possible link between bed-leveling mechanical dredging and sea turtle takes. Although there are no confirmed reports to date which definitively implicate bed-levelers with sea turtle takes, NOAA Fisheries believes, based on the Brunswick Harbor report, that a significant possibility exists that bed-leveling mechanical dredging may kill sea turtles during leveling/cleanup operations associated

with hopper dredging projects not only at Brunswick Harbor, but also in Gulf of Mexico channels and dredged-material deposition areas where bed-levelers are used. Following the Brunswick Harbor report, NOAA Fisheries issued a biological opinion on September 11, 2003, to the Savannah District COE to allow the use of bed-leveling mechanical dredging devices during the Brunswick Harbor deepening project. That Opinion anticipated and established an incidental take of sea turtles pursuant to the proposed action. In the Gulf of Mexico, NOAA Fisheries will use STSSN observer reports and evidence from strandings in proximity of dredging projects where bed-levelers are being used to determine if sufficient evidence exists to indicate that a turtle was killed by a bed-leveler. If compelling STSSN observer reports and evidence indicate that a turtle was killed by a bed-leveling type dredge, that take will be deducted from the ITS' anticipated take level for that COE District where the take occurred.

NOAA Fisheries anticipates that for the entire Gulf of Mexico from the U.S.-Mexico border to Key West, not including Key West, endangered species observers aboard COE hopper dredging operations, and STSSN personnel indirectly monitoring bed-leveler type dredging, will document the take yearly, by injury or mortality, of a maximum of approximately 40 loggerhead turtles, 20 Kemp's ridley turtles, 14 green turtles, four hawksbill turtles, and four Gulf sturgeon, and of a maximum of 300 turtles and eight Gulf sturgeon taken non-injuriously by relocation trawling. These estimates are based on factors such as documented average and maximum yearly takes during previous years, variability in sea turtle abundance and distribution, annual maintenance dredging schedules, anticipated increases in beach nourishment projects, and anticipated takes established in previous Opinions. To be conservative and account for listed species which may be taken but not documented, NOAA Fisheries assumes that an equal number of sturgeon and turtles are killed by being crushed by the deflector dragheads but are not entrained and thus are not documented, or are entrained in fragments and are not detected by hopper dredge endangered species observers, or takes occur during periods when hopper dredge endangered species observers are not required or are not present. Thus, a maximum estimate of 80 loggerhead turtles, 40 Kemp's ridleys, 28 green turtles, eight hawksbill turtles, and eight Gulf sturgeon may be killed or injured annually in COE Gulf of Mexico hopper dredging operations. NOAA Fisheries estimates that 0-2 turtles and 0-1 Gulf sturgeon will be killed or injured annually pursuant to annual relocation trawling in the Gulf of Mexico.

With the exception of the northern nesting population of loggerheads, nesting for loggerheads, Kemp's ridley, and green sea turtles has been increasing or remaining stable in the southeast United States and (in the case of Kemp's ridleys) Rancho Nuevo, Mexico, given all of the ongoing impacts to these species which includes takes through maintenance dredging and sand mining using hopper dredges. Based on information presented in the Environmental Baseline section of this Opinion, the increase in TED opening sizes associated with the final rule, published in the *Federal Register* on February 21, 2003, (68 FR 8456) is expected to allow the northern nesting population of loggerheads to increase, though all sea turtle species in the Gulf of Mexico, and Gulf sturgeon, will benefit from the enlarged openings which will enhance escapement. Similarly, the population of Gulf sturgeon appears to be stable or increasing, and recent designation of critical habitat should further aid its recovery. Except for the Mobile District which previously has not had an Opinion authorizing incidental take (though NOAA Fisheries suspects takes none-the-less occurred), the proposed action does not constitute a significant increase in the authorized take, particularly injurious or lethal take, of sea turtles or Gulf sturgeon above levels associated with past and ongoing authorized maintenance dredging and sand mining activities involving the use of hopper dredging. Further, these take levels are very small compared to other activities, such as shrimping, other commercial fisheries, and vessel collisions, which are much greater sources of sea turtle and Gulf sturgeon take and mortality. Therefore, NOAA Fisheries believes that this level of anticipated take is not likely to alter the positive population trajectories of any of these species.

Finally, the critical habitat analysis that NOAA Fisheries conducted to investigate potential project impacts to PCEs within units #8 and #11 concluded that impacts from the project would not have a measurable effects on water quality, sediment quality, migratory pathways or prey availability. This conclusion was dependent upon two important parameters: 1) channels would only be maintained, not improved, and 2) sediments removed from the channel bed would not be different from those remaining; therefore available habitat would not be modified.

6.0 Cumulative Effects

Cumulative effects are the effects of future state, local, or private activities that are reasonably certain to occur within the action area or within the range of sea turtles. Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Within the action area, major future changes are not anticipated in the ongoing human activities described in the environmental baseline. The present, major human uses of the action area are expected to continue at the present levels of intensity in the near future. Listed species of turtles, however, migrate throughout the Atlantic Ocean and Gulf of Mexico and may be affected during their life cycles by non-Federal activities outside the action area.

Throughout the coastal Gulf of Mexico the loss of thousand of acres of wetlands is occurring due to natural subsidence and erosion, as well as reduced sediment input from the Mississippi River. Impacts caused by residential, commercial, and agricultural developments appear to be the primary causes of wetland loss in Texas.

Oil spills from tankers transporting foreign oil, as well as the illegal discharge of oil and tar from vessels discharging bilge water, will continue to affect water quality in the Gulf of Mexico. Cumulatively, these sources and natural oil seepage contribute most of the oil discharged into the Gulf of Mexico. Floating tar sampled during the 1970s, when bilge discharge was still legal, concluded that up to 60% of the pelagic tars sampled did not originate from northern Gulf of Mexico coast.

Marine debris will likely persist in the action area in spite of national and international treaty prohibitions. In Texas and Florida, approximately half of the stranded turtles examined have ingested marine debris (Plotkin and Amos 1990, Bolten and Bjorndal 1991). Although few individuals are affected, entanglement in marine debris may contribute more frequently to the death of sea turtles.

Coastal runoff and river discharges carry large volumes of petrochemical and other contaminants from agricultural activities, cities, and industries into the Gulf of Mexico. The coastal waters of the Gulf of Mexico have more sites with high contaminant concentrations than other areas of the coastal United States due to the large number of waste discharge point sources. The species of turtles analyzed in this Opinion may be exposed to and accumulate these contaminants during their life cycles. A few (n=12) Gulf sturgeon have been analyzed for pesticides and heavy metals (Bateman and Brim 1994). Each individual fish had concentrations of arsenic, mercury, DDT metabolites, toxaphene, polycyclic aromatic hydrocarbons and aliphatic hydrocarbons high enough to warrant concern (USFWS et al. 1995). Specific sources were not identified.

Beachfront development, lighting, and beach erosion control all are ongoing activities along the Atlantic and Gulf coasts. These activities potentially reduce or degrade sea turtle nesting habitats or interfere with hatchling movement to sea. Nocturnal human activities along nesting beaches may also discourage sea

turtles from nesting sites. The extent to which these activities reduce sea turtle nesting and hatchling production is unknown. However, as conservation awareness spreads, more and more coastal cities and counties are adopting more stringent measures to protect hatchling sea turtles from the disorienting effects of beach lighting.

Because many activities that affect marine habitat involve some degree of Federal authorization (e.g., through MMS or COE), NOAA Fisheries expects that ESA section 7 will apply to most major, future actions that could affect designated Gulf sturgeon critical habitat.

State-regulated commercial and recreational fishing activities in Atlantic Ocean and Gulf of Mexico waters currently result in the incidental take of threatened and endangered species. It is expected that states will continue to license/permit large vessel and thrill-craft operations which do not fall under the purview of a Federal agency, and issue regulations that will affect fishery activities. Any increase in recreational vessel activity in inshore and offshore waters of the Gulf of Mexico and Atlantic Ocean will likely increase the number of turtles taken by injury or mortality in vessel collisions. Recreational hook-and-line fisheries have been known to lethally take sea turtles. Future cooperation between NOAA Fisheries and the states on these issues should help decrease take of sea turtles caused by recreational activities. NOAA Fisheries will continue to work with coastal states to develop and refine ESA section 6 agreements and section 10 permits to enhance programs to quantify and mitigate these takes.

7.0 Conclusion

The current status of sea turtle and Gulf sturgeon populations is not likely to be appreciably affected by hopper dredging operations in the action area, as has been described in detail in Sections 3.0 and 5.0 of this Opinion. In summary, NOAA Fisheries believes that the current status of sea turtle and Gulf sturgeon populations is stable or increasing and that hopper dredge-related take levels anticipated in the Effects of the Action (Section 5) and ITS of this Opinion will not change that conclusion. NOAA Fisheries acknowledges that documented takes represent partial estimates of total takes and believes that some takes may pass undetected by observers through inflow screening devices, due to the force of the water pressure, or because the animals are killed but not entrained; NOAA Fisheries estimates that unseen (thus, undocumented) takes represent roughly 50% of total documented takes and has evaluated the effects of the action including the expected undocumented takes.

It is also NOAA Fisheries' biological opinion that following the maintenance dredging of the channels (to existing depths only without improvements) the benthic community structure will return to, or return nearly to, pre-dredging status (i.e., species diversity, species richness, species abundance) with some inherent natural variability. Those benthic prey species will then be available for the conservation of Gulf sturgeon. NOAA Fisheries also concludes that the project will not impact water quality, sediment quality, or migratory pathways essential to the conservation of Gulf sturgeon. Therefore, NOAA Fisheries concludes that, when channels within designated critical habitat are dredged to only their current depth, without improvements (i.e., deepening or widening), the project will not destroy or adversely modify designated Gulf sturgeon critical habitat.

After reviewing the current status of sea turtles and Gulf sturgeon in the Gulf of Mexico; the environmental baseline for the action area; the effects of the proposed hopper dredging activities; and the cumulative effects of future state, local, or private actions that are reasonably certain to occur in the action area considered in this Opinion, it is NOAA Fisheries' biological opinion that the COE's hopper dredging activities, as proposed and described in the Proposed Action section of this Opinion, are not likely to

jeopardize the continued existence of any listed species or destroy or adversely modify designated Gulf sturgeon critical habitat.

8.0 Incidental Take Statement

Section 9 of the ESA and Federal regulations issued pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2) of the ESA, taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of an Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the Galveston, New Orleans, Mobile, and Jacksonville COE Districts so that they become binding conditions of any grant or permit issued to Gulf of Mexico hopper dredge operators for the exemption in section 7(o)(2) to apply. The COE has a continuing duty to regulate the activity covered by this incidental take statement. If the COE (1) fails to assume and implement the terms and conditions, or (2) fails to require the hopper dredge operators to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) will lapse. In order to monitor the impact of incidental take, the COE must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement. [50 CFR 402.14(i)(3)].

Only incidental take resulting from the agency action, including incidental take 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 take prohibition of section 9(a) of the ESA.

Based on results of previous hopper dredging activities including dredging of Gulf of Mexico and southeastern U.S. channels, NOAA Fisheries foresees that future hopper dredging activities in U.S. Gulf of Mexico navigation channels and sand mining areas may result in the injury or mortality of loggerhead, Kemp's ridley, hawksbill, and green turtles, and Gulf sturgeon. A level of incidental take is anticipated; therefore, terms and conditions necessary to minimize and monitor takes are established.

Anticipated Gulf-wide Take by Hopper Dredging Activities:

For the entire Gulf of Mexico from the U.S.-Mexico border to Key West, the annual documented COE incidental take per fiscal year, by injury or mortality, is expected to consist of twenty (20) Kemp's ridley turtles, fourteen (14) green turtles, four (4) hawksbill turtles, forty (40) loggerhead turtles, and four (4) Gulf sturgeon. This take level represents a total take per fiscal year for all channel dredging and sand mining by hopper dredges in the Gulf of Mexico by the COE's Galveston, New Orleans, Mobile, and Jacksonville Districts. Takes by bed-leveler type dredges will be more difficult to ascertain and determine responsibility for because bed-levelers do not entrain turtle parts, and no dredged materials come aboard for observers to monitor; furthermore, bed-leveler impacted turtles may not float ashore for several days, if at all. However, if compelling STSSN observer reports and evidence indicate that a turtle was killed by a bed-leveler associated with a hopper dredging project covered by this Opinion, that take will be deducted from the ITS' anticipated take level for that COE District where the take occurred.

In addition, the total anticipated annual non-injurious take by relocation trawling that is required under this ITS is expected to consist of 300 (three hundred) sea turtles, of any combination of the species, and of eight (8) Gulf sturgeon, across all the COE Districts and hopper dredging projects (the relocation trawling takes are not allocated by districts). NOAA Fisheries estimates that 0-2 turtles and 0-1 Gulf sturgeon will be killed or injured annually pursuant to annual relocation trawling in the Gulf of Mexico.

Galveston District

For the Galveston District, the annual documented incidental take by hopper dredges, by injury or mortality, is expected to consist of seven (7) Kemp's ridleys, five (5) green turtles, one (1) hawksbill, and fifteen (15) loggerhead turtles per fiscal year for all channel dredging and sand mining by hopper dredge in the Galveston District. This level of take represents the same level of take authorized by the previous Opinion. Although the annual level of hopper dredging in Freeport Channel has doubled since the previous Opinion, all takes recorded from Freeport Channel have been loggerheads and the District has never come close to reaching its anticipated take level for loggerheads, so no increase in take numbers of loggerheads or other species is expected.

New Orleans District

For the New Orleans District, the documented annual incidental take by hopper dredges, by injury or mortality, is expected to consist of seven (7) Kemp's ridleys, three (3) green turtles, one (1) hawksbill, and fifteen (15) loggerhead turtles, and one (1) Gulf sturgeon per fiscal year for all channel dredging and sand mining by hopper dredge in the New Orleans District. As in the previous Opinion, a greater number of green turtles is included in the incidental take level predicted for the Galveston District due to the greater abundance of green turtles in south Texas waters.

Mobile District (Florida Panhandle west of Aucilla River Basin to, but not including, the Mississippi River)

For the Mobile District, the documented annual incidental take by hopper dredges, by injury or mortality, is expected to consist of three (3) Kemp's ridley, three (3) green turtles, one (1) hawksbill, five (5) loggerhead turtles, and two (2) Gulf sturgeon per fiscal year for all channel dredging and sand mining by hopper dredge in the Mobile District. A greater number of Gulf sturgeon is included in the incidental take level predicted for the Mobile District than the New Orleans District due to the greater abundance of Gulf sturgeon, and larger areas of designated Gulf sturgeon critical habitat, in the former.

Jacksonville District (Florida West Coast: Aucilla River Basin to, but not including, Key West)

For the Jacksonville District, the documented annual incidental take by hopper dredges, by injury or mortality, is expected to consist of three (3) Kemp's ridleys, three (3) green turtles, one (1) hawksbill, five (5) loggerhead turtles, and one (1) Gulf sturgeon per fiscal year for all channel dredging and sand mining by hopper dredge in the Jacksonville District west of Key West (hopper dredging of Key West navigation channels is covered under the existing regional hopper dredging RBO to the COE's SAD).

Responsibility for Hopper Dredging Takes Where COE Jurisdiction is Blurred (Civil Works vs. Regulatory Projects):

As mentioned in Section 2.0, sometimes a hopper dredging activity is permitted by a COE District but the applicant/permittee is a different COE District. To ensure that the COE District ultimately responsible for authorizing a hopper dredge activity is held accountable for its permitting action which may result in a take, and to avoid confusion as to which COE District is to be charged with a take during a hopper dredging project authorized by a COE District but performed by another District or performed in another District, NOAA Fisheries has established the following guidelines for assigning take responsibility:

A protected species take shall normally be charged to the District which issues the regulatory permit for the hopper dredging. Civil works projects do not require regulatory permitting therefore civil works hopper dredging takes shall be charged to the COE District conducting or contracting the dredging project.

However, in Florida, the Mobile District will assume responsibility for (and be charged with) all takes of threatened or endangered species resulting from hopper dredging or relocation trawling activities contracted by the Mobile District even though regulatory permits for the activities may be issued by the Jacksonville District, based on a working agreement to this effect developed between the Mobile and Jacksonville Districts (Susan Rees, pers. comm. to Eric Hawk, October 30, 2003).

For example: The Jacksonville District authorizes (via regulatory permit action through a branch office of its Regulatory Division) the restoration of Pensacola Beach utilizing a hopper dredge. The Jacksonville District's Florida West Coast anticipated incidental take level ("quota") shall be charged with any takes ensuing from the hopper dredge activities even though Pensacola Beach geographically lies within the Mobile District's civil works boundaries, since the Jacksonville District has the authority to incorporate permit conditions to limit protected species take, and contracts the work.

For example: The Mobile District typically acts as construction agent for the U.S. Navy to hopper dredge the navigation channel at the Pensacola Naval Air Station ("Navy channel"), a non-civil works "regulatory" project subject to permitting by the Jacksonville District's Regulatory Division (which has regulatory permitting authority for projects in the Florida Panhandle). The Mobile District, acting for the Navy, applies for and obtains the required regulatory permit from Jacksonville District's Regulatory Division. However, the Mobile District, pursuant to the working agreement in place between the Mobile and Jacksonville Districts, shall be charged for any takes ensuing from that hopper dredging activity.

9.0 Reasonable and Prudent Measures

Regulations (50 CFR 402.02) implementing section 7 of the ESA define reasonable and prudent measures as actions the Director believes necessary or appropriate to minimize the impacts, i.e., amount or extent, of incidental take. The reasonable and prudent measures that NOAA Fisheries believes are necessary to minimize the impacts of hopper dredging in the Gulf of Mexico have been discussed with the COE and include use of temporal dredging windows, intake and overflow screening, use of sea turtle deflector dragheads, observer and reporting requirements, and sea turtle relocation trawling. The following reasonable and prudent measures and associated terms and conditions are established to implement these measures, and to document incidental takes. Only incidental takes that occur while these measures are in full implementation are authorized. These restrictions remain valid until reinitiation and conclusion of any subsequent section 7 consultation.

Seasonal Dredging Windows, Observer Requirements, Deflector Dragheads, and Relocation Trawling[5]

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[5]The COE Wilmington District's sidecast dredges FRY, MERRITT, and SCHWEIZER, and split-hull hopper dredge CURRITUCK, are exempt from the above hopper dredging requirements (operating windows, deflectors, screening, observers, reporting requirements, etc.). Their small size and operating characteristics including small draghead sizes [2-ft by 2-ft, to 2-ft by 3-ft], small draghead openings [5-in by 5-in to 5 in by 8 in], small suction intake pipe diameters [10-14 in], and limited draghead suction [350-

Experience has shown that injuries sustained by sea turtles entrained in the hopper dredge dragheads are usually fatal. Current regional opinions for hopper dredging require seasonal dredging windows and observer monitoring requirements, deflector dragheads, and conditions and guidelines for relocation trawling, which NOAA Fisheries' believes are necessary to minimize effects of these removals on listed sea turtle species that occur in inshore and nearshore Gulf and South Atlantic waters.

Temperature- and date-based dredging windows:
Both the Mobile and Jacksonville Districts expressed comments opposing NOAA Fisheries' imposition of seasonal dredging windows in their respective Gulf of Mexico dredging areas. In their November 28, 2000, BA on their Florida west coast hopper dredging activities, the Jacksonville District indicated that sea turtles are present year-round in the Gulf, so windows would only be of limited effectiveness. In their October 30, 2002, comments to NOAA Fisheries, the Mobile District noted it did not want to be restricted to seasonal hopper dredging windows, indicating that these would potentially seriously and detrimentally impact its ability to complete its operations and maintain Federal navigation projects due to "no excess of large dredges of the type required to perform maintenance of most Federal projects" and other reasons related to dredging industry capacity, downsizing, "loss of production" associated with the deflector draghead, and safety concerns.

Sea turtles generally move inshore with warming waters and offshore with cooling waters. In East Coast channels, Dickerson et al. (1995) found reduced sea turtle abundance with water temperatures less than 16°C. They found that 1,008 trawls conducted at or below 16°C captured 22 turtles (4.4 per cent), while 1,791 trawls conducted above 16°C resulted in 473 (95.6 percent) captures. Dickerson et al. also found that sea turtles tend to avoid water temperatures less than 15°C; however, hopper dredging Kings Bay, Georgia between March 1-12, 1997 with surface water temperatures of 57-58°F (13.9-14.4°C) resulted in 11 turtle takes in nine days (NMFS 1997).

More recently, the Savannah District COE (COE 2003) reported that the average surface temperature at which recent hopper dredge turtle takes have occurred in Brunswick is 57.7°F (14.3°C) and that "there are scattered takes at lower temperatures than turtles would normally be expected to occur" but that "These lower temperatures may not have played a significant role in those takes." The lowest temperature at which multiple takes have occurred in Brunswick in 2003 is 57°F (13.9°C).

Recognizing the relationship between water temperature and sea turtle presence and based on work by the NOAA Fisheries' Galveston Laboratory (Renaud et al. 1994, 1995) funded by the COE, NOAA Fisheries wrote in its September 22, 1995 RBO to the Galveston and New Orleans Districts that sea turtles might be taken by hopper dredges "in all ship channels in the northern Gulf when temperatures exceed 12°C," and that "Lacking seasonal water temperature data, NMFS believes takes may occur from April through November northeast of Corpus Christi, Texas." Consequently, Term and Condition No. 3 of the 1995 RBO required that observers be aboard hopper dredges year-round from Corpus Christi southwest to the Mexican border, but "If no turtle take is observed in December, then observer coverage can be terminated during January and February or until water temperatures again reach 12°." It also required that "In channels

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400 hp]) have been previously determined by NOAA Fisheries to not adversely affect listed species (March 9, 1999, ESA consultation with COE Wilmington District, incorporated herein by reference). The aforementioned vessels and commercial hopper and sidecast dredges of the same or lesser sizes and operating characteristics working in the Gulf of Mexico would be considered similarly exempt by NOAA Fisheries' SERO after consultation with SERO.

northeast of Corpus Christi (except for MR-SWP), observers shall be aboard whenever surface water temperatures are 12°C or greater, and/or between April 1 and November 30."

NOAA Fisheries published a final rule (67 FR 71895, December 3, 2002) effective January 2, 2003, to reduce the impact of large-mesh gillnet fisheries on the Atlantic Coast on sea turtles. This rule was directed primarily at the monkfish fishery, which uses large-mesh gillnet gear and operates in the area when sea turtles are present. The rule reduces impacts on endangered and threatened species of sea turtles by closing portions of the Mid-Atlantic Exclusive Economic Zone (EEZ) waters to fishing with gillnets with a mesh size larger than 8-inch (20.3-cm) stretched mesh. The timing of the restrictions was based upon an analysis of sea surface temperatures for the above areas. Sea turtles are known to migrate into and through these waters when the sea surface temperature is 11°C or greater (Epperly and Braun-McNeill 2002). The January 15 date for the re-opening of the areas north of Oregon Inlet, North Carolina to the large-mesh gillnet fisheries was also based upon the 11°C threshold and is consistent with the seasonal boundary established for the summer flounder fishery-sea turtle protection area (50 CFR 223.206(d)(2) (iii)(A)). In summary, NOAA Fisheries believes that the 11°C threshold established to protect East Coast sea turtles is reasonable and prudent to protect sea turtles in the Gulf of Mexico from hopper dredging operations.

Temperature- and date-based dredging windows appear to have been very effective in reducing sea turtle entrainments. Observer requirements and monitoring including assessment and relocation trawling have provided valuable real-time estimates of sea turtle abundance, takes, and distribution which have been helpful to COE project planning efforts. Evidence that the windows and observer requirements are effective and valuable is that neither the Galveston or New Orleans District's hopper dredging projects have exceeded their anticipated incidental takes since their combined RBO was issued in 1995; SAD has not exceeded its anticipated incidental take since its RBO was amended in 1997.

NMFS-approved observers monitor dredged material inflow and overflow screening baskets on many projects; however, screening is only partially effective and observed, documented takes provide only partial estimates of total sea turtle and Gulf sturgeon mortality. NOAA Fisheries believes that some listed species taken by hopper dredges go undetected because body parts are forced through the sampling screens by the water pressure and are buried in the dredged material, or animals are crushed or killed but not entrained by the suction and so the takes may go unnoticed. The only mortalities that are documented are those where body parts either float, are large enough to be caught in the screens, and can be identified as from sea turtle or sturgeon species. However, this Opinion estimates that with 4-inch inflow screening in place, the observers probably detect and record at least 50% of total mortality.

Relocation trawling has proved to be a useful conservation tool in most dredging projects where it has been implemented. The September 22, 1995, RBO included a Conservation Recommendation for relocation trawling which stated that "Relocation trawling in advance of an operating dredge in Texas and Louisiana channels should be considered if takes are documented early in a project that requires use of a hopper dredge during a period in which large number of sea turtles may occur." That RBO was amended by NOAA Fisheries (Amendment No. 1, June 13, 2002) to change the Conservation Recommendation to a Term and Condition of the RBO. Overall, it is NOAA Fisheries' opinion that the COE Districts choosing to implement relocation trawling have benefitted from their decisions. For example, in the Galveston District, Freeport Harbor Project (July 13-September 24, 2002), assessment and relocation trawling resulted in one loggerhead capture. In Sabine Pass (Sabine-Neches Waterway), assessment and relocation trawling in July-August 2002 resulted in five loggerhead and three Kemp's ridley captures. One turtle was killed by the dredge; this occurred while the relocation trawler was in port repairing its trawl net (P. Bargo, pers. comm. 2002). In the Jacksonville District, sea turtles have been relocated out of the path of hoppers dredges operating in Tampa Bay and Charlotte Harbor or their entrance channels. During St. Petersburg Harbor and

Entrance Channel dredging in the fall of 2000, a pre-dredging risk assessment trawl survey resulted in capture, tagging, and relocation of two adult loggerheads and one subadult green turtle. In February 2002 during the Jacksonville District's Canaveral Channel emergency hopper dredging project for the Navy, two trawlers working around the clock captured and relocated 69 loggerhead and green turtles in seven days, and no turtles were entrained by the hopper dredge. In the Wilmington District's Bogue Banks Project in North Carolina, two trawlers successfully relocated five turtles in 15 days between March 13 and 27, 2003; one turtle was taken by the dredge. Most recently, Aransas Pass relocation trawling associated with hopper dredging resulted in 71 turtles captured and released (with three recaptures) in three months of dredging and relocation trawling. Five turtles were killed by the dredge. No turtles were killed after relocation trawling was increased from 12 to 24 hours per day (Trish Bargo, October 27, 2003, pers. comm. to Eric Hawk).

This Opinion authorizes the per-fiscal-year non-lethal non-injurious take (minor skin abrasions resulting from trawl capture are considered non-injurious), external flipper-tagging, and taking of tissue samples of 300 sea turtles and eight Gulf sturgeon in association with all relocation trawling conducted by the COE throughout the Gulf of Mexico. This take shall not be broken down by District but rather is a Gulf-wide take limit. This take is limited to relocation trawling conducted during the 0-3 days immediately preceding the start of hopper dredging (as a means to determine/reduce the initial abundance of sea turtles in the area and determine if additional trawling efforts are needed), and during actual hopper dredging. Relocation trawling performed to reduce endangered species/hopper dredge interactions is subject to the requirements detailed in the terms and conditions of this Opinion.

NOAA Fisheries estimates that 0-2 turtles and 0-1 Gulf sturgeon will be killed or injured annually pursuant to annual relocation trawling in the Gulf of Mexico. Lethal or injurious takes which result from relocation trawling (including capturing, handling, weighing, measuring, tagging, holding, and releasing) are limited to one sea turtle and one Gulf sturgeon per District per fiscal year and will be subtracted from (counted against) the authorized, anticipated take levels discussed previously for hopper dredging. For example: a Kemp's ridley injury or lethal take during a COE District's relocation trawling effort shall be counted as a documented take against that District's fiscal year anticipated take level for that species. NOAA Fisheries shall be immediately notified of any mortalities or injuries sustained by protected species during relocation/assessment trawling.

Deflector Dragheads

V-shaped, sea turtle deflector dragheads prevent an unquantifiable yet significant number of sea turtles from being entrained and killed in hopper dredges each year. Without them, turtle takes during hopper dredging operations would unquestionably be higher. Draghead tests conducted in May-June 1993 by the COE's WES in clear water conditions on the sea floor off Fort Pierce, Florida, with 300 mock turtles placed in rows, showed convincingly that the newly-developed WES deflector draghead "performed exceedingly well at deflecting the mock turtles." Thirty-seven of 39 mock turtles encountered were deflected, two turtles were not deflected, and none were damaged. Also, "the deflector draghead provided better production rates than the unmodified California draghead, and the deflector draghead was easier to operate and maneuver than the unmodified California flat-front draghead." The V-shape reduced forces encountered by the draghead, and resulted in smoother operation (WES, Sea Turtle Project Progress Report, June 1993)." V-shaped deflecting dragheads are now a widely accepted conservation tool, the dredging industry is familiar with them and their operation, and they are used by all COE Districts conducting hopper dredge operations where turtles may be present, with the exception of the Mobile District.

In Gulf of Mexico coastal waters, evidence indicates that turtles are present year-round, further arguing for year-round deflector draghead use by all COE Districts of the Gulf of Mexico. Recent comprehensive NOAA Fisheries' Southeast Fishery Science Center (SEFSC) review and analyses (unpublished data,

December 2002: Environmental Assessment/Regulatory Impact Review of Technical Changes to the Turtle Excluder Device (TED) Regulations to Enhance Turtle Protection in the Southeastern United States) of seasonal sea turtle distribution and strandings throughout the Gulf of Mexico (including coastal waters dredged by the Mobile District) noted that "Aerial surveys and observer data have indicated the presence of turtles in areas where strandings data are sparse" and "Turtles were in all areas at all times." (September 13, 2002, e-mail, Epperly to Hawk). NOAA Fisheries' SEFSC's sea turtle team leader Epperly also recommended against hopper dredges operating in those same areas "without monitoring, relocation, and specialized gear (i.e., deflectors) on the dragheads."

It wasn't until late-summer 2002 that the Mobile District started requiring observers and screening on its hopper dredges. REMSA recently completed ten days of 24-hr relocation trawling/dredged material monitoring for the Mobile District during ten days of emergency maintenance hopper dredging of the Mobile Bay ship channel (July 10-20, 2003). No sea turtle specimens or parts of specimens were observed during the ten days by either the relocation trawler observers or the shipboard dredge observers. Dredging is currently conducted in the Mobile District with onboard observers and 4-inch inflow screening but without deflector dragheads (Ladner, pers. comm. to Hawk, November 26, 2002). Mobile District, in written comments dated October 30, 2002, on a draft version of the present Opinion, noted that "The District recognizes the benefits of deflector dragheads to conservation of the species in areas where sea turtle takes occur. However, dragheads reduce dredging efficiency and result in dredges being onsite for a longer period of time. Consequently, the District finds no overriding need to utilize deflectors until it is proven, through use of screens and observers, that the Mobile District actually takes sea turtles during normal operations."

Habitat Protection Buffers

COE Jacksonville District biologists expressed concern (Yvonne Haberer, email to Eric Hawk, April 2003; Terri Jordan, pers. comm. August 11, 2003) over a NOAA Fisheries' draft version of the current Opinion proposed requirement of a 200-m buffer zone around hardgrounds in the vicinity of COE-proposed sand mining areas off Florida. In discussions over the Pinellas County Shore Protection Project, the COE noted that NOAA Fisheries has previously required only a 200-ft zone around hardgrounds adjacent to COE sand mining operations in the Gulf of Mexico. NOAA Fisheries' Protected Resources Division consulted with NOAA Fisheries Habitat Conservation Division, which stated that as a general rule, buffer zones should not be less than 400 feet to protect essential fish habitat. In its response to the COE, which included a request for additional information (Eric Hawk email to Yvonne Haberer, May 14, 2003) which was never received, NOAA Fisheries' Protected Resources Division concluded that a 200-ft buffer was inadequate and that a 200-meter buffer zone was appropriate to protect sea turtles which may be foraging on or around hardgrounds adjacent to mining sites from hopper dredge entrainment. NOAA Fisheries noted that hopper dredge vessels are large (typically 300-400 ft long); limited in their ability to maneuver; and given other variable factors such as wind, tide, weather, sea state, currents, operator fatigue, operator error, and instrument error, a 200-ft margin of safety around hardgrounds was inadequate to protect NOAA Fisheries trust resources and sea turtles which could be expected to frequent hardgrounds and their vicinity. Subsequently, however, conversations with hopper dredge industry officials and dredge operators have led NOAA Fisheries to conclude that based on advances in hopper dredge construction, including the use of highly maneuverable Z-drives (on some dredges), enhanced station-keeping ability, and industry-standard navigation practices and technologies including routine use of differential global positioning systems (DGPS), dredge operators will be able to routinely and safely maintain desired safe distances from hardgrounds that are marked on their charts (E. Hawk, August 14 and 18, 2003, pers. comms. with R. Richardson, Manson Dredging; Mark Sickles, Dredge Contractors of America; and W. Murcheson, NATCO Dredging). NOAA Fisheries has determined that 400 feet is an adequate, reasonable buffer zone that should be maintained around hardgrounds, to protect endangered living resources–i.e., sea turtles that

may be foraging in their vicinity. Four hundred feet also provides the additional benefit of protecting hardgrounds from some of the probable adverse effects of sedimentation from the dredged material plume. For example, a generic test case numerical model simulation of a typical situation representative of hopper dredging of MMS shoals using the Trailing Suction Hopper Dredge Plume Model developed by Baird, Inc., for MMS, using inputted variables of a cross current of 20 cm/s, fine sand, two million cubic meter project, and a water depth of about 15 to 20 m, gave a sedimentation footprint of 200 m beyond the boundary of the dredge area (Rob Nairn, October 3, 2003, pers. comm. to Eric Hawk).

Summary

NOAA Fisheries has carefully reviewed and fully considered these and all other comments received from the affected COE Districts; however, in summary, after review of WES studies, SEFSC survey data, and based on past experience, NOAA Fisheries believes that seasonal dredging windows, deflector dragheads, observer and screening requirements, and relocation trawling have proved convincingly over the last decade to be an excellent combination of reasonable and prudent measures for minimizing the number and impact of sea turtle takes, enabling NOAA Fisheries to assess the quantity of turtles being taken, and allowing the affected COE Districts (Wilmington, Charleston, Savannah, Jacksonville, New Orleans, and Galveston) to meet their essential dredging requirements to keep Federal navigation channels open.

There are increased costs associated with observers and relocation trawling (current estimates are $3,500-$5,000/day for 24 hours of relocation trawling, $150-$200/day for a hopper dredge endangered species observer); delays sometimes occur, particularly when two turtles are taken in 24 hours, or when clay-like materials clog the inflow screening boxes; and dredging projects may take longer to complete. However, overall, NOAA Fisheries believes that loss of production associated with the deflector draghead is insignificant, while saving significant numbers of sea turtles from almost-certain death by dismemberment in suction dragheads; increased production costs, including costs of observers and relocation trawlers, pale in comparison to overall project costs; and NOAA Fisheries' experience over the past decade with the COE's SAD Districts and the Gulf of Mexico's Galveston and New Orleans Districts has shown that Federal hopper dredging projects get completed in a timely fashion. Also, allowable overdredging by the COE reduces to some degree the need for frequent maintenance dredging, and the conservation measures required by the biological opinions in place result in significantly reduced dredge interactions with sea turtles–interactions which usually prove fatal.

NOAA Fisheries considers that PIT tagging, external flipper tagging, and tissue sampling of turtles captured pursuant to relocation trawling, including genetic analysis of tissue samples taken from dredge- and trawl-captured turtles, will provide benefits to the species by providing data which will enable NOAA Fisheries to make determinations on what sea turtle stocks are being impacted, and how that may change over time as the population growth rates change among the different stocks (Sheryan Epperly, pers. comm. to Eric Hawk).

NOAA Fisheries estimates that 150-300 sea turtle tissue samples will be taken annually in the Gulf of Mexico during COE dredging and relocation trawling operations. Depending on the species, a few years of collection will provide sufficient sample size to assess stock composition (Peter Dutton, pers. comm. to Eric Hawk). Samples will continue to be collected and archived, until a follow-up analysis can be done two to three years after that if it is deemed necessary. NOAA Fisheries estimates that genetic analysis of tissue samples, including labor, costs about $100-150 per sample (Peter Dutton, pers. comm. to Eric Hawk); thus, the cost of analysis of 300 samples will be between $30,000 and $45,000. NOAA Fisheries believes that, minimally, the combined COE Gulf of Mexico Districts affected by this Opinion should provide $10,000 to help defray the cost of analysis of the first 300 samples taken. COE funds should be provided to NOAA

Fisheries' Southwest Fisheries Center's Dr. Peter Dutton, preferably in a lump-sum, one-time payment as a part of a Memorandum of Understanding (MOU) to be developed between Dr. Dutton and the COE's combined Gulf of Mexico Districts (similar to the current MOU nearing completion between the COE's South Atlantic Division and the Southwest Fisheries Science Center for hopper dredging/relocation trawling conducted by the South Atlantic Divisions four Atlantic Districts). After the initial financial contribution by the COE, NOAA Fisheries would continue to archive and store samples gathered by the COE but the COE's responsibility would be limited to taking the samples and shipping them to NOAA Fisheries' Southwest Fisheries Science Center. Incorporation of this funding requirement as a reasonable and prudent measure of this Opinion will result in the gathering of knowledge that is expected to reduce the effect of the takes from Gulf of Mexico dredging projects.

The dredging windows set forth in the terms and conditions of the 1995 Gulf of Mexico hopper dredging RBO, while very strongly encouraged by NOAA Fisheries for previously stated reasons, were ultimately discretionary activities by the COE and could be deviated from by the SAD or the Galveston or New Orleans Districts when they deemed essential or necessary after consultation with NOAA Fisheries, though this was infrequent. This flexibility is also stipulated in the Proposed Action section of the present Opinion which applies to all four COE Districts. Terms and conditions of the present Opinion remain largely the same, with the following significant exceptions:

1) The allowable window for hopper dredging has been extended to include the Mobile and Jacksonville Districts so that the December-March window is now Gulf-wide, from the Texas-Mexico border to Key West channels;

2) Previous temperature requirements of Term and Condition No. 3 of the 1995 RBO (i.e., "If no turtle take is observed during December, observer coverage can be terminated during January and February or until water temperatures again reach 12°C; In channels northeast of Corpus Christi, Texas [except for Southwest Pass as discussed below], observers shall be aboard whenever surface water temperatures are 12° or greater, and/or between April 1 and November 30.") have been modified downward to 11°C based on new sea turtle distribution information which indicates that sea turtles are more tolerant of cold than was previously thought. The discussion of temperature/sea turtle distribution supporting this change is incorporated herein by reference to the Monkfish Biological Opinion (dated April 14, 2003, prepared by NOAA Fisheries Northeast Region).

3) The September 22, 1995, RBO included a Conservation Recommendation for relocation trawling which stated that "Relocation trawling in advance of an operating dredge in Texas and Louisiana channels should be considered if takes are documented early in a project that requires use of a hopper dredge during a period in which large number of sea turtles may occur." That RBO was amended by NOAA Fisheries SER (Amendment No. 1, June 13, 2002), to change the Conservation Recommendation to a Term and Condition of the RBO. Term and Condition No. 10 of the amended RBO specified conditions under which relocation trawling "should be considered" and subject to what precautions it should be carried out, and authorized unlimited non-lethal, non-injurious take of sea turtles and Gulf sturgeon in association with relocation trawling deemed necessary the by COE. This amount of discretion has since been determined to be inappropriate for a non-discretionary term and condition of an ITS. Thus, the present Opinion's requirement for relocation trawling is more non-discretionary than as written in Amendment No. 1 in that it <u>requires</u> the use of relocation trawlers under specific conditions as a way to minimize turtle interactions, rather than only requiring that it be "considered" by the COE.

4) In the present Opinion, the COE Districts are authorized to request waivers from the relocation trawling requirement (which may be delivered and responded to by both agencies via electronic mail) for projects where the COE Districts do not feel relocation trawling is feasible, necessary or warranted.

5) The Districts are required to fund the cost of tissue sampling and genetic analyses of tissue samples from turtles taken during projects in their respective Districts.

The following terms and conditions implement the reasonable and prudent measures discussed above:

Terms and Conditions

Hopper Dredging: Hopper dredging activities in Gulf of Mexico waters from the Mexico-Texas border to Key West, Florida up to one mile into rivers shall be completed, whenever possible, between December 1 and March 31, when sea turtle abundance is lowest throughout Gulf coastal waters. Hopper dredging of Key West channels is covered by the existing August 25, 1995, RBO to the COE's SAD. The COE shall discuss with NOAA Fisheries why a particular project cannot be done within the December 1-March 31 "window."

2. *Non-hopper Type Dredging*: Pipeline or hydraulic dredges, because they are not known to take turtles, must be used whenever possible between April 1 and November 30 in Gulf of Mexico waters up to one mile into rivers. This should be considered particularly in channels such as those associated with Galveston Bay and Mississippi River - Gulf Outlet (MR-GO), where lethal takes of endangered Kemp's ridleys have been documented during summer months, and Aransas Pass, where large numbers of loggerheads may be found during summer months. In the MR-GO, incidental takes and sightings of threatened loggerhead sea turtles have historically been highest during April and October.

3. *Annual Reports*: The annual summary report, discussed below (#9), must give a complete explanation of why alternative dredges (dredges other than hopper dredges) were not used for maintenance dredging of channels between April and November.

4. *Observers*: The COE shall arrange for NOAA Fisheries-approved observers to be aboard the hopper dredges to monitor the hopper spoil, screening, and dragheads for sea turtles and Gulf sturgeon and their remains.

   a. Brazos Santiago Pass east to Key West, Florida: Observer coverage sufficient for 100% monitoring (i.e., two observers) of hopper dredging operations is required aboard the hopper dredges year-round from Brazos Santiago Pass to (not including) Key West, Florida between April 1 and November 30, and whenever surface water temperatures are 11°C or greater.

   b. Observer coverage of hopper dredging of sand mining areas shall ensure 50% monitoring (i.e., one observer).

   c. Observers are not required at any time in Mississippi River - Southwest Pass (MR-SWP).

5. *Operational Procedures*: During periods in which hopper dredges are operating and NOAA Fisheries-approved observers are *not* required, (as delineated in #4 above), the appropriate COE District must:

a. Advise inspectors, operators and vessel captains about the prohibitions on taking, harming, or harassing sea turtles

b. Instruct the captain of the hopper dredge to avoid any turtles and whales encountered while traveling between the dredge site and offshore disposal area, and to immediately contact the COE if sea turtles or whales are seen in the vicinity.

c. Notify NOAA Fisheries if sea turtles are observed in the dredging area, to coordinate further precautions to avoid impacts to turtles.

d. Notify NOAA Fisheries immediately by phone (727/570-5312) or fax (727/570-5517) if a sea turtle or Gulf sturgeon is taken by the dredge.

6. *Screening*: When sea turtle observers are required on hopper dredges, 100% inflow screening of dredged material is required and 100% overflow screening is recommended. If conditions prevent 100% inflow screening, inflow screening may be reduced gradually, as further detailed in the following paragraph, but 100% overflow screening is then required. NOAA Fisheries must be consulted prior to the reductions in screening and an explanation must be included in the dredging report.

a. Screen Size: The hopper's inflow screens should have 4-inch by 4-inch screening. If the COE, in consultation with observers and the draghead operator, determines that the draghead is clogging and reducing production substantially, the screens may be modified sequentially: mesh size may be increased to 6-inch by 6-inch, then 9-inch by 9-inch, then 12-inch by 12-inch openings. Clogging should be greatly reduced with these flexible options; however, further clogging may compel removal of the screening altogether, in which case effective 100% overflow screening is mandatory. The COE shall notify NOAA Fisheries beforehand if inflow screening is going to be reduced or eliminated, and provide details of how effective overflow screening will be achieved.

b. Need for Flexible, Graduated Screens: NOAA Fisheries believes that this flexible, graduated-screen option is necessary, since the need to constantly clear the inflow screens will increase the time it takes to complete the project and therefore increase the exposure of sea turtles to the risk of impingement or entrainment. Additionally, there are increased risks to sea turtles in the water column when the inflow is halted to clear screens, since this results in clogged intake pipes, which may have to be lifted from the bottom to discharge the clay by applying suction.

c. Exemption - MR-SWP: Screening is not required at any time in MR-SWP.

7 *Dredging Pumps*: Standard operating procedure shall be that dredging pumps shall be disengaged by the operator when the dragheads are not firmly on the bottom, to prevent impingement or entrainment of sea turtles within the water column. This precaution is especially important during the cleanup phase of dredging operations when the draghead frequently comes off the bottom and can suck in turtles resting in the shallow depressions between the high spots the draghead is trimming off.

8. *Sea Turtle Deflecting Draghead*: A state-of-the-art rigid deflector draghead must be used on all hopper dredges in all Gulf of Mexico channels and sand mining sites at all times of the year except that the rigid deflector draghead is not required in MR-SWP at any time of the year.

9. *Dredge Take Reporting*: Observer reports of incidental take by hopper dredges must be faxed to NOAA Fisheries' Southeast Regional Office (727-570-5517) by onboard endangered species observers within 24 hours of any sea turtle, Gulf sturgeon, or other listed species take observed.

A preliminary report summarizing the results of the hopper dredging and any documented sea turtle or Gulf sturgeon takes must be submitted to NOAA Fisheries within 30 working days of completion of any dredging project. Reports shall contain information on project location (specific channel/area dredged), start-up and completion dates, cubic yards of material dredged, problems encountered, incidental takes and sightings of protected species, mitigative actions taken (if relocation trawling, the number and species of turtles relocated), screening type (inflow, overflow) utilized, daily water temperatures, name of dredge, names of endangered species observers, percent observer coverage, and any other information the COE deems relevant.

An annual report (based on fiscal year) must be submitted to NOAA Fisheries summarizing hopper dredging projects and documented incidental takes.

10. *Sea Turtle Strandings*: The COE Project Manager or designated representative shall notify the Sea Turtle Stranding and Salvage Network (STSSN) state representative (contact information available at: http://www.sefsc.noaa.gov/seaturtleSTSSN.jsp) of the start-up and completion of hopper dredging operations and bed-leveler dredging operations and ask to be notified of any sea turtle/sturgeon strandings in the project area that, in the estimation of STSSN personnel, bear signs of potential draghead impingement or entrainment, or interaction with a bed-leveling type dredge.

Information on any such strandings shall be reported in writing within 30 days of project end to NOAA Fisheries' Southeast Regional Office. Because of different possible explanations for, and subjectivity in the interpretation of potential causes of strandings, these strandings will not normally be counted against the COE's take limit; however, if compelling STSSN observer reports and evidence indicate that a turtle was killed by a hopper dredge or a bed-leveling type dredge, that take will be deducted from the ITS' anticipated take level for that COE District where the take occurred.

11 *Reporting - Strandings*: Each COE District shall provide NOAA Fisheries' Southeast Regional Office with an annual report detailing incidents, with photographs when available, of stranded sea turtles and Gulf sturgeon that bear indications of draghead impingement or entrainment. This reporting requirement may be included in the end-of-year report required in Term and Condition No. 9, above.

12. *District Annual Relocation Trawling Report*: Each COE District shall provide NOAA Fisheries' Southeast Regional Office with end-of-project reports within 30 days of completion of relocation trawling projects, and an annual report summarizing relocation trawling efforts and results within their District. The annual report requirement may be included in the end-of-year report required in Term and Condition # 9, above.

Conditions Requiring Relocation Trawling: Handling of sea turtles captured during relocation trawling in association with hopper dredging projects in Gulf of Mexico navigation channels and sand mining areas shall be conducted by NOAA Fisheries-approved endangered species observers. Relocation trawling shall be undertaken by the COE at all projects where <u>any</u> of the following conditions are met; however, other ongoing projects not meeting these conditions are not required to conduct relocation trawling:

a. Two or more turtles are taken in a 24-hour period in the project.

b. Four or more turtles are taken in the project.

c. 75% of a District's sea turtle species quota for a particular species has previously been met.

14. *Relocation Trawling Waiver*: For individual projects the affected COE District may request by letter to NOAA Fisheries a waiver of part or all of the relocation trawling requirements. NOAA Fisheries will consider these requests and decide favorably if the evidence is compelling.

15. *Relocation Trawling - Annual Take Limits*: This Opinion authorizes the annual (by fiscal year) take of 300 sea turtles (of one species or combination of species) and eight Gulf sturgeon by duly-permitted, NOAA Fisheries-approved observers in association with all relocation trawling conducted or contracted by the four Gulf of Mexico COE Districts to temporarily reduce or assess the abundance of these listed species during (and in the 0-3 days immediately preceding) a hopper dredging project in order to reduce the possibility of lethal hopper dredge interactions, subject to the following conditions:

a. *Trawl Time*: Trawl tow-time duration shall not exceed 42 minutes (doors in - doors out) and trawl speeds shall not exceed 3.5 knots.

b. *Handling During Trawling*: Sea turtles and sturgeon captured pursuant to relocation trawling shall be handled in a manner designed to ensure their safety and viability, and shall be released over the side of the vessel, away from the propeller, and only after ensuring that the vessel's propeller is in the neutral, or disengaged, position (i.e., not rotating). Resuscitation guidelines are attached (Appendix IV).

c. *Captured Turtle Holding Conditions*: Captured turtles shall be kept moist, and shaded whenever possible, until they are released.

d. *Weight and Size Measurements*: All turtles shall be measured (standard carapace measurements including body depth) and tagged, and weighed when safely possible, prior to release; Gulf sturgeon shall be measured (fork length and total length) and–when safely possible–tagged, weighed, and a tissue sample taken prior to release. Any external tags shall be noted and data recorded into the observers log. Only NOAA Fisheries-approved observers or observer candidates in training under the direct supervision of a NOAA Fisheries-approved observer shall conduct the tagging/measuring/weighing/tissue sampling operations.

e. *Take and Release Time During Trawling - Turtles*: Turtles shall be kept no longer than 12 hours prior to release and shall be released not less than three nautical miles (nmi) from the dredge site. If two or more released turtles are later recaptured, subsequent turtle captures shall be released not less than five nmi away. If it can be done safely, turtles may be transferred onto another vessel for transport to the release area to enable the relocation trawler to keep sweeping the dredge site without interruption.

f. *Take and Release Time During Trawling - Gulf Sturgeon*: Gulf sturgeon shall be released immediately after capture, away from the dredge site or into already dredged areas, unless the trawl vessel is equipped with a suitable (not less than: 2 ft high by 2 ft wide by 8 ft long), well-aerated

seawater holding tank where a maximum of one sturgeon may be held for not longer than 30 minutes before it must be released or relocated away from the dredge site.

g. *Injuries and Incidental Take Quota*: Any protected species injured or killed during or as a consequence of relocation trawling shall count toward the appropriate COE District's incidental take quota. Minor skin abrasions resulting from trawl capture are considered non-injurious. Injured sea turtles shall be immediately transported to the nearest sea turtle rehabilitation facility.

h. *Flipper Tagging*: All sea turtles captured by relocation trawling shall be flipper-tagged prior to release with external tags which shall be obtained prior to the project from the University of Florida's Archie Carr Center for Sea Turtle Research. This Opinion serves as the permitting authority for any NOAA Fisheries-approved endangered species observer aboard these relocation trawlers to flipper-tag with external tags (e.g., Inconel tags) captured sea turtles. Columbus crabs or other organisms living on external sea turtle surfaces may also be sampled and removed under this authority.

i. *Gulf Sturgeon Tagging*: Tagging of live-captured Gulf sturgeon may also be done under the permitting authority of this Opinion; however, it may be done only by personnel with prior fish tagging experience or training, and is limited to external tagging only, unless the observer holds a valid sturgeon research permit (obtained pursuant to section 10 of the ESA, from the NOAA Fisheries' Office of Protected Resources, Permits Division) authorizing sampling, either as the permit holder, or as designated agent of the permit holder.

j. *PIT-Tag Scanning*: All sea turtles captured by relocation trawling (or dredges) shall be thoroughly scanned for the presence of PIT tags prior to release using a scanner powerful enough to read dual frequencies (125 and 134 kHz) and read tags deeply embedded deep in muscle tissue (e.g., manufactured by Biomark or Avid). Turtles which scans show have been previously PIT tagged shall never-the-less be externally flipper tagged. The data collected (PIT tag scan data and external tagging data) shall be submitted to NOAA, National Marine Fisheries Service, Southeast Fisheries Science Center, Attn: Lisa Belskis, 75 Virginia Beach Drive, Miami, Florida 33149. All data collected shall be submitted in electronic format within 60 working days to Lisa.Belskis@noaa.gov.

k. *CMTTP:* External flipper tag and PIT tag data generated and collected by relocation trawlers shall also be submitted to the Cooperative Marine Turtle Tagging Program (CMTTP), on the appropriate CMTTP form, at the University of Florida's Archie Carr Center for Sea Turtle Research.

l. *Tissue Sampling*: All live or dead sea turtles captured by relocation trawling or dredging shall be tissue-sampled prior to release, according to the protocols described in Appendix II or Appendix III of this Opinion. Tissue samples shall be sent within 60 days of capture to: NOAA, National Marine Fisheries Service, Southeast Fisheries Science Center, Attn: Lisa Belskis, 75 Virginia Beach Drive, Miami, Florida 33149. All data collected shall be submitted in electronic format within 60 working days to Lisa.Belskis@noaa.gov. This Opinion serves as the permitting authority for any NOAA Fisheries-approved endangered species observers aboard relocation trawlers or hopper dredges to tissue-sample live- or dead-captured sea turtles, without the need for a section 10 permit.

m. *Cost Sharing of Genetic Analysis*: The COE's Gulf of Mexico Districts shall combine to provide a one-time payment of $10,000 to NOAA Fisheries to share the cost of NOAA-Fisheries'

analysis of 300 tissue samples taken during COE hopper dredging/trawling operations in the Gulf of Mexico. This cost is currently estimated by NOAA Fisheries to be about $100-150 per sample, or $30,000-$45,000. COE funds shall be provided to NOAA Fisheries' Southwest Fisheries Center's Dr. Peter Dutton as a part of a Memorandum of Understanding (MOU) to be developed between Dr. Dutton and the COE's combined Gulf of Mexico Districts and Divisions within six months of the issuance of this Opinion.

n. *PIT Tagging:* PIT tagging is not required or authorized for, and shall not be conducted by, ESOs who do not have 1) section 10 permits authorizing said activity and 2) prior training or experience in said activity; however, if the ESO has received prior training in PIT tagging procedures and is also authorized to conduct said activity by a section 10 permit, then the ESO **must** PIT tag the animal prior to release (in addition to the standard external flipper tagging). PIT tagging must then be performed in accordance with the protocol detailed at NOAA Fisheries' Southeast Science Center's webpage: http://www.sefsc.noaa.gov/seaturtlefisheriesobservers.jsp. (See Appendix C on SEC's "Fisheries Observers" webpage). PIT tags used must be sterile, individually wrapped tags to prevent disease transmission. PIT tags should be 125 kHz, glass-encapsulated tags - the smallest ones made. Note: If scanning reveals a PIT tag and it was not difficult to find, then **do not** insert another PIT tag; simply record the tag number and location, and frequency, if known. If for some reason the tag is difficult to detect (e.g., tag is embedded deep in muscle, or is a 400 mHz tag), then insert one in the other shoulder.

o. *Other Sampling Procedures*: All other tagging and external or internal sampling procedures (e.g., PIT tagging, blood letting, laparoscopies, anal and gastric lavages, mounting satellite or radio transmitters, etc.) performed on live sea turtles or live sturgeon are **not permitted under this Opinion unless** the observer holds a valid sea turtle or sturgeon research permit (obtained pursuant to section 10 of the ESA, from the NOAA Fisheries' Office of Protected Resources, Permits Division) authorizing the activity, either as the permit holder, or as designated agent of the permit holder.

p. *Handling Fibropapillomatose Turtles*: Observers handling sea turtles infected with fibropapilloma tumors shall either: 1) clean all equipment that comes in contact with the turtle (tagging equipment, tape measures, etc.) with mild bleach solution, between the processing of each turtle or 2) maintain a separate set of sampling equipment for handling animals displaying fibropapilloma tumors or lesions. Tissue/tumor samples shall be sent within 60 days of capture to: NOAA, National Marine Fisheries Service, Southeast Fisheries Science Center, Attn: Lisa Belskis, 75 Virginia Beach Drive, Miami, Florida 33149. All data collected shall be submitted in electronic format within 60 working days to Lisa.Belskis@noaa.gov. This Opinion serves as the permitting authority for all NOAA Fisheries-approved endangered species observers aboard a relocation trawler or hopper dredge to tissue-sample fibropapilloma-infected sea turtles without the need for a section 10 permit.

16. *Hardground Buffer Zones*: All dredging in sand mining areas will be designed to ensure that dredging will not occur within a minimum of 400 feet from any significant hardground areas or bottom structures that serve as attractants to sea turtles for foraging or shelter. NOAA Fisheries considers (for the purposes of this Opinion only) a significant hardground in a project area to be one that, over a horizontal distance of 150 feet, has an average elevation above the sand of 1.5 feet or greater, and has algae growing on it. The COE Districts shall ensure that sand mining sites within their Districts are adequately mapped to enable the dredge to stay at least 400 feet from these areas. If the COE is uncertain as to what constitutes significance, it shall consult with NOAA

Fisheries' Habitat Conservation Division and NOAA Fisheries' Protected Resources Division for clarification and guidance.

17. *Training - Personnel on Hopper Dredges*: The respective COE Districts must ensure that all contracted personnel involved in operating hopper dredges (whether privately-funded or federally-funded projects) receive thorough training on measures of dredge operation that will minimize takes of sea turtles. It shall be the goal of each hopper dredging operation to establish operating procedures that are consistent with those that have been used successfully during hopper dredging in other regions of the coastal United States, and which have proven effective in reducing turtle/dredge interactions. Therefore, COE Engineering Research and Development Center experts or other persons with expertise in this matter shall be involved both in dredge operation training, and installation, adjustment, and monitoring of the rigid deflector draghead assembly.

18. *Dredge Lighting*: From May 1 through October 31, sea turtle nesting and emergence season, all lighting aboard hopper dredges and hopper dredge pumpout barges operating within three nmi of sea turtle nesting beaches shall be limited to the minimal lighting necessary to comply with U.S. Coast Guard and/or OSHA requirements. All non-essential lighting on the dredge and pumpout barge shall be minimized through reduction, shielding, lowering, and appropriate placement of lights to minimize illumination of the water to reduce potential disorientation effects on female sea turtles approaching the nesting beaches and sea turtle hatchlings making their way seaward from their natal beaches.

10.0 Conservation Recommendations

Pursuant to section 7(a)(1) of the ESA, the following conservation recommendations are made to assist the COE in contributing to the conservation of sea turtles and Gulf sturgeon by further reducing or eliminating adverse impacts that result from hopper dredging.

Channel Conditions and Seasonal Abundance Studies: Channel-specific studies should be undertaken to identify seasonal relative abundance of sea turtles and Gulf sturgeon within Gulf of Mexico channels. The December 1 through March 31 dredging window and associated observer requirements listed above may be adjusted (after consultation and authorization by NOAA Fisheries) on a channel-specific basis, if (a) the COE can provide sufficient scientific evidence that sea turtles and Gulf sturgeon are not present or that levels of abundance are extremely low during other months of the year, or (b) the COE can identify seawater temperature regimes that ensure extremely low abundance of sea turtles or Gulf sturgeon in coastal waters, and can monitor water temperatures in a real-time manner. Surveys may indicate that some channels do not support significant turtle populations, and hopper dredging in these channels may be unrestricted on a year-round basis, as in the case of MR-SWP. To date, sea turtle deflector draghead efficiency has not reached the point where seasonal restrictions can be lifted.

2. *Draghead Modifications and Bed Leveling Studies*: The New Orleans, Galveston, Mobile, and Jacksonville Districts should supplement the efforts of SAD and WES to develop modifications to existing dredges to reduce or eliminate take of sea turtles, and develop methods to minimize sea turtle take during "cleanup" operations when the draghead maintains only intermittent contact with the bottom. Some method to level the "peaks and valleys" created by dredging would reduce the amount of time dragheads are off the bottom.

3. *Draghead Evaluation Studies and Protocol*: Additional research, development, and improved performance is needed before the V-shaped rigid deflector draghead can replace seasonal restrictions as a method of reducing sea turtle captures during hopper dredging activities. Development of a more effective deflector draghead or other entrainment-deterring device (or combination of devices, including use of acoustic deterrents) could potentially reduce the need for sea turtle relocation or result in expansion of the winter dredging window. NOAA Fisheries should be consulted regarding the development of a protocol for draghead evaluation tests. NOAA Fisheries recommends that the COE's Galveston, New Orleans, Mobile, and Jacksonville Districts coordinate with ERDC, SAD, the Association of Dredge Contractors of America, and dredge operators (Manson, Bean-Stuyvesant, Great Lakes, Natco, etc.) regarding additional reasonable measures they may take to further reduce the likelihood of sea turtle and Gulf sturgeon takes.

4. *Continuous Improvements in Monitoring and Detecting Takes*: The COE should seek continuous improvements in detecting takes and should determine, through research and development, a better method for monitoring and estimating sea turtle and Gulf sturgeon takes by hopper dredge. Observation of overflow and inflow screening is only partially effective and provides only partial estimates of total sea turtle and Gulf sturgeon mortality.

   Overflow Screening: The COE should encourage dredging companies to develop or modify existing overflow screening methods on their company's dredge vessels for maximum effectiveness of screening and monitoring. Horizontal overflow screening is preferable to vertical overflow screening because NOAA Fisheries considers that horizontal overflow screening is significantly more effective at detecting evidence of protected species entrainment than vertical overflow screening.

   Preferential Consideration for Horizontal Overflow Screening: The COE should give preferential consideration to hopper dredges with horizontal overflow screening when awarding hopper dredging contracts for areas where new materials, large amounts of debris, or clay may be encountered, or have historically been encountered. Excessive inflow screen clogging may in some instances necessitate removal of inflow screening, at which point effective overflow screening becomes more important.

5. *Section 10 Research Permits and Relocation Trawling*: NOAA Fisheries recommends that the COE's Galveston, New Orleans, Mobile, and Jacksonville Districts, either singly or combined, apply to NOAA Fisheries for an ESA section 10 research permit to conduct endangered species research on species incidentally captured during relocation trawling. For example, satellite tagging of captured turtles could enable the COE Districts to gain important knowledge on sea turtle seasonal distribution and presence in navigation channels and sand mining sites and also, as mandated by section 7(a)(1) of the ESA, to utilize their authorities in furtherance of the purposes of the ESA by carrying out programs for the conservation of listed species. SERO shall assist the COE Districts with the permit application process.

6. *Draghead Improvements - Water Ports*: NOAA Fisheries recommends that the COE's Gulf of Mexico Districts require or at least recommend to dredge operators that all dragheads on hopper dredges contracted by the COE for dredging projects be eventually outfitted with water ports located in the *top* of the dragheads to help prevent the dragheads from becoming plugged with sediments. When the dragheads become plugged with sediments, the dragheads are often raised off the bottom (by the dredge operator) with the suction pumps on in order to take in enough water to help clear clogs in the dragarm pipeline, which increases the likelihood that sea turtles in the

vicinity of the draghead will be taken by the dredge. Water ports located in the top of the dragheads would relieve the necessity of raising the draghead off the bottom to perform such an action, and reduce the chance of incidental take of sea turtles.

NOAA Fisheries supports and recommends the implementation of proposals by ERDC and SAD personnel for various draghead modifications to address scenarios where turtles may be entrained during hopper dredging (Dickerson and Clausner 2003). These include: a) an adjustable visor; b) water jets for flaps to prevent plugging and thus reduce the requirement to lift the draghead off the bottom; and c) a valve arrangement (which mimics the function of a "Hoffer" valve used on cutterhead type dredges to allow additional water to be brought in when the suction line is plugging) that will provide a very large amount of water into the suction pipe thereby significantly reducing flow through the visor when the draghead is lifted off the bottom, reducing the potential to take a turtle.

7. *Economic Incentives for No Turtle Takes*: The COE should consider devising and implementing some method of significant economic incentives to hopper dredge operators such as financial reimbursement based on their satisfactory completion of dredging operations, or *X* number of cubic yards of material moved, or hours of dredging performed, *without taking turtles*. This may encourage dredging companies to research and develop 'turtle friendly' dredging methods; more effective, deflector dragheads; pre-deflectors; top-located water ports on dragarms, etc.

8. *Sedimentation Limits to Protect Resources (Hardbottoms/Reefs)*: NOAA Fisheries recommends water column sediment load deposition rates of no more than 200 $mg/cm^2/day$, averaged over a 7-day period, to protect coral reefs and hard bottom communities from dredging-associated turbidity impacts to listed species foraging habitat.

9. *Boca Grande Pass - Conditions*: If the COE's Jacksonville District decides to renew dredging permits for the Boca Grande Pass, NOAA Fisheries recommends that the District conduct or sponsor a Gulf sturgeon study, including gillnetting and tagging utilizing ultrasonic and radio transmitters, and mtDNA sampling, to help determine the genetic origins, relative and seasonal abundance, distribution and utilization of estuarine and marine habitat by Gulf sturgeon within Charlotte Harbor estuary and Charlotte Harbor Entrance Channel, and shall report to NOAA Fisheries biannually on the progress and final results of said study.

10. *Relocation Trawling - Guidelines*: Within six months of the issuance of this Opinion, the COE's Gulf of Mexico Districts, in coordination with COE's SAD, shall develop relocation trawling guidelines to ensure safe handling and standardized data gathering techniques for sea turtles and Gulf sturgeon by COE contractors, and forward copies to NOAA Fisheries' Protected Resources Division.

Sodium Vapor Lights on Offshore Equipment: On offshore equipment (i.e., hopper dredges, pumpout barges) shielded low pressure sodium vapor lights are highly recommended for lights that cannot be eliminated.

11.0 Reinitiation of Consultation

Requirements for Reinitiation of Consultation: Reinitiation of formal consultation is required if (a) the amount or extent of taking specified in the incidental take statement is exceeded, (b) new information reveals effects of the action that may affect listed species or critical habitat when designated in a manner or

12.0 Appendices

Appendix I.

Summary of Takes by Hopper Dredges in the COE Galveston District Since the 1995 RBO.

TABLE 1

MAINTENANCE DREDGING TURTLE TAKES BY FISCAL YEAR

Date Taken	Kemp's ridley	Loggerhead	Green	Hawksbill
Fiscal Year 1995				
Feb 19, 1995			1	
Feb 22, 1995			1	
Feb 26, 1995	1			
Aug 5, 1995	1			
Aug 31, 1995	1			
Sep 4, 1995	1			
Sep 16, 1995		1		
TOTAL FY 95	4	1	2	0
Fiscal Year 1996				
Oct 9, 1995		1		
Jun 28, 1996		1		
Jul 11, 1996		1		
Jul 13, 1996		1		
Jul 22, 1996		1		
TOTAL FY 96	0	5	0	0
Fiscal Year 1997				
Oct 13, 1996		1		
Mar 26, 1997	1			
Apr 29, 1997	1			
Jun 13, 1997		1		
TOTAL FY 97	2	2	0	0
Fiscal Year 1998				
TOTAL FY 98	0	0	0	0

Fiscal Year 1999				
Oct 29, 1998		1		
Feb 18, 1999			1	
Mar 2, 1999			1	
Jun 18, 1999		1		
Jun 19, 1999		1		
Jun 30, 1999		1		
TOTAL FY 99	0	4	2	0

Fiscal Year 2000				
Aug 10, 2000		1		
Aug 15, 2000		1		
TOTAL FY 00	0	2	0	0

Fiscal Year 2001				
TOTAL FY 01	0	0	0	0

Fiscal Year 2002				
Mar 18, 2002			1	
Mar 19, 2002			2	
Mar 20, 2002			1	
Aug 11, 2002		1		
TOTAL FY 02	0	1	4	0

TOTAL	6	15	8	0

TABLE 2

NEW-WORK DREDGING TURTLE TAKES BY FISCAL YEAR

Date Taken	Kemp's ridley	Loggerhead	Green	Hawksbill
Fiscal Year 1999				
Jan 4, 1999	1			

TABLE 2

NEW-WORK DREDGING TURTLE TAKES BY FISCAL YEAR

Date Taken	Kemp's ridley	Loggerhead	Green	Hawksbill
Sep 29, 1999			1	
TOTAL FY 99	1	0	1	0
Fiscal Year 2000				
TOTAL FY 00	0	0	0	0
TOTAL	1	0	1	0

TABLE 3

TURTLE TAKES BY PROJECT

Date Taken	Kemp's ridley	Loggerhead	Green	Hawksbill
Brazos Island Harbor				
Feb 19, 1995			1	
Feb 22, 1995			1	
Feb 26, 1995	1			
Apr 29, 1997	1			
Jun 13, 1997		1		
Feb 18, 1999			1	
Mar 2, 1999			1	
Mar 18, 2002			1	
Mar 19, 2002			1	
TOTAL	2	1	6	0

Corpus Christi Ship Channel				
Sep 16, 1995		1		
Jun 18, 1999		1		
Jun 19, 1999		1		
Jun 30, 1999		1		
TOTAL	0	4	0	0

TABLE 3

TURTLE TAKES BY PROJECT

Date Taken	Kemp's ridley	Loggerhead	Green	Hawksbill
Freeport Harbor				
Oct 9, 1995		1		
Jun 28, 1996		1		
Jul 11, 1996		1		
Jul 13, 1996		1		
Jul 22, 1996		1		
Oct 29, 1998		1		
Aug 10, 2000		1		
Aug 15, 2000		1		
TOTAL	0	8	0	0
Galveston Harbor and Channel /Houston-Galveston Navigation Channels				
Aug 15, 1995	1			
Aug 31, 1995	1			
Sep 4, 1995	1			
Jan 4, 1999	1			
Sep 29, 1999			1	
TOTAL	4	0	1	0
Matagorda Ship Channel				
Oct 13, 1996		1		
TOTAL	0	1	0	0
Sabine – Neches Waterway				
Mar 26, 1997	1			
Aug 11, 2002		1		
TOTAL	1	1	0	0
Port Mansfield Channel				

TABLE 3

TURTLE TAKES BY PROJECT

Date Taken	Kemp's ridley	Loggerhead	Green	Hawksbill
Mar 19, 2002			1	
Mar 20, 2002			1	
TOTAL	0	0	2	0

Appendix II:

PROTOCOL FOR COLLECTING TISSUE FROM DEAD TURTLES FOR GENETIC ANALYSIS

Method for Dead Turtles

<<<IT IS CRITICAL TO USE A NEW SCALPEL BLADE AND GLOVES FOR EACH TURTLE TO AVOID CROSS-CONTAMINATION OF SAMPLES>>>

1. Put on a new pair of latex gloves.
2. Use a new disposable scalpel to cut out an approx. 1 cm (½ in) cube (bigger is NOT better) piece of muscle. Easy access to muscle tissue is in the neck region or on the ventral side where the front flippers "insert" near the plastron. It does not matter what stage of decomposition the carcass is in.
3. Place the muscle sample on a hard uncontaminated surface (plastron will do) and make slices through the sample so the buffer solution will penetrate the tissue.
4. Put the sample into the plastic vial containing saturated NaCl with 20% DMSO *(SEE BELOW)
5. Use the pencil to write the stranding ID number (observer initials, year, month, day, turtle number by day), species, state and carapace length on the waterproof paper label and place it in the vial with the sample. EXAMPLE: For a 35.8 cm curved carapace length green turtle documented by Jane M. Doe on July 15, 2001 in Georgia, the label should read "JMD20010715-01, C. mydas, Georgia, CCL=35.8 cm". If this had been the third turtle Jane Doe responded to on July 15, 2001, it would be JMD20010715-03.
6. Label the outside of the vial with the same information (stranding ID number, species, state and carapace length) using the permanent marker.
7. Place clear scotch tape over the writing on the vial to protect it from being smeared or erased.
8. Wrap parafilm around the cap of the vial by stretching it as you wrap.
9. Place vial within whirlpak and close.
10. Dispose of the scalpel.
11. Note on the stranding form that a part was salvaged, indicating that a genetic sample was taken and specify the location on the turtle where the sample was obtained.
12. Submit the vial with the stranding report to your state coordinator. State coordinators will forward the reports and vials to NMFS for processing and archiving.

*The 20% DMSO buffer in the plastic vials is nontoxic and nonflammable. Handling the buffer without gloves may result in exposure to DMSO. This substance soaks into skin very rapidly and is commonly used to alleviate muscle aches. DMSO will produce a garlic/oyster taste in the mouth along with breath odor. The protocol requires that you WEAR gloves each time you collect a sample and handle the buffer vials.

The vials (both before and after samples are taken) should be stored at room temperature or cooler. If you don't mind the vials in the refrigerator, this will prolong the life of the sample. DO NOT store the vials where they will experience extreme heat (like in your car!) as this could cause the buffer to break down and not preserve the sample properly.

Questions:

Sea Turtle Program
NOAA/NMFS/SEFSC
75 Virginia Beach Drive
Miami, FL 33149
305-361-4207

THANK YOU FOR COLLECTING SAMPLES FOR SEA TURTLE GENETIC RESEARCH!!

Genetic Sample Kit Materials – DEAD turtles

latex gloves
single-use scalpel blades (Fisher Scientific 1-800-766-7000, cat. # 08-927-5A)
plastic screw-cap vial containing saturated NaCl with 20% DMSO, wrapped in parafilm
waterproof paper label, ¼" x 4"
pencil to write on waterproof paper label
permanent marker to label the plastic vials
scotch tape to protect writing on the vials
piece of parafilm to wrap the cap of the vial

- whirl-pak to return/store sample vial

Appendix III:

PROTOCOL FOR COLLECTING TISSUE FROM LIVE TURTLES FOR GENETIC ANALYSIS

Method for Live Turtles

<<<IT IS CRITICAL TO USE A NEW BIOPSY PUNCH AND GLOVES FOR EACH TURTLE TO AVOID CROSS-CONTAMINATION OF SAMPLES>>>

1. Turn the turtle over on its back.
2. Put on a new pair of latex gloves.
3. Swab the entire cap of the sample vial with alcohol.
4. Wipe the ventral and dorsal surfaces of the rear flipper 5-10 cm from the posterior edge with the Betadine/iodine swab.
5. Place the vial under the flipper edge to use the cleaned cap as a hard surface for the punch.
6. Press a new biopsy punch firmly into the flesh as close to the posterior edge as possible and rotate one complete turn. Cut all the way through the flipper to the cap of the vial.
7. Wipe the punched area with Betadine/iodine swab; rarely you may need to apply pressure to stop bleeding.
8. Use a wooden skewer to transfer the sample from the biopsy punch into the plastic vial containing saturated NaCl with 20% DMSO *(SEE BELOW)
9. Use the pencil to write the stranding ID number (observer initials, year, month, day, turtle number by day), species, state and carapace length on the waterproof paper label and place it in the vial with the sample. EXAMPLE: For a 35.8 cm curved carapace length green turtle documented by Jane M. Doe on July 15, 2001 in Georgia, the label should read "JMD20010715-01, C. mydas, Georgia, CCL=35.8 cm". If this had been the third turtle Jane Doe responded to on July 15, 2001, it would be JMD20010715-03.
10. Label the outside of the vial with the same information (stranding ID number, species, state and carapace length) using the permanent marker.
11. Place clear scotch tape over the writing on the vial to protect it from being smeared or erased.
12. Wrap parafilm around the cap of the vial by stretching it as you wrap.
13. Place vial within whirlpak and close.
14. Dispose of the biopsy punch.
15. Note on the stranding form that a part was salvaged, indicating that a genetic sample was taken and specify the location on the turtle where the sample was obtained.
16. Submit the vial with the stranding report to your state coordinator. State coordinators will forward the reports and vials to NMFS for processing and archiving.

*The 20% DMSO buffer in the plastic vials is nontoxic and nonflammable. Handling the buffer without gloves may result in exposure to DMSO. This substance soaks into skin very rapidly and is commonly used to alleviate muscle aches. DMSO will produce a garlic/oyster taste in the mouth along with breath odor. The protocol requires that you WEAR gloves each time you collect a sample and handle the buffer vials.

The vials (both before and after samples are taken) should be stored at room temperature or cooler. If you don't mind the vials in the refrigerator, this will prolong the life of the sample. DO NOT store the vials where they will experience extreme heat (like in your car!) as this could cause the buffer to break down and not preserve the sample properly.

Questions:

Sea Turtle Program
NOAA/NMFS/SEFSC
75 Virginia Beach Drive
Miami, FL 33149
305-361-4207

THANK YOU FOR COLLECTING SAMPLES FOR SEA TURTLE GENETIC RESEARCH!!

Genetic Sample Kit Materials – LIVE turtles

- latex gloves
  alcohol swabs
  Betadine/iodine swabs
  4-6 mm biopsy punch – sterile, disposable (Moore Medical Supply 1-800-678-8678, part #0052442)
  plastic screw-cap vial containing saturated NaCl with 20% DMSO, wrapped in parafilm
  wooden skewer
  waterproof paper label, ¼" x 4"
- pencil to write on waterproof paper label
  permanent marker to label the plastic vials
  scotch tape to protect writing on the vials
  piece if parafilm to wrap the cap of the vial
  whirl-pak to return/store sample vial

Appendix IV: SEA TURTLE HANDLING AND RESUSCITATION GUIDELINES

Any sea turtles taken incidentally during the course of fishing or scientific research activities must be handled with due care to prevent injury to live specimens, observed for activity, and returned to the water according to the following procedures:

A) Sea turtles that are actively moving or determined to be dead (as described in paragraph (B)(4) below) must be released over the stern of the boat. In addition, they must be released only when fishing or scientific collection gear is not in use, when the engine gears are in neutral position, and in areas where they are unlikely to be recaptured or injured by vessels.

B) Resuscitation must be attempted on sea turtles that are comatose or inactive by:

1. Placing the turtle on its bottom shell (plastron) so that the turtle is right side up and elevating its hindquarters at least 6 inches (15.2 cm) for a period of 4 to 24 hours. The amount of elevation depends on the size of the turtle; greater elevations are needed for larger turtles. Periodically, rock the turtle gently left to right and right to left by holding the outer edge of the shell (carapace) and lifting one side about 3 inches (7.6 cm) then alternate to the other side. Gently touch the eye and pinch the tail (reflex test) periodically to see if there is a response.

2. Sea turtles being resuscitated must be shaded and kept damp or moist but under no circumstance be placed into a container holding water. A water-soaked towel placed over the head, carapace, and flippers is the most effective method in keeping a turtle moist.

3. Sea turtles that revive and become active must be released over the stern of the boat only when fishing or scientific collection gear is not in use, when the engine gears are in neutral position, and in areas where they are unlikely to be recaptured or injured by vessels. Sea turtles that fail to respond to the reflex test or fail to move within 4 hours (up to 24, if possible) must be returned to the water in the same manner as that for actively moving turtles.

4. A turtle is determined to be dead if the muscles are stiff (rigor mortis) and/or the flesh has begun to rot; otherwise, the turtle is determined to be comatose or inactive and resuscitation attempts are necessary.

Any sea turtle so taken must not be consumed, sold, landed, offloaded, transshipped, or kept below deck.

These guidelines are adapted from 50 CFR § 223.206(d)(1). Failure to follow these procedures is therefore a punishable offense under the Endangered Species Act.

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