ANNUAL SEA TURTLE MONITORING REPORT
GALVESTON DISTRICT
FISCAL YEAR 1997

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INTRODUCTION

This report is submitted in fulfillment of requirements of the Endangered Species Act and the Section 7 Consultation - Biological Opinion, dated September 22, 1995, concerning channel maintenance dredging using a hopper dredge. Specifically, this report, summarizing hopper dredging operations in Fiscal Year (FY) 1997 within the Galveston District, is submitted in compliance with reasonable and prudent measure No. 8 - Reporting.

The following five hopper dredging projects were completed in FY 97.

Matagorda Ship Channel	Oct 3, 1996 – Oct 21, 1997
Galveston Harbor and Channel	Dec 6, 1996 – Mar 31, 1997
Freeport Harbor	Jan 5, 1997 – Apr 21, 1997
Sabine-Neches Waterway	Mar 12, 1997 – Sep 25, 1997
Brazos Island Harbor	Mar 30, 1997 – Jun 14, 1997

The use of hopper dredges to maintain these navigation projects is necessary because of three factors: safety, weather conditions and productivity. These factors are closely interrelated; however, the underlying emphasis is placed on safety. The nearshore Gulf of Mexico is characterized by a wide shallow shelf. The Sabine-Neches Waterway, for example, extends about 22 miles into the Gulf. A cutterhead dredge operating offshore would require a pipeline length that could extend for several miles.

The dredges operating in these channels must be highly mobile to rapidly maneuver out of the way of other vessels. Pipeline cutterhead dredges are not self-propelled, and are held into position with spuds. Furthermore, the swing of the cutterhead is controlled by cables attached to the cutterhead arm. These cables are anchored along the outer limits of the channel to be dredged. Prior to moving the dredge, tenders must raise the anchors, and a towboat must be fastened to the dredge. These characteristics prevent the pipeline dredge from quickly moving out of the channel when other vessels approach. From a practical standpoint, dredges are generally not relocated for normal ship traffic, rather, dredging may be interrupted, but the dredge remains a stationary obstruction in half of the channel. This situation is encountered in inland bays. The use of hopper dredges in the Gulf avoids such a stationary obstruction.

Weather conditions also affect the safety of the dredge and crew. Pipeline cutterhead dredges were not designed to operate in open-sea conditions. Due to the reasons stated above, these dredges cannot rapidly demobilize in harsh weather. The pipelines used to transport the dredged material to the placement sites would also be highly susceptible to breaking during rough weather. Even in relatively sheltered bays, cutterhead dredges often stop dredging in rough

weather, and during frontal passages, only water is pumped to keep tension on the pipelines to prevent breaking. In the open Gulf of Mexico, this precaution would not be effective, even if it were possible to leave the dredge offshore. During relatively calm weather conditions, only the largest cutterhead dredges would be able to operate efficiently. Sea swells make it difficult to control the depth of the cutterhead; consequently, this affects the dredging operation. To illustrate this point, in 1977, a 27-inch diameter pipeline cutterhead dredge sank near the jetties while dredging the Entrance Channel of the Port Mansfield project. A frontal passage caused large waves, which battered the dredge, breaking the spud used to secure the vessel. Water entered the dredge through cable ports faster than it could be pumped out. A 27-inch dredge is one of the largest dredges commonly used within the Galveston District.

Productivity of the dredging operation is important because the purpose of dredging is to remove shoals and provide a safe depth for waterborne traffic. The use of cutterhead pipeline dredges in the open Gulf would result in frequent relocations, or other interruptions, due to weather and traffic conditions. Consequently, it would take longer to remove shoals, which in themselves present a hazard to safe navigation. The longer the time to remove the shoals, the longer a dredge must be on site to maintain the channel. The presence of the dredge and pipeline, themselves, present an obstruction to safe navigation. For these reasons, hopper dredges are used exclusively to maintain entrance channels in the Galveston District.

The Galveston District will attempt to schedule hopper-dredging operations during the December 1 through March 31 window, wherever feasible. However, it is impossible to schedule all hopper-dredging projects during this time frame, due to the availability of the hopper dredge fleet. Hopper dredging priorities are developed in concert with other Corps Districts that conduct these operations along the East Atlantic and Gulf Coasts. The priorities are determined after considering the dredging needs and resident sea turtle populations within the various Districts.

TURTLE MONITORING PROGRAM

A result of the consultation process, was the requirement to document turtle takes by the dredges. In order to accomplish this task, before hopper dredging operations commenced, they were equipped such that all inflows and overflows would be screened. The configuration and location of the screens depends upon the construction of the dredge. The mesh size of this screening is 4-inches by 4-inches. Additionally, around-the-clock monitoring by NMFS-approved turtle inspectors was conducted to identify any turtles or turtle parts that were caught on these screens. Draghead deflectors were also deployed to deflect any turtles that may happen to be in, or near, the path of the draghead during excavation. The design of the deflectors is such that a sediment riffle is created ahead of the draghead, cushioning any contact with turtles thereby preventing injuries.

The observers inspected and cleaned all inflow and overflow screening at the end of each load. Dragheads and deflectors were also inspected immediately after each load, and dredge personnel were informed if repairs were necessary. Data sheets were completed daily, detailing all biological samples and debris found in the screening and dragheads. The observers also recorded the start, end and discharge times for each load, the specific location of the dredging area, the type of material being dredged, weather, tide and water temperature data, the condition of the screening, and any other pertinent information. Any sea turtle encounters or takes were described on a separate incident report form. Additionally, all incidents were photographed and diagrams were made of the specimen sampled. Dead specimens were frozen until all concerned parties were notified. Specimens were then weighted with scrap iron and disposed of at the dredged material placement site, thereby ensuring that these same samples would not wash ashore or be taken again by the dredge.

A bridge watch for sea turtles and marine mammals was maintained during all daylight hours, except when the observer was off the bridge, cleaning and inspecting the screens and dragheads. All sightings of cetaceans and sea turtles were recorded in a bridge watch logbook.

SCREEN CONFIGURATIONS

Turtle monitoring activities were conducted aboard seven different hopper dredges during FY 1997. These are the *Atchafalaya*, *Ouachita*, *Mermentau*, *Padre Island*, *Sugar Island*, *Stuyvesant*, and *Eagle I.* Each of these vessels was required to have 100% inflow screening with openings no greater than 4" x 4", and rigid draghead deflectors.

PROJECTS

Matagorda Ship Channel - Entrance Channel

On October 3, 1996, the contract hopper dredge *Ouachita* began work in the Entrance Channel of the Matagorda Ship Channel Project. Contract specifications required dredging an estimated 392,000 cubic yards (CY) of shoal material. The required depth of dredging was 41 feet below Mean Low Tide (MLT, Corps of Engineers Datum), with 2 feet of allowable overdepth dredging, except for the channel segment from Stations -9+000 to -9+500 where the required depth was -43 feet MLT with 2 feet of overdepth.

Dredging began on October 3, 1996, and was completed on October 21, 1996. A total of 270 loads of dredged material was collected and deposited into Placement Area No. 1. Dredging was performed between Stations -9+000 and -20+000. A total of 488,383 CY of material was excavated from within the channel.

The dredge was equipped with draghead turtle deflectors, and 100% inflow screening with a 4-inch square mesh. NMFS-approved turtle observers provided 24-hour/day monitoring of dragheads and screens for each load cycle. The observers were employed by Coastwise Consulting under a subcontract to the dredging contractor, Gulf Coast Trailing Co., Inc.

During the performance of this dredging, only one sea turtle take was experienced. This take of a loggerhead occurred on October 13, in load No. 154.

Water temperatures were taken in conjunction with the screen and draghead monitoring. The water seemed to be well mixed, as the surface and below mid-depth temperatures were nearly identical. These temperatures ranged from 23EC to 26EC. The single turtle take occurred when the water temperature was about 24EC.

Throughout the duration of dredging, bridge watch observations included numerous sightings of bottlenose dolphins (*Tursiops truncatus*), and one sighting on October 10, of an adult Kemp's ridley sea turtle swimming in the vicinity.

The material dredged consisted of primarily sand with silt, and clay. Non-biological samples commonly included wood, netting, rocks, monofilament fishing line, plastic bags, and cable, along with other debris. The most common biological samples were comprised of various species of fish, rays, crabs, shrimp, conchs, whelks, whelk eggs, eels, worms, grasses, and jellyfish.

Galveston Harbor and Channel - Entrance Channel and Anchorage Area

On December 6, 1996, contract hopper dredges began work on the Entrance Channel and Anchorage Area of the Galveston Harbor and Channel Project. Contract specifications required dredging an estimated 2,386,000 CY of shoal material. The required depth of dredging was -36 feet MLT, with 2 feet of allowable overdepth dredging along the Anchorage Area, -42 feet MLT with 1 foot of overdepth along the Inner Bar Channel, -44 feet MLT with 1 foot of overdepth along the Outer Bar Channel and -45 feet MLT with 1 foot of overdepth along the Entrance Channel.

Dredging began on December 6, 1996, and was completed on March 31, 1997. Three dredges were employed under this contract; they were the *Padre Island*, *Sugar Island*, and the *Stuyvesant*. The *Padre Island* worked from December 6, 1996 until December 14, 1996, and dredged 44 loads of dredged material. This dredge then returned to remove an additional 13 loads from March 29 through March 13, 1997. The *Stuyvesant* worked from January 20, 1997 until February 10, 1997, dredging 140 loads. The *Sugar Island* worked from January 26, 1997 until March 11, 1997, dredging 370 loads. A total of 567 loads of dredged material were collected and placed into Placement Area No. 1. Dredging was performed between Stations

4+649.75 of the Inner Bar Channel and 25+000 in the Outer Bar Channel, and 36+000 to 56+000 in the Entrance Channel. A total of 2,525,532 CY of material was excavated from this project.

The dredges were equipped with draghead turtle deflectors, and 100% inflow screening with a 4-inch square mesh. NMFS-approved turtle observers provided 24-hour/day monitoring of dragheads and screens for each load cycle. The observers were employed by Coastwise Consulting under a subcontract to the dredging contractor, NATCO Limited Partnership.

No turtles were encountered during the performance of this dredging.

Water temperatures were taken in conjunction with the screen and draghead monitoring. The water seemed to be well mixed, as the surface and below mid-depth temperatures were nearly identical. These temperatures ranged from 10EC to 27EC

Throughout the duration of dredging, bridge watch observations included numerous sightings of bottlenose dolphins.

The material dredged consisted of primarily silt with clay, and sand. Non-biological samples commonly included wood, netting, rocks, monofilament fishing line, plastic bags, and cable, along with other debris. The most common biological samples were comprised of various species of fish, rays, crabs, shrimp, whelks, whelk eggs, eels, gastropods, bivalves, polychaetes, and jellyfish.

Recurring difficulties experienced by the observers involved the excessive amounts of clay that were often dredged. The clay was taken as cohesive masses, which often clogged the screening and made cleanup physically difficult and time-consuming. The dredge also often picked up abundant amounts of trash, which fouled the screens and required manual removal.

Freeport Harbor - Entrance and Jetty Channels

On January 5, 1997, contract hopper dredges began emergency work on the Entrance and Jetty Channels of the Freeport Harbor Channel Project. Contract specifications required dredging an estimated 2,773,000 CY of shoal material. The required depth of dredging was -49 feet MLT, with 2 feet of allowable overdepth dredging along the Entrance Channel and -47 feet MLT with 2 feet of overdepth along the Jetty Channel.

Dredging began on January 5, 1997, and was completed on April 21, 1997. Three dredges were employed under this contract, they were the *Sugar Island, Eagle I* and the *Padre Island*. The *Sugar Island* worked from January 5, 1997 until January 26, 1997, dredging 224 loads. The *Eagle I* worked from January 25, 1997 until February 22, 1997, and dredged 497 loads of dredged material. The *Padre Island* worked from April 1, 1997 until April 21, 1997, and

dredged 229 loads of dredged material. A total of 950 loads of dredged material were collected and placed into Placement Area No. 1-A. Dredging was performed between Stations 71+52.58 along the Jetty Channel and -200+00 along the Entrance Channel. A total of 2,488,808 CY of material was excavated from this project.

The dredge was equipped with draghead turtle deflectors, and 100% inflow screening with a 4-inch square mesh. NMFS-approved turtle observers provided 24-hour/day monitoring of dragheads and screens for each load cycle. During stormy weather, however, on January 12 and 13, the screens were left open at night because of safety concerns for the observers operating in the dark in rough conditions. The observers were employed by Coastwise Consulting under a subcontract to the dredging contractor, Bean Horizon Corp.

No turtles were encountered during the performance of this dredging.

Water temperatures were taken in conjunction with the screen and draghead monitoring. The water seemed to be well mixed, as the surface and below mid-depth temperatures were nearly identical. These temperatures ranged from 11EC to 22EC.

Throughout the duration of dredging, bridge watch observations included numerous sightings of bottlenose dolphins.

The material dredged consisted of primarily silt with clay, and sand. Non-biological samples commonly included wood, netting, rocks, monofilament fishing line, plastic bags, and cable, along with other debris. The most common biological samples were comprised of various species of fish, rays, crabs, shrimp, whelks, eels, tunicates, and jellyfish.

Recurring difficulties experienced by the observers involved the excessive amounts of clay that were often dredged. The clay was taken as cohesive masses that often clogged the screening and made cleanup physically difficult and time-consuming. The dredge also often picked up abundant amounts of grass and trash, which fouled the screens and required manual removal. This material also caused the screening on the *Eagle I* to warp, leaving gaps that made the screening process inefficient. This problem was eventually corrected after numerous attempts.

Sabine-Neches Waterway - Sabine Pass Outer Bar Channel.

On March 12, 1997, contract hopper dredges began work on the Sabine Pass Outer Bar, and Sabine Bank Channels of the Sabine-Neches Waterway Project. Dredging specifications required dredging an estimated 3,800,000 CY of shoal material. The required depth of dredging was -44 feet MLT, with 2 feet of allowable overdepth dredging.

Dredging began on March 12, 1997, and was completed on September 25, 1997. Three dredges were employed under this contract; they were the *Mermentau, Atchafalaya,* and the *Ouachita*. The *Mermentau* worked from March 12, 1997 until August 1, 1997, dredging 3,237 loads. The *Atchafalaya* worked from June 6, 1997 until August 27, 1997, and excavated 342 loads of dredged material. The *Mermentau* and *Atchafalaya* also conducted bed-leveling operations. The *Ouachita* worked from August 4, 1997 until September 25, 1997, and dredged 997 loads of dredged material. A total of 4,576 loads of dredged material were collected and placed into the four Placement Areas. Dredging was performed Stations 0+000 and 20+000 along the Outer Bar Channel. The two segments of the Sabine Bank Channel that were dredged extended from Stations 40+000 to 46+000, and 70+000 to 90+000. A total of 4,727,775 CY of material were excavated from within the channel.

The dredges were equipped with draghead turtle deflectors, and 100% inflow screening with a 4-inch square mesh. NMFS-approved turtle observers provided 24-hour/day monitoring of dragheads and screens for each load cycle. The observers were employed by Coastwise Consulting under a subcontract to the dredging contractor, Gulf Coast Trailing Co., Inc.

Bed-leveling operations consisted of water injection dredging (WID). This process involves the injection of a high volume of low-pressure water into the sediment. This raises the sediment as a mass, without significant dispersion, creating a gravity flow of the material toward the low areas in the channel. This was accomplished by installing a water injection head onto one of the dragheads. The other draghead was suspended in the water column about 12 feet from the surface, and functioned as the input of the injected water. During the course of the WID operations, the inflow screens continued to be monitoring, at approximately 6-hour intervals. This WID process was conducted in lieu of traditional sweeping operations. Anecdotal evidence suggests that sweeping operations result in a significant number of turtle takes during hopper dredge operations.

During the performance of this dredging, one sea turtle take was documented. This was a Kemp=s ridley taken by the *Mermentau* on March 26 in load No. 376. This turtle was taken from the Outer Bar Channel within 5,000 feet of the end of the jetties. The water temperature was about 19°C. Following this take, dredging continued for six months, during which the water temperature increased to 32°C. This later dredging was conducted more distant from the jetty, than the channel segment where the turtle take occurred. There were also instances where turtles were swimming in the vicinity of the dredge, in the more Gulfward sections. This suggests that as the distance from the jetties increases, the likelihood for lethal turtle encounters decreases.

Water temperatures were taken in conjunction with the screen and draghead monitoring. There seemed to be a slight stratification of the water column, as suggested by comparisons of the surface temperature with the below mid-depth temperature. The below mid-depth temperatures tended to be about 1 to 2EC cooler than the surface temperature until around late June, when the

water seemed to lose this stratification and temperatures became nearly identical. Throughout the project, both the surface temperature and the below surface temperature ranged form 16EC to 32EC.

Throughout the duration of dredging, bridge watch observations included numerous sightings of bottlenose dolphins. There were also several observations of sea turtles swimming in the vicinity of the dredge. On July 10 and August 1, unidentified turtles were observed, while on July 9 and July 16, Kemp's ridley turtles were seen, one of which was associated with a sargassum drift. On August 11 and August 19, loggerheads was found swimming in the vicinity. On August 12, a dead loggerhead was observed floating in the area. This turtle was moderately decomposed and had a severely cracked carapace. This injury was not attributed to hopper dredging operations.

The material dredged consisted of primarily silt, with occasional accumulations of stiff clay. Non-biological samples commonly included rope, wood, netting, and rocks, along with other debris. The most common biological samples were comprised of various species of fish, rays, blue crabs, shrimp, whelks, whelk eggs, eels, moonsnails, seagrass, algae, worms, other crab species, jellyfish, and occasional bones and shell.

One of the difficulties experienced by the observers involved the characteristics of the clay that was occasionally dredged. The clay was taken as cohesive masses, which often clogged the screening and made cleanup physically difficult and time-consuming. The dredge also often picked up abundant amounts of trash, which fouled the screens and required manual removal.

Brazos Island Harbor - Entrance Channel

On March 30, 1997, contract hopper dredges began work on the Entrance Channel of the Brazos Island Harbor Project. Contract specifications required dredging an estimated 793,000 CY of shoal material. However, only about 285,000 CY were to be removed by hopper dredge. The remainder of the material was to be excavated by pipeline dredge and used for beach nourishment. The required depth of dredging was -46 feet MLT, with 2 feet of allowable overdepth dredging.

Dredging began on March 30, 1997, and was completed on June 14, 1997. Two dredges were employed under this contract; they were the *Atchafalaya* and the *Eagle I*. The *Atchafalaya* worked from March 30, 1997 until June 4, 1997, dredging 301 loads. The *Eagle I* worked from June 9, 1997 until June 14, 1997, and dredged 41 loads (numbered 299 to 339) of dredged material. A total of 342 loads of dredged material were collected and placed into Placement Area No. 1. Hopper dredging was performed between Stations -6+000 and -12+000 along the Entrance Channel. A total of 350,907 CY of material was excavated by hopper dredges from this project.

The dredge was equipped with draghead turtle deflectors, and 100% inflow screening with a 4-inch square mesh. NMFS-approved turtle observers provided 24-hour/day monitoring of dragheads and screens for each load cycle. The observers were employed by Coastwise Consulting under a subcontract to the dredging contractor, Gulf Coast Trailing Co., Inc.

During the performance of this dredging, a total of two sea turtle takes were documented. The first was a Kemp=s ridley taken by the *Atchafalaya* on April 29 in load No. 160. The second was a loggerhead taken on June 13, by the *Eagle I* in load No. 336.

Water temperatures were taken in conjunction with the screen and draghead monitoring. The water seemed to be well-mixed, as the surface and below mid-depth temperatures were nearly identical. These temperatures ranged from 18EC to 29EC. The Kemp's ridley was taken when the water temperature was about 21EC; the loggerhead was taken when the temperature was about 27EC.

Throughout the duration of dredging, bridge watch observations included numerous sightings of bottlenose dolphins.

The material dredged consisted of primarily sand with some silt and clay. Non-biological samples commonly included rope, wood, netting, and rocks, along with other debris. The most common biological samples were comprised of various species of fish, eels, rays, crabs, shrimp, whelks, whelk egg cases, squid, sea stars, brittle stars, urchins, sea cucumbers, bryozoans, jellyfish, and sargassum. The screens were occasionally clogged with sargassum and bryozoans, which resulted in downtime while the screens were manually cleared.

COSTS

The costs incurred in performing the turtle-monitoring program during FY 1997 include the costs for equipping and maintaining screens and draghead deflectors on contractor-owned dredges, as well as providing NMFS-approved observers. In addition to the direct costs are District costs for administration and oversight. Below is a table depicting the costs for FY 1997. However, costs not included in this discussion are unquantifiable costs associated with decreased dredging efficiency which may result from the use of the draghead deflectors, and downtime experienced during cleaning of excessively fouled screens. Estimates of these increased costs are anticipated by the potential contractors during the preparation of bids, and there is no way to determine the actual value of these costs.

ANNUAL SEA TURTLE MONITORING REPORT.
GALVESTON DISTRICT - FISCAL YEAR 1997 (Cont'd.)

PROJECT	COST OF MONITORING
Matagorda Ship Channel	$50,000.00
Galveston Harbor and Channel	$56,000.00
Freeport Harbor	$85,000.00
Sabine Neches Waterway	$45,000.00
Brazos Island Harbor	$20,000.00
District labor	$17,920.00
TOTAL	$273,920.00

SUMMARY

During Fiscal Year 1997, five maintenance-dredging projects were performed by hopper dredges. Below is a table summarizing lethal turtle encounters.

	SPECIES TAKEN		
PROJECT	*Chelonia mydas*	*Lepidochelys kempi*	*Caretta caretta*
Matagorda Ship Channel	0	0	1
Sabine-Neches Waterway	0	1	0
Brazos Island Harbor	0	1	1
TOTALS	0	2	2