DRAFT FINAL REPORT

THE MONITORING AND MITIGATION OF IMPACTS TO PROTECTED SPECIES DURING BEACH RESTORATION AT COLLIER COUNTY, FLORIDA

Submitted To:

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INTRODUCTION

Coastwise Consulting, Incorporated (CCI) provided Great Lakes Dredge & Dock Company with the required monitoring and mitigation of impacts to endangered and threatened species during the dredging operations at the Collier County Shore Protection Project. The most commonly encountered endangered or protected species in this area are the loggerhead sea turtle (*Caretta caretta*) and West Indian manatee (*Trichechus manatus*). Several other species less likely to be encountered include the sea turtle species Kemp's ridley (*Lepidochelys kempi*), green (*Chelonia mydas*), hawksbill (*Eretmochelys imbricata*) and leatherback (*Dermochelys coriacea*).

While several marine mammal species may be encountered, principally the bottlenose dolphin (*Tursiops truncatus*), none of the activities undertaken by Great Lakes were documented to have an adverse effect on marine mammals. Manatee precautions were required near shore. However, most manatees occur near grassbeds, structures where macro-algae proliferates (seawalls), sources of fresh water, such as creeks and water hoses at marinas and were succesfully avoided by support vessels.

Hopper dredging was closely monitored for indications that any of the listed species, especially turtles, has been impacted. Great Lakes Dredge & Dock dredges are equipped with some of the most effective screening systems in the industry. The operators of all dredges and support vessels were thoroughly briefed on manatee behavior and biology, as well as, the mandated modes of vessel/dredge operation in manatee habitat.

The *Sugar Island* was on site from 02/20/06 – 05/22/06, 91 days
The *Manhattan Island* was on site 03/01/05 – 05/21/06, 82 days
173 "dredge days"*

A shrimp trawler rigged for relocating sea turtles
from the borrow site worked from 02/10/6 – 05/22/06, 103 trawl days*

No turtles were taken during the course of this project.
No other impacts to protected species were observed.
A total of 87 turtles were successfully relocated during this project.

*Total days do not account for brief interruptions for weather and fueling.

HOPPER DREDGE MONITORING

The Great Lakes Hopper dredges *Sugar Island* and *Manhattan Island* were used for dredging at the Collier County Shore Protection Project. During dredging operations endangered species observers, approved by the National Marine Fisheries Service, provided twenty-four hour monitoring of impacts to endangered and protected species, particularly sea turtles.

Rigid turtle deflectors were installed on the dragheads before work began and all points of inflow were screened before the observers board the dredge(s). Inflow occurs on these Great Lakes *Island* dredges at the end of four pipes, two of which empty into the forward section of the hopper, port and starboard, and two of which discharge at the aft end of the hopper, port and starboard. Cages are attached directly to the ends of the discharge pipes and are constructed of steel bar-stock, welded in a grid pattern, with openings of approximately 4" x 4". Observers gain access into the top of these cages

through hinged trap doors. The aft walls of the cages are hinged and can be opened by hydraulic rams in order to clear the cages of debris after inspection by observers.

Observers cleaned and inspected this screening, around-the-clock, in order to document any evidence of turtle take. Before cleaning and inspecting the screens, the observers checked the dragheads and turtle deflectors. Load sheets were completed at the end of each load cycle, detailing everything found in the screening or the dragheads, as well as the condition of the screens and the deflectors. Also recorded was the start, end and pump times for each load, the specific location of the dredging area, the type of material being dredged, weather, tide and water temperature data (surface and mid-depth), and any other pertinent information.

Observers maintained a bridge watch for protected species and noted all sightings of turtles and marine mammals. All sightings were summarized on the Daily Reports. Sightings data included date, time, location, species, number of animals, distance and bearing from dredge, direction of travel and any other information available. Daily Reports and Weekly Summaries were filed with Great Lakes.

Had there been a turtle take or suspected take, observers follow the following protocol: Photograph and measure samples. Samples which are not positively identified are frozen in the ship's freezer for later analyses. Samples are then sent ashore to be handled by the local Sea Turtle Salvage and Stranding Network (STSSN). A small piece of tissue from all turtles taken will be preserved in DMSO for later genetic analyses (see Appendix 1). Injured but living turtles are delivered to a facility that can provide rehabilitation to injured turtles.

SEA TURTLE RELOCATION TRAWLING

Introduction

Shrimp trawlers have been successfully used to capture sea turtles for research and relocation for over 20 years. The *research* motivation for the trawl capture of turtles is usually to provide a means for attaching tags to non-nesting turtles. The capture of turtles using shrimp trawlers for the purpose of *relocation* is usually associated with hopper dredging. The imperative of relocation trawling is to reduce the potential for turtle mortality associated with dredging.

During the past 10 years Coastwise Consulting has conducted over 1100 days of live-capture trawling at the port entrances and beach borrow sites near Norfolk, VA, Atlantic Beach and Wilmington, NC, Murrell's Inlet and Charleston, SC Savannah, Brunswick and Kings Bay Naval Base, GA, Jacksonville, Cape Canaveral, Cocoa Beach, West Palm, Naples, Longboat Key, Destin and Pensacola, FL, Mobile, AL, Pascagoula and Gulfport, MS, the MRGO and the Cameron, LA and Sabine Pass, Galveston, Freeport and Brownsville, TX. *Over 450 turtles have been captured*, tagged, relocated and released with less than 3% captures and no injuries or mortalities associated with trawling activity. We have captured all sea turtle species native to North American waters including loggerheads, Kemp's ridleys, greens, hawksbills and leatherbacks. We have also successfully relocated Atlantic and Gulf Sturgeon.

Methods

Coastwise Consulting conducts trawling using methods developed by the USACE Waterways Experiment Station. Turtles are captured with trawl nets in the dredge area prior to and/or during dredging operations. Methods and equipment are standardized including data sheets, nets and length of tow time. Data on each tow is recorded using standard data sheets. The trawler is equipped with two 60 foot trawl nets constructed from 8 inch mesh (stretch) fitted with mud rollers and floats as specified by the USACE (see Appendix 3).

Trawling is targeted at the active dredging site within the channel or borrow area. The physical length of each tow may vary as dictated by large vessel traffic in the area or by the size and configuration of the borrow site but the temporal length of the tows is always strictly limited to 42 minutes (total time).

Positions at the beginning and end of each tow are determined from GPS positioning equipment. Tow speed is recorded at the approximate midpoint of each tow. Water temperature measurements are taken twice each day. Weather conditions are recorded from visual observations and instruments on the trawler. Weather conditions recorded include air temperature, wind velocity and direction, sea state, wave height and precipitation. High and low tides also are recorded, as well as tidal stages associated with each tow.

Captured turtles are photographed, measured, biopsied for genetics (see Appendix 2), epibionts present are recorded and each turtle is tagged. One inconel tag is applied on each front flipper, on the second or third proximal scutes, along the trailing edge of the flippers. Turtles are then relocated at least 3 nautical miles from the dredge site in a direction that provides for the least likelihood of recapture.

All work in Florida waters is performed under NOAA National Marine Fisheries Service Federal Endangered Species Permit # 1380 and Florida Fish and Wildlife Conservation Commission Marine Turtle Permit #097.

RESULTS

Hopper Dredge Monitoring

The *Sugar Island* was on site from the beginning of the project on 02/20/06, to the end of the project, 05/22/06, a total of 91 days. The *Manhattan Island* was on site 03/01/06 to 05/21/06, for a total of 82 days. Over the course of these 94 days, no evidence of turtle take by either dredge was documented. This is significant when dredge effort is figured at 173 “dredge days”, based on the operation of both dredges.

We believe that the successful completion of this project with no turtle mortalities should be credited to two primary factors: 1) the diligence of the dredge crews and their skill at operating the dragheads and pumps in a way that reduces the likelihood of entraining turtles at the dragheads and 2) sea turtles relocation trawling which removed dozens of turtles from the path of the dredges working at the Collier County borrow site.

RESULTS

Sea Turtle Relocation Trawling

Sea turtle relocation trawling began at the borrow site for the Collier County beach restoration project approximately 10 days before dredging commenced. Eleven sea turtles were relocated before dredging began and subsequently a total of 87 sea turtles, including 86 loggerheads(*Caretta caretta*) and 1 green (*Chelonia mydas*) were relocated over the course of this project. There were 14 recaptures of turtles that had been previously relocated. This is by far the largest percentage of recaptures we have experienced during our 10 years of relocation work. No turtles were injured or killed as a result of the trawling.

See the attached Excel file for tables containing the data associated with this project.

APPENDIX 1

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 (1/2 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

APPENDIX 2

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.

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APPENDIX 3: TRAWL NETS SPECIFICATIONS

DESIGN: 4 seam, 4 legged, 2 bridal trawl net

WEBBING: 4 inch bar, 8 inch stretch top - 36 gauge twisted nylon dipped side - 36 gauge twisted nylon dipped bottom - 84 gauge braided nylon dipped

NET LENGTH: 60 ft from cork line to cod end

BODY TAPER: 2 to 1

WING END HEIGHT: 6 ft

CENTER HEIGHT: Dependent on depth of trawl 14 to 18 ft

COD END: Length 50 meshes x 4" = 16.7 ft Webbing 2 inch bar, 4 inch stretch, 84 gauge braid nylon dipped, 80 meshes around, 40 rigged meshes with 1/4 x 2 inch choker rings, 1 each « x 4 inch at end cod end cover - none chaffing gear - none

HEAD ROPE: 60 ft « inch combination rope (braid nylon with stainless cable center)

FOOT ROPE: 65 ft « inch combination rope

LEG LINE: top - 6 ft, bottom 6 - ft

FLOATS: size - tuna floats (football style), diameter - 7 inch length - 9 inch, number - 12 each, spacing - center on top net 2 inches apart

MUD ROLLERS: size 5 inch diameter 5.5 inch length, number - 22 each, spacing - 3 ft attached with 3/8 inch polypropelene rope (replaced with snap on rollers when broken)

TICKLER CHAINS: NONE (discontinued- but previously used 1/4 inch x 74 ft galvanized chain)

WEIGHT: 20 ft of 1/4 inch galvanized chain on each wing, 40 ft per net looped and tied

DOOR SIZE: 7 ft x 40 inches (or 8 ft x 40 inches), Shoe - 1 inch x 6 inch, bridles - 3/8 inch high test chain

CABLE LENGTH (bridle length, total): 7/16 inch x 240-300 ft varies with bottom conditions

LAZY LINES: 1 inch nylon

PICKUP LINES: 3/8 inch polypropelene

WHIP LINES: 1 inch nylon