Florida Oyster Cultch Project

Biological Assessment

Draft: January 27, 2014

Action Agencies: National Marine Fisheries Agency-Restoration Center

Activity: The proposed Florida Oyster Cultch project would enhance and improve the oyster populations in Pensacola Bay, Andrew Bay and Apalachicola Bay. The proposed improvements include the placement of a total of 42,000 cubic yards of suitable cultch material over 210 acres of previously constructed oyster bars for the settling of native oyster larvae and oyster colonization in three Florida Bays.

Consulting Agency: National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southeast Regional Office, Protected Resources

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Executive Summary

The objective of the proposed Florida Oyster Cultch project is promote reef development for oysters by restoring existing, degraded oyster reef habitat that have reached their productive lifespan. The restoration work proposed includes the placement of suitable cultch material on existing or previously constructed oyster bars for the settling of native oyster larvae and oyster colonization. In particular, it will include:

- Placing 12,000 cubic yards of shell on debilitated oyster reefs over a 60 acre area in the Pensacola Bay system in Escambia and Santa Rosa Counties;
- Placing 12,000 cubic yards of shell on debilitated oyster reefs over a 60 acre area in the St. Andrew Bay system in Bay County; and
- Placing 18,000 cubic yards of shell on debilitated oyster reefs over a 90 acre area in the Apalachicola Bay system in Franklin County.

The total estimated cost for this project is $5,370,596.

Gulf Sturgeon

The proposed bays included in the project action area include habitat used by the endangered Gulf sturgeon that occur within designated critical habitat units 9 (Pensacola Bay) and 13 (Apalachicola Bay) for Gulf sturgeon. However, because the project is placing cultch on top of existing degraded oyster beds no significant loss of sandy bottom habitat is anticipated. Gulf sturgeon mortality may occur from certain in-water activities including boat traffic associated with the project implementation. However, Gulf sturgeon are mobile and will likely avoid the project areas during the cultch placement periods due to project activity and noise. To avoid potential impacts to migrating Gulf sturgeon, relevant BMPs for in water work will be adhered to and placement of material will generally take place in summer months when the oyster bars in Apalachicola and Pensacola Bay are closed to harvest and when Gulf sturgeon are generally not in these waters. Therefore, restoration operations associated with this project may affect, but are not likely to adversely affect and will not jeopardize the continued existence of the species.

Sea Turtles

The proposed action was evaluated for impacts to 5 threatened or endangered sea turtles (Green, Loggerhead, Hawksbill, Leatherback, and Kemp's Ridley). The proposed project action area does not contain designated critical habitat or suitable nesting habitat for sea turtles because of its offshore location and, therefore no habitat effects are anticipated. However, in-water impacts to sea turtles using the proposed action area could occur. Sea turtle mortality may occur from certain in-water activities including boat traffic associated with the project implementation. However, sea turtles are mobile and will likely avoid the area due to project activity and noise. Potential impacts from boat activity associated with the placement of cultch material may be avoided with compliance during all in-water activities with the *Sea turtle and Smalltooth Sawfish Construction Guidelines* (NOAA, 2006) and *Standard Manatee Conditions for In-water Work* (FWS, 2011). Additionally, project components are not expected to impede sea turtle migratory routes. Therefore, operations associated with this project may affect, but are not likely to adversely affect and will not jeopardize the continued existence of these sea turtle species.

Smalltooth sawfish

The 2009 recovery plan for *Smalltooth* sawfish (NMFS, 2009) notes "Currently, smalltooth sawfish can only be found with any regularity in south Florida between the Caloosahatchee River and the Florida Keys". However, there have been infrequent (i.e., less than one per year) reported sightings of smalltooth sawfish in the proposed project areas, with the greatest number of reports in Apalachicola Bay (6 from 2001-2008). As a result, we conclude the likelihood of encountering a Smalltooth sawfish during the cultch placement activities are very low and risk of impacts would be mitigated with adherence to the with *Sea turtle and Smalltooth Sawfish Construction Guidelines* (NOAA, 2006). As a result of these factors combined with their mobility, impacts to Smalltooth sawfish are likely to be insignificant and not likely to adversely affect or jeopardize the continued existence of Smalltooth sawfish.

List of Project Sponsors and Partners

Florida Department of Environmental Protection (FDEP)

Project Summary

The proposed Florida Oyster Cultch project would enhance and improve the oyster populations in Pensacola Bay, Andrew Bay and Apalachicola Bay. The proposed improvements include the placement of a total of 42,000 cubic yards of suitable cultch material over 210 acres of previously constructed oyster bars for the settling of native oyster larvae and oyster colonization in three Florida Bays.

In particular, it will include:

- Placing 12,000 cubic yards of shell on debilitated oyster reefs over a 60 acre area in the Pensacola Bay system in Escambia and Santa Rosa Counties;
- Placing 12,000 cubic yards of shell on debilitated oyster reefs over a 60 acre area in the St. Andrew Bay system in Bay County; and
- Placing 18,000 cubic yards of shell on debilitated oyster reefs over a 90 acre area in the Apalachicola Bay system in Franklin County.

Cultch material to be placed will consist of combinations of oyster shells, either mined from existing sources or from active oyster shell collection sources, and/or limestone approved for use in these projects by Florida's Department of Agriculture and Consumer Services (DACS). The cultch placement generally involves offloading material from barges mechanically using either spray cannons or large excavator type equipment. The new cultch material will be placed on top of existing oyster bars created and managed by DACS because these bars are depleted of shell material or have reached the end of their productive life.

The total estimated cost for this project is $5,370,596.

Species Considered in Biological Assessment

Gulf Sturgeon, *Acipenser oxyrinchus desotoi*, Threatened
Green Sea Turtle, *Chelonia mydas*, Endangered
Loggerhead Sea Turtle, *Caretta caretta*, Threatened
Hawksbill Sea Turtle, *Eretmochelys imbricate*, Endangered
Leatherback Sea Turtle, *Dermochelys coriacea*, Endangered
Kemp's Ridley Sea Turtle, *Lepidochelys kempii*, Endangered

The 2009 recovery plan for Smalltooth sawfish (NMFS, 2009) notes "Currently, smalltooth sawfish can only be found with any regularity in south Florida between the Caloosahatchee River and the Florida Keys". However, there have been infrequent (i.e., less than one per year) reported sightings of smalltooth sawfish in the proposed project areas, with the greatest number of reports in Apalachicola Bay (6 from 2001-2008). As a result, we conclude the likelihood of encountering a Smalltooth sawfish during the cultch placement activities associated with this project are extremely unlikely. Further any potential impacts would be mitigated with adherence to the conditions within the *Sea turtle and Smalltooth Sawfish Construction Guidelines* (NOAA, 2006). As a result of this extremely low probability of exposure to the project activity combined with implementation of effective BMPs to reduce risk of harm, impacts to

Smalltooth sawfish are likely to be discountable. As a result, additional consideration of impacts to Smalltooth sawfish is not undertaken in this assessment.

Consultation History

- April 2013: NOAA Restoration Center initiated pre-consultation technical assistance discussions with NMFS-Protected Resources Division (PRD) for Phase III DWH early restoration projects.
- June 26, 2013: FDEP developed and submitted a project description for early coordination with PRD.
- July 30, 2013: FDEP prepared and submitted the "NMFS Endangered Species Act Section 7 Checklist for Federal Action Agencies" to the PRD. A preliminary evaluation of "Not Likely to Adversely Affect" was made for five species of turtle and Gulf sturgeon. The PRD requires that a Biological Assessment (BA) is prepared for any determination other than "no effect" for major construction activities; therefore, a request for a BA was confirmed in discussions on October 28, 2013.
- September 23, 2013: FDEP prepared the "Southeast Region Intra-Service Section 7 Biological Evaluation Form" and submitted the form to U.S. Fish and Wildlife Service for review.

Project Description

Location

The Trustees propose to enhance and improve the oyster populations in three Florida Bays (see Figure 1 for envisioned project locations). The objective of the proposed Florida Oyster Cultch project is promote reef development for oysters by restoring existing oyster reef habitat. The restoration work proposed includes the placement of suitable cultch material on existing or previously constructed oyster bars for the settling of native oyster larvae and oyster colonization. In particular, it will include:

- Placing 12,000 cubic yards of shell on debilitated oyster reefs over a 60 acre area in the Pensacola Bay system in Escambia and Santa Rosa Counties;
- Placing 12,000 cubic yards of shell on debilitated oyster reefs over a 60 acre area in the St. Andrew Bay system in Bay County; and
- Placing 18,000 cubic yards of shell on debilitated oyster reefs over a 90 acre area in the Apalachicola Bay system in Franklin County.

Cultch material to be placed will consist of combinations of oyster shells, either mined from existing sources or from active oyster shell collection sources, and/or limestone approved for use in these projects by Florida's Department of Agriculture and Consumer Services (DACS). The cultch placement generally involves offloading material from barges mechanically using either spray cannons or large excavator type equipment. The new cultch material will be placed on top of existing oyster bars created and managed by DACS because these bars are depleted of shell material or have reached the end of their productive life. Placing substrate or "cultch" in bays where natural reproduction occurs is the most effective technique used throughout the Gulf of Mexico to 1) create three-dimensional reef structure, 2) stimulate spat setting, 3) sustain oyster fisheries, 4) enhance community functions, 5) increase natural productivity and 6) accelerate the recovery process. Florida DACS has been involved in rehabilitating oyster reefs for more than sixty years and provides a multi-dimensional approach built on decades of experience. The restoration methods proposed here are established methods for this type of restoration project.

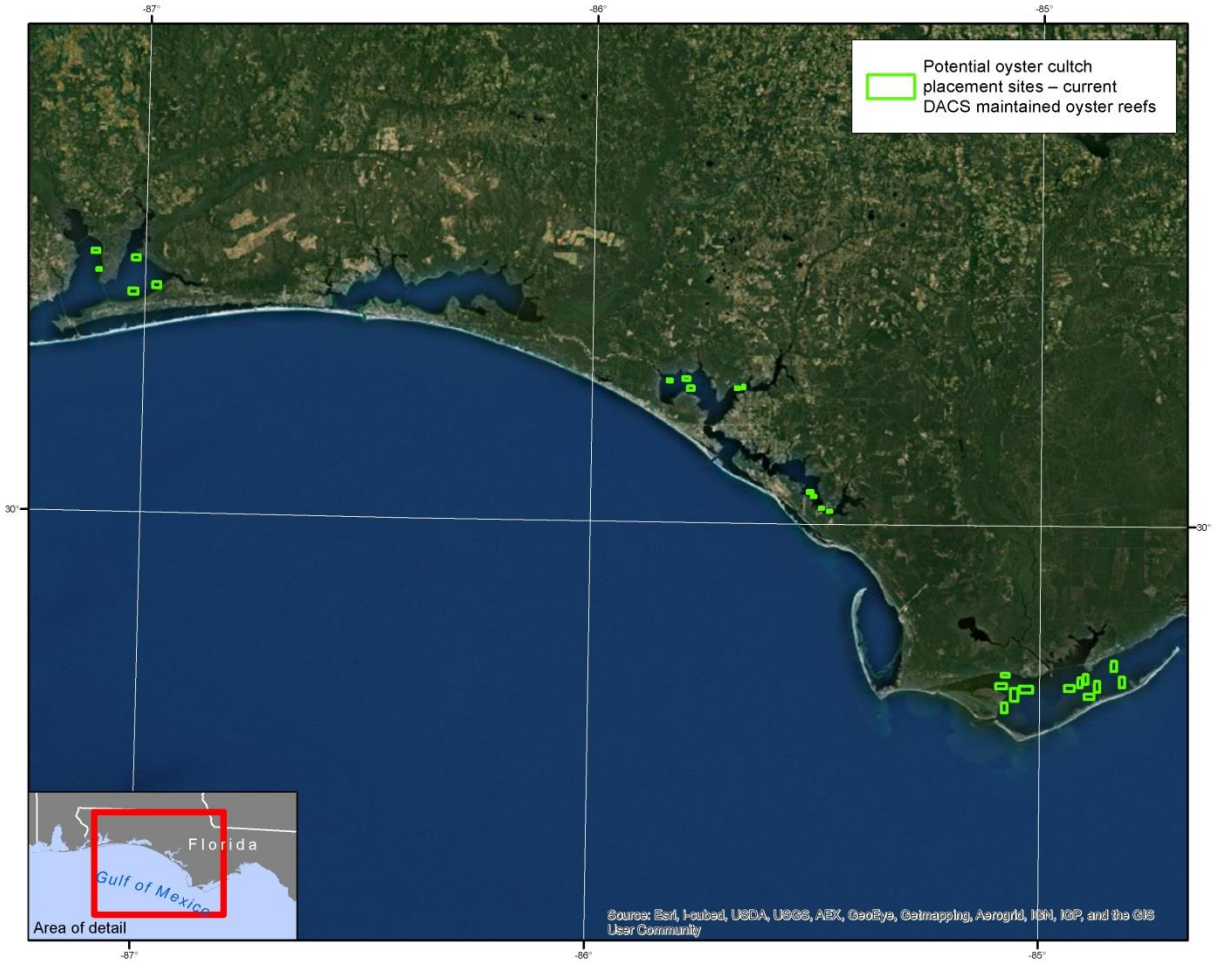

Figure 1. Potential locations for cultch placement within the three bays incorporated in the Florida Oyster Cultch Restoration Project.

Proposed Actions

Proposed Project Implementation Approach

The restoration work proposed includes the placement of suitable cultch material on existing or previously constructed oyster bars for the settling of native oyster larvae and oyster colonization. In particular, it will include:

- Placing 12,000 cubic yards of shell on debilitated oyster reefs over a 60 acre area in the Pensacola Bay system in Escambia and Santa Rosa Counties;
- Placing 12,000 cubic yards of shell on debilitated oyster reefs over a 60 acre area in the St. Andrew Bay system in Bay County; and
- Placing 18,000 cubic yards of shell on debilitated oyster reefs over a 90 acre area in the Apalachicola Bay system in Franklin County.

Approximate centers of activity for this project can be identified by the cluster of locations within each bay (see Figure 1). These locations are as follows:

- Pensacola Bay system:
  - West cluster of potential locations: Latitude 30.49005 N and Longitude 87.09934 W
  - East cluster of potential locations: Latitude 30.44401 N and Longitude 87.02825 W
- St. Andrew Bay system:
  - West cluster of potential locations: Latitude 30.26932 N and Longitude 85.80003 W
  - East cluster of potential locations: Latitude 30.03817 N and Longitude 85.49134 W
- Apalachicola Bay system:
  - West cluster of potential locations: Latitude 29.67804 N and Longitude 85.05086 W
  - East cluster of potential locations: Latitude 29.70660 N and Longitude 84.84417 W

Cultch material to be placed would consist of combinations of oyster shells, either mined from existing, permitted sources or from active oyster shell collection sources, and/or limestone approved for use in these project areas by DACS. Fossil shell and lime rock are commonly mined from quarries in the Gulf Coast region and may be used if oyster shell is not available. Processed oyster shell is preferred for cultch material to restore oyster reefs where the shell is available and can be efficiently transported to reef sites. Processed shell would be purchased from local processors through a shell buying program. DACS schedules shell collections, collects shell using dump trucks and front-end loaders, and then transports and stockpiles shell at a staging area in the city of Apalachicola for oyster restoration projects. Processed shell would be collected from 2 to 5 days per week, depending on the availability of shell and the time of year.

Oyster shells would be stored for at least 2 weeks to allow for a process called “seasoning.” Seasoning involves sun exposure of oyster shells to dry and removes bacterial film from the shells to provide a cleaner substrate for larval attachment. Currently, there is a supply of seasoned shells available to address the project needs that are several years old (J. Shields, DACS, personal communication, December 30, 2013). Seasoned shell would be removed from the stockpile, placed on deck barges using front-end loaders and dump trucks, and transported to oyster reef sites. Once at the site, oyster cultch locations and specific deposition sites would be delineated and marked by staff prior to depositing cultch materials as specific substrate types are necessary to support the cultch.

Once the specific cultch locations have been determined, the cultch would be washed overboard using high-pressure water jets (See Figure 2 for images of this sequence of events – Note at no time in this process would the water jets be directed down into the water column). Similarly, fossil shell or

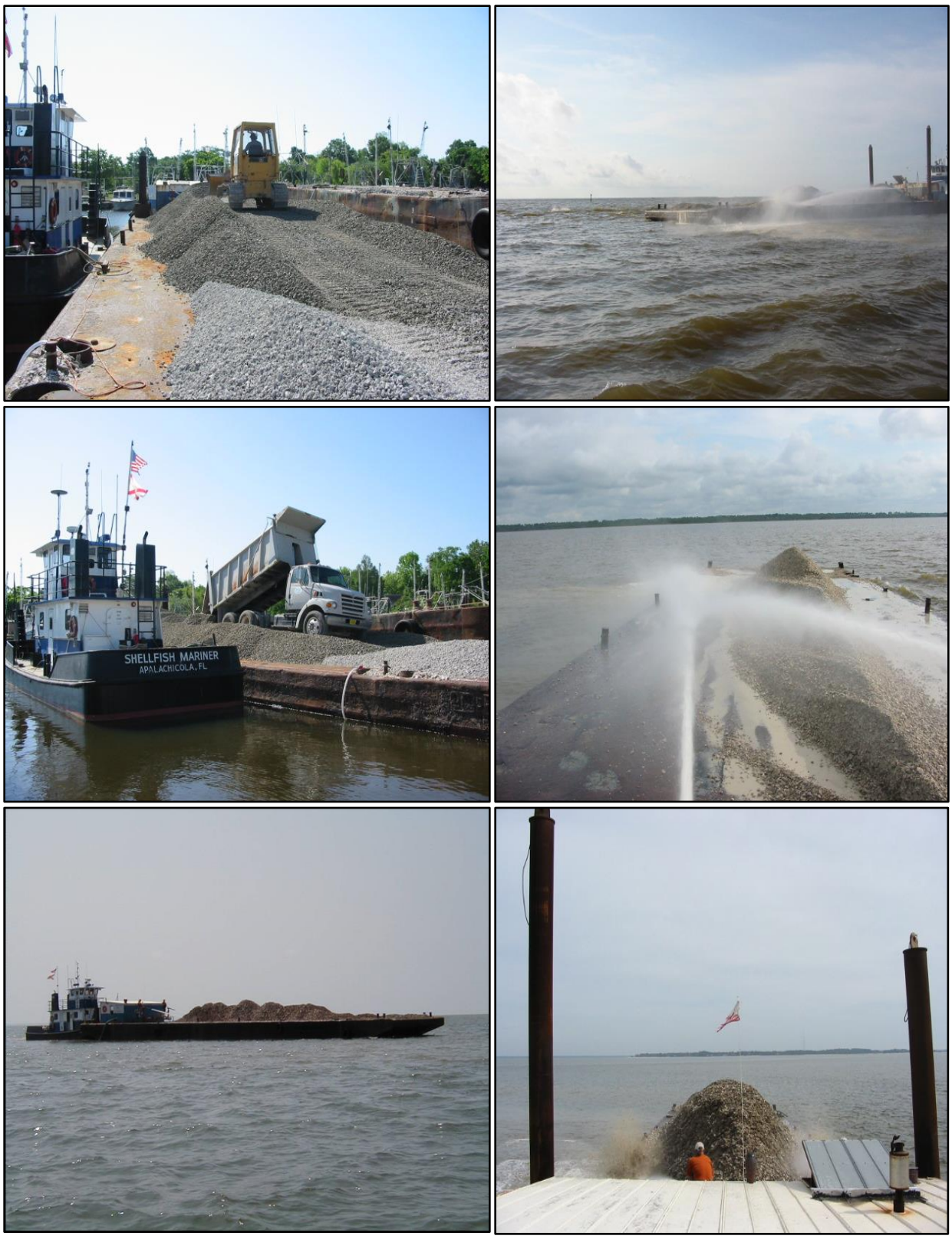

Figure 2. Examples of cultch loading and transportation (right images) and offloading using water cannon (left images).

lime rock would be transported by deck barge to the reef sites, where they would be washed overboard using a high-pressure water stream, or deposited using a crane and bucket. The method for deposition is determined by the material used and the configuration and elevation of the reef to be restored. Cultch would be deposited at a rate of 100 to 300 cubic yards per acre; the amount of material deposited is determined by the condition of the reef to be restored. In cases where the physical integrity of the reef has been severely damaged, up to 300 cubic yards may be required.

For Apalachicola Bay cultch deposition, loading would occur on one day and, based on the proximity to the in-water staging area, planting would be accomplished on the following day. For all estuaries west of Apalachicola Bay, loading would be accomplished in 2 or 3 days, and travel time to and from a given estuary (2 to 9 days) would yield a maximum project duration of 12 days to accomplish the restoration work at each individual site within an estuary.

Anticipated Construction Schedule

For Apalachicola Bay cultch deposition, loading would occur be completed in one day (one barge) and, based on the proximity to the in-water staging area, planting would be accomplished on the following day. For all estuaries west of Apalachicola Bay, loading would be accomplished in 2 or 3 days (two barges), and travel time to and from a given estuary (2 to 9 days) would yield a maximum project duration of 12 days to accomplish the restoration work for each individual site within an estuary.

Project work is expected to commence 7 to 12 months after funding is received. Oyster reef restoration activities are expected to be completed within 1 year after work begins.

Cultching activities have been historically conducted from February to November. Summertime harvest closures, from June through August, of the Pensacola and Apalachicola reefs will make these times the focus of activity for cultch placement in these bays. Placement within St. Andrew Bay between May 1 and October 1 will also be attempted if possible to limit potential impacts to Gulf sturgeon. Ideally, cultching activities are conducted prior to a spat fall event; however, cultching activities are similar to crop rotation in that many oyster reef complexes require routine maintenance in the form of cultching. DACS rotates which reefs receive the required attention based on commercial harvesting seasons, availability of material, and severity of reef conditions. Post construction performance monitoring would focus on the recruitment and growth of oysters on the new cultch placements. Restored reefs may become productive in as few as 3 to 6 months under optimal conditions, with oysters reaching market size in 12 to 18 months. However, since recruitment and survival can be highly variable, some reefs may not become productive for 2 to 5 years. It has been shown that restored reefs can remain productive for more than 10 years with little additional maintenance. Based on the expected longevity of the restored reefs, a monitoring program would assess oyster population parameters for 10 years.

DACS would be responsible for effectively assessing the status of oyster resources on reefs that are restored during this project and would collect information on a number of metrics in order to delineate reef locations and reef area, measure population parameters, and estimate production potential. The monitoring would include collecting oyster samples following project completion on all restored reefs and establishing a sampling schedule based on expected recruitments cycles. All restored reefs would be sampled twice a year from year 1 through year 5 and once a year from year 6 through year 10. Sampling intervals may be modified to assess significant events, which may affect oyster population dynamics. A total of 16 sampling trips are planned for each restored reef that would involve the use execution of the Standard Oyster Resource Management Protocol (Florida Administrative Code 2012).

Description of Species and Habitats

Gulf Sturgeon

Status of the Species and Critical Habitat

Historically, the Gulf sturgeon occurred from the Mississippi River east to Tampa Bay. Its present range extends from Lake Pontchartrain and the Pearl River system of Louisiana and Mississippi, east to the Suwannee River in Florida (Wooley and Crateau 1985), with infrequent sightings occurring west of the Mississippi River. In the late 19th century and early 20th century, the Gulf sturgeon supported an important commercial fishery, providing eggs for caviar, flesh for smoked fish, and swim bladders for isinglass, a gelatin used in food products and glues (Huff 1975; Carr 1983). Gulf sturgeon numbers declined due to over fishing throughout most of the 20th century. After 1950, the decline was exacerbated by habitat loss associated with the construction of water control structures, such as dams and sills (submerged ridges or vertical walls of relatively shallow depth separating two bodies of water). In several rivers throughout the species' range, dams have severely restricted sturgeon access to historic migration routes and spawning areas (Boschung 1976; Wooley and Crateau 1985). Gulf sturgeon exhibit a high degree of fidelity, with over 99 percent returning to spawn in the same river system in which they were hatched (USACE 2006).

Continuing and new or potential threats to the Gulf sturgeon include: construction of dams, modifications to habitat associated with dredging, dredged material disposal, de-snagging (removal of trees and their roots) and other navigation maintenance activities; incidental take by commercial fishermen; poor water quality associated with contamination by pesticides, heavy metals, and industrial contaminants; hurricanes, red tides, boat collisions, climate change, aquaculture and incidental or accidental introductions of non-native species; and the Gulf sturgeon's long maturation and limited ability to recolonize areas from which it is extirpated (USFWS 1991; USFWS and NMFS 2009).

These threats persist to varying degrees in different portions of the species range. In recent years, dredging for channel maintenance and beach nourishment has resulted in death and injury of some Gulf sturgeon in the marine environment. Trawling has also resulted in the capture of several Gulf sturgeon. Collisions with boats traveling at high speeds have occurred on numerous occasions in the Suwannee and Choctawhatchee rivers. A sturgeon colliding with a boat can occur when the fish leaps out of the water towards the boat or when the sturgeon is physically struck by the boat propellers. Shallow waters will increase the likelihood of a ship strike due to the lack of buffer space between boat and fish (USFWS and NMFS 2009).

U.S. FWS and NMFS designated critical habitat essential to the conservation of the Gulf sturgeon. In accordance with regulations, critical habitat determinations were based on the best scientific data available for those physical and biological features (Primary Constituent Elements) essential to the conservation of the species. The potential placement locations within Pensacola Bay (Critical Habitat Unit 9) and Apalachicola Bay (Critical Habitat Unit 11) are within designated Gulf sturgeon critical habitat units because they provide feeding, resting, and passage habitat between ciritical river habitat on the Escambia and Apalachicola Rivers respectively, and the Gulf (DOI and DOC 2003).

Life History

The Gulf sturgeon is an anadromous fish; adults spawn in freshwater then migrate to feed and grow in estuarine/marine habitats (Table 1). 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, Sulak and Clugston, 1999, Fox et al. 2000). 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 meters (m) (approximately 12 feet) and salinity less than 6.3 parts per thousand (Fox and Hightower 2002). The majority of tagged fish have been located in areas lacking seagrass (Fox et al. 2002), in shallow shoals 1.5 to 2.1m 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 (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 (Abele and Kim 1986).

Generally, Gulf sturgeon prey are burrowing species (e.g., annelids: polychaetes and oligochaetes, amphipods, isopods, and lancelets) that feed on detritus and/or suspended particles, and inhabit sandy substrate. Their guts generally contain benthic marine invertebrates including amphipods, lancelets, polychaetes, gastropods, shrimp, isopods, mollusks, 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 and presumed to be foraging in marine or estuarine areas that have depths less than 20 feet and contain sandy substrates that support burrowing macroinvertebrates (Craft et al. 2001, Ross et al. 2001, Fox et al. 2002, Parauka et al. 2001, Ross et al. 2009).

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 of400, 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), it is assumed 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 (DOI and DOC 2003). Spawning occurs in the upper river reaches in the spring when water temperature is around 15° to 20°Celcius (approximately 60° to 70° Fahrenheit). Fertilization is external; females deposit their eggs on the river bottom and males fertilize them. Gulf sturgeon eggs are demersal (they sink to the bottom), adhesive, and vary in color from gray to brown to black (Huff 1975, Parauka et al. 1991).

Genetic studies conclude that Gulf sturgeon exhibit 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).

Table 1: General Life Stage Movements of Gulf sturgeon

Life Stage	Where	When
All ages except YOY	Lower, middle, upper reaches of main part of rivers	Spring-Fall
Spawning adults	Upper river reaches	March-April
Eggs and larvae	Upper river reaches	March-April
Juveniles 1-6 yrs	Close to river mouth, nearshore, or within estuary	Winter
Large juveniles >6 yrs	Gulf of Mexico both near and offshore of bays and estuaries	Winter
Spring stage (migrating upstream)	Lower, tidally influenced river reaches	Early March
Fall stage (migrating downstream)	Transitioning from marine to freshwater conditions	October-November

Population Dynamics

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 near unvegetated sandy shorelines, shallow shoals, and other areas containing mostly sand with benthic prey items (such as barrier islands) at depths ranging from 1.5 m to 6 m deep (Odenkirk 1989; Foster 1993; Clugston et al. 1995; Parauka et al. 2001; Ross et al. 2001a; Fox et al. 2002; Harris et al. 2005; Craft et al. 2001; Rogillio et al. 2001). Gulf sturgeon will migrate along barrier islands and are often found in passes between islands or in deep holes near the passes (Ross et al. 2001a; Rogillio et al. 2001). Studies of subadult Gulf sturgeon (ages 4 to 7) in Choctawhatchee Bay found that 78 percent of tagged fish remained in the bay the entire winter, while 13 percent ventured into a connecting bay. Possibly the remaining 9 percent overwintered in the Gulf of

Mexico; while, adult Gulf sturgeon were more likely to overwinter or spend extended periods of time in the Gulf of Mexico (DOI and DOC 2003, Fox and Hightower 1998; Fox et al. 2002). Subadults from the Suwannee River subpopulation remain in the mouth of the Suwannee River over winter while adults are known to migrate into the nearshore waters, where they remain for up to two months and then depart to unknown feeding locations in the open Gulf of Mexico (Carr et al. 1996; Edwards et al. 2003). Sonic-tracking evidence suggests that Gulf sturgeon target and share certain wintering grounds. A summary of Gulf sturgeon wintering habitat is presented in Table 3.

Table 2. Estimated size of known reproducing subpopulations of Gulf sturgeon

River System	States	Estimated Subpopulation Size* (95% Confidence Interval)	Source
Pascagoula	MS	216 (124-429)	Ross et al. 2001b
Pearl	LA, MS	430 (323-605)	Rogillio et al. 2001
Escambia	AL, FL	451 (338-656)	USFWS 2007
Yellow	AL, FL	1,036 (724-1348)	Herrington and Kaeser 2013
Choctawhatchee	AL, FL	3,314**	Herrington and Kaeser 2013
Apalachicola	FL	1,292 (525-1,968)	Herrington and Kaeser 2013
Suwannee	FL	14,000**	Sulak et al. 2009

Estimates refer to numbers of individuals greater than a certain size, which varies between sources depending on sampling gear, and in some cases, to numbers of individuals that use a particular portion of the river (e.g., a summer holding area or one migratory pathway among several). Estimates are not necessarily comparable between researchers due to key differences in methods and assumptions. ** Confidence interval not reported.

Table 3. Summary of known Gulf sturgeon wintering areas

Subpopulation	Wintering sites	Source
Pascagoula	Barrier Islands, Mississippi Sound, Pascagoula Estuary	Ross et al. (2009)
Pearl	The Rigolets, Barrier Islands, Mississippi Sound	Ross et al. (2009)
Choctawhatchee	Choctawhatchee Bay, Escambia Bay, nearshore Gulf of Mexico, Santa Rosa Sound, Pensacola Bay	Fox et al. (2002); Duncan et al. (2011)
Escambia	Pensacola Bay, Santa Rosa Sound, nearshore Gulf of Mexico	Parauka et al. (2011); Duncan et al. (2011)
Yellow	Pensacola Bay, Santa Rosa Sound, nearshore Gulf of Mexico	Parauka et al. (2011); Duncan et al. (2011)
Apalachicola	Apalachicola Bay, nearshore Gulf of Mexico, Saint Vincent Sound	Parauka et al. (2011); Sulak et al. (2009)
Suwannee	Suwannee Sound, nearshore Gulf of Mexico	Sulak et al. (2009)

Species Occurrence in Action Area

Project work will take place in or near Critical Habitat Units 9 and 13. Figures 3 and 4 illustrate these critical habitat units. Unit 9 (Figure 2) includes the main body of Pensacola Bay, Big Lagoon, Escambia Bay, East Bay, Blackwater Bay, Bayou Grande, Macky Bay, Saultsmar Cove, Bass Hole Cove, and Catfish Basin. All other bayous, creeks, and rivers are excluded at their mouths/entrances. The western boundary is the Florida State Highway 292 Bridge crossing Big Lagoon to Perdido Key. The southern boundary is the 1972 International Regulations for Preventing Collisions "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 mean high water line on each shoreline of the included water bodies.

Three rivers that support genetically distinct subpopulations of Gulf Sturgeon flow into Pensacola Bay (Escambia, Yellow, and Choctawhatchee). The Pensacola Bay system provides winter feeding and migration habitat for Gulf sturgeon from the Escambia River and Yellow River subpopulations. However, the likely migratory pathway into the Choctawhatchee River is not within Pensacola Bay, but through the

Choctawhatchee Bay. Gulf sturgeon are known to use Pensacola Bay as migratory path to these rivers from March to May and from these rivers to Gulf waters from September to November (DOI and DOC 2003).

Studies have identified specific areas where Gulf sturgeon collect or migrate through Pensacola Bay to the Escambia and Yellow Rivers. Researchers found that Gulf sturgeon showed a preference Redfish Point, Fort Dickens, and Escribano Point, near Catfish Basin (USFWS, 1998; and Craft et al., 2001). Habitats preferred at this sites were sandy shoal areas located along the south and east side of Garcon Point, south shore of East Bay (Redfish Point area) and near Fair Point, especially in the fall and early spring. 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 to 12.1 m (20 to 40 ft). Other areas where tagged fish were frequently located include Escribano Point, near Catfish Basin, and the mouth of the Yellow River. These areas are outside the proposed project action area and would not be affected by the proposed activities. Although it is important to note that incidental captures of Gulf sturgeon have been recorded in other areas such as Pensacola Bay, Big Lagoon, and Bayou Grande (Reynolds, 1993; and Lorio, 2000).

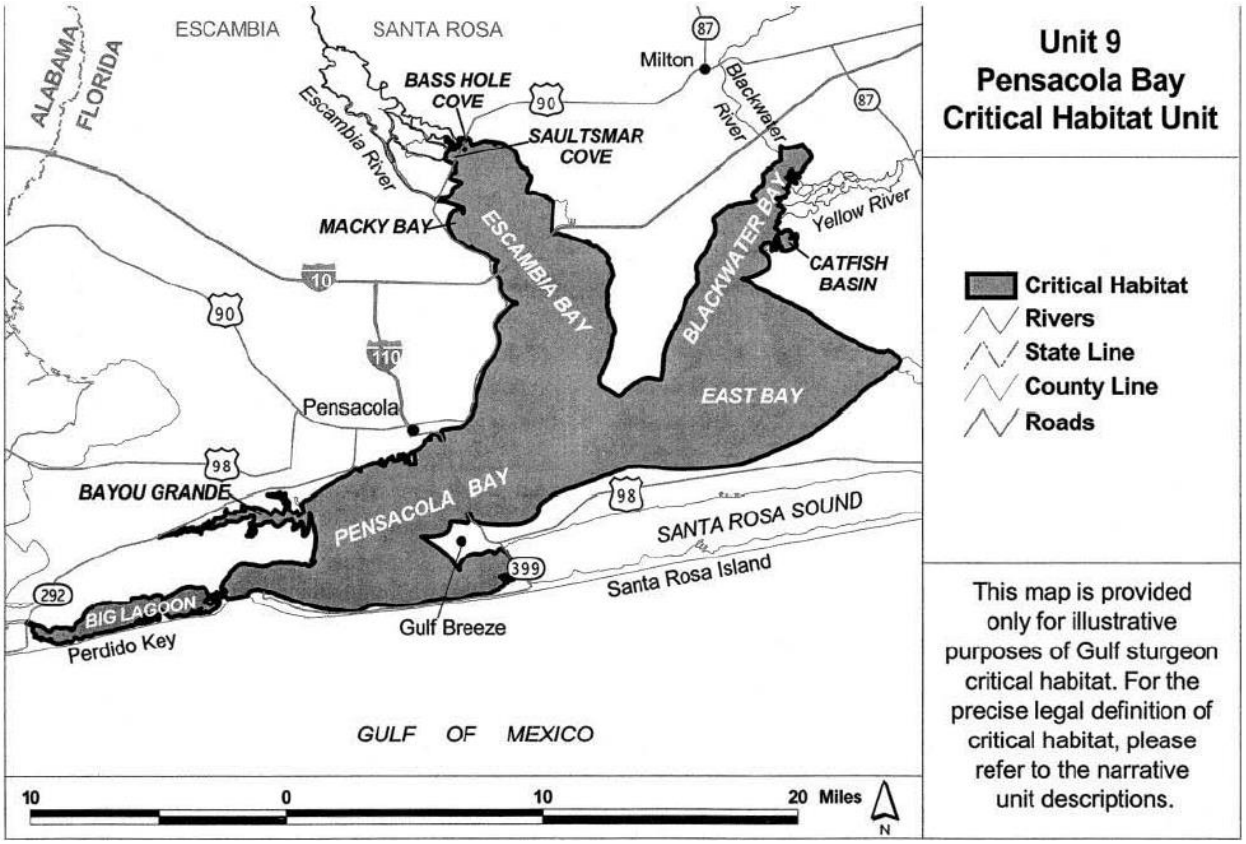

Figure 3. Gulf Sturgeon Critical Habitat Unit 9 – Pensacola Bay.

Unit 13 (Figure 3) includes the main body of Apalachicola bay, Big Lagoon, East Bay, Blackwater Bay and Escambia Bay, as well as the nearshore waters of the Gulf of Mexico. The southern boundary includes water extending 1nm (1.9 km) into the Gulf of Mexico. The western boundary is 85º17.0'W from its intersection with the shore to its intersection with the southern boundary. The eastern boundary is

formed by a line drawn from the shore of Lanark Village at 29º53.1'N, 84º33.2'W to a point 1 nm (1.9 km) off shore from the northeastern extremity of Dog Island at 29º49.6'Nm 84º33.2'W. The lateral extent is MHW line on each shoreline of the water bodies or the entrance of excluded rivers, bayous, and creeks.

Unit 13 provides winter feeding migration habitat for Gulf Sturgeon (Odenkirt, 1989).

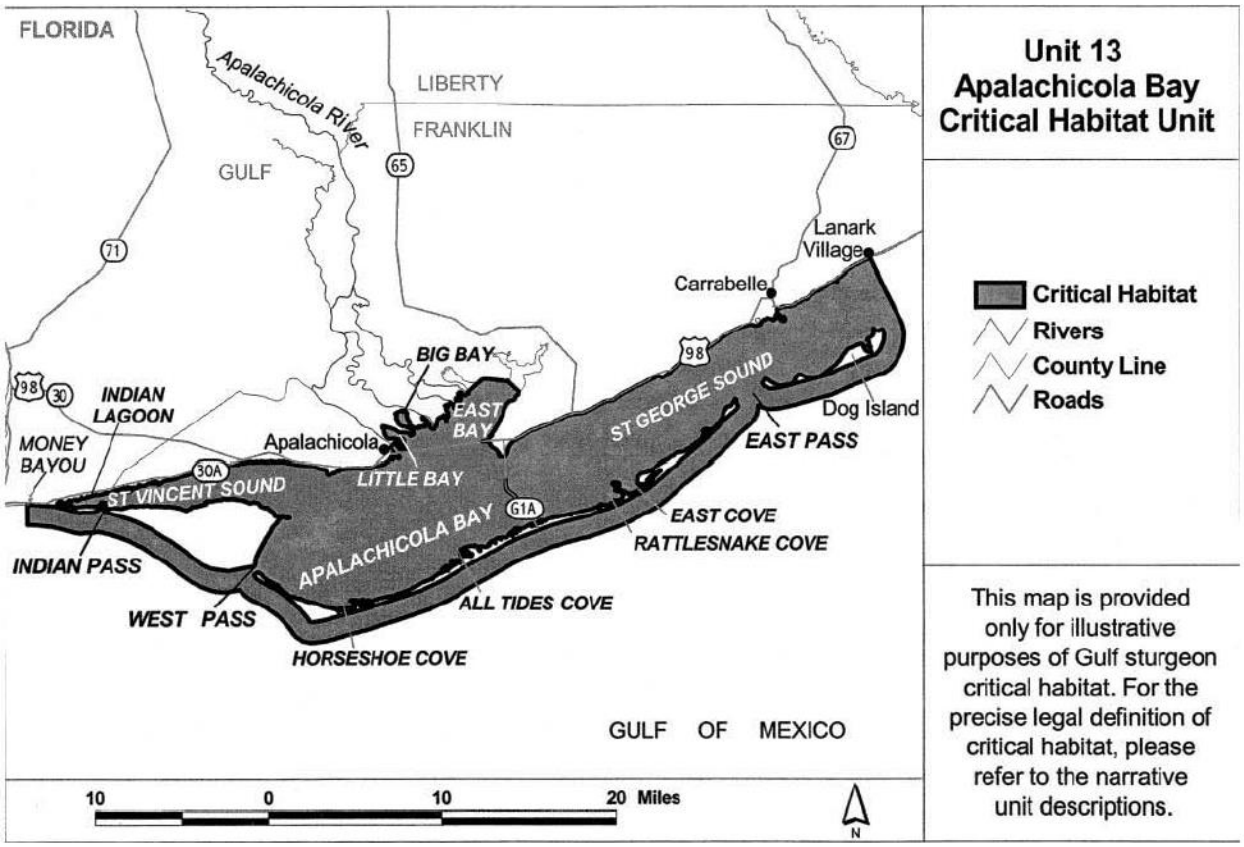

Figure 4. Gulf Sturgeon Critical Habitat Unit 13 – Apalachicola Bay.

Sea Turtles

There are five species of sea turtles that are found within the Gulf of Mexico: green sea turtle, hawksbill sea turtle, loggerhead sea turtle, Kemp's ridley sea turtle, and leatherback sea turtle. All five species of sea turtles found in the Gulf of Mexico are listed under the ESA. The Gulf populations of green (breeding populations in Florida), hawksbill, Kemp's ridley, and leatherback sea turtles are listed as endangered. Loggerhead (northwest Atlantic distinct population segment) and green (except the Florida breeding population) sea turtles are listed as threatened.

Green Sea Turtle

Status of the Species and Critical Habitat

The green sea turtle was federally listed on July 28, 1978 (43 FR 32800). Breeding populations of the green turtle in Florida and along the Pacific Coast of Mexico are listed as endangered and all other populations are listed as threatened. The green sea turtle has a worldwide distribution in tropical and

subtropical waters. Within the U.S., green turtles nest in small numbers in the U.S. Virgin Islands and Puerto Rico, and in larger numbers along the east coast of Florida, particularly in Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward Counties (NMFS and USFWS 1991). Nesting has also been documented by the Florida Sea Turtle Nesting Beach Monitoring Program in Lee, Charlotte, Sarasota, Manatee, Franklin, Walton, and Escambia counties on Florida's west coast (FWC 2013a).

Critical habitat for the green sea turtle has been designated for the waters surrounding Culebra Island, Puerto Rico, and its outlying keys.

Life History

The green sea turtle grows to a maximum size of about three feet and a weight of 350 pounds. It has a heart-shaped shell, small head, and single-clawed flippers. The carapace is smooth and colored gray, green, brown and black. Hatchlings are black on top and white on the bottom (NMFS and FWS 1991). Hatchling green turtles eat a variety of plants and animals, but adults feed almost exclusively on seagrasses and marine algae. Green sea turtles are generally found in fairly shallow waters inside reefs, bays, and inlets except when they are migrating. The green turtle is attracted to lagoons and shoals with an abundance of marine grass and algae. Open beaches with a sloping platform and minimal disturbance are required for nesting. Green turtle nesting in Florida occurs from June through late September. Every two or three years, a female will return to the same nesting location. Green sea turtles deposit from one to nine clutches within a nesting season, but the overall average is about 3.3 nests. The interval between nesting events within a season varies around a mean of about 13 days (Hirth 1997). Mean clutch size varies widely among populations. Only occasionally do females produce clutches in successive years. Usually two or more years intervene between breeding seasons (NMFS and FWS 1991). Age at sexual maturity is believed to be 20 to 50 years (Hirth 1997).

Population Dynamics

The green sea turtle is a circum-global species found in tropical and sub-tropical waters. The worldwide distribution of green turtles has been described by Groombridge (1982). In the U.S., green turtles are found around the U.S. Virgin Islands and Puerto Rico, and in the continental U.S. from Texas to Massachusetts. Adult females migrate from foraging areas to mainland or island nesting beaches and may travel hundreds or thousands of kilometers each way. After emerging from the nest, hatchlings swim to offshore areas, where they are believed to live for several years, feeding close to the surface on a variety of pelagic plants and animals. Once the juveniles reach a certain age/size range, they leave the pelagic habitat and travel to nearshore foraging grounds. Once they move to these nearshore benthic habitats, adult green turtles are almost exclusively herbivores, feeding on sea grasses and algae. Areas that are known as important feeding areas for green turtles in Florida include: Indian River Lagoon, the Florida Keys, Florida Bay, Homosassa River, Crystal River and Cedar Key.

Species Occurrence in Action Area

Although nesting activity has been recorded in almost every coastal county in Florida, most green turtle nesting is concentrated along the southeast coast of Florida. Florida nest counts show that Green turtle nests have increased approximately one hundredfold since counts began in 1989, with 2013 counts more than twice the count from the next highest year. This increase was observed in Escambia county with 4 nests observed in 2011 and 5 in 2012, whereas no nest were observed in either 2009 or 2010 (FWC 2013b). Nesting near Pensacola Bay occurs on the Gulf side of Santa Rosa Island, including the Gulf Island National Seashore.

Figure 5 illustrates the locations where green sea turtles have been observed nesting in the general vicinity of project actins areas where cultch may be placed. In all cases, nesting occurs on the Gulf beaches and shorelines while project work will take place primarily in nearshore and open water habitat of the three bays, thus, project work is not unlikely to directly affect nesting habitat. Green sea turtles are not present throughout approximately half of the shoreline in the project area. This is the case in the areas closest to Pensacola and St. Andrews Bays. The remaining half of the shoreline has green sea turtle nesting densities of medium (25%-75%) and low (less than 25%) densities with low density areas closest to the Apalachicola Bay sites.

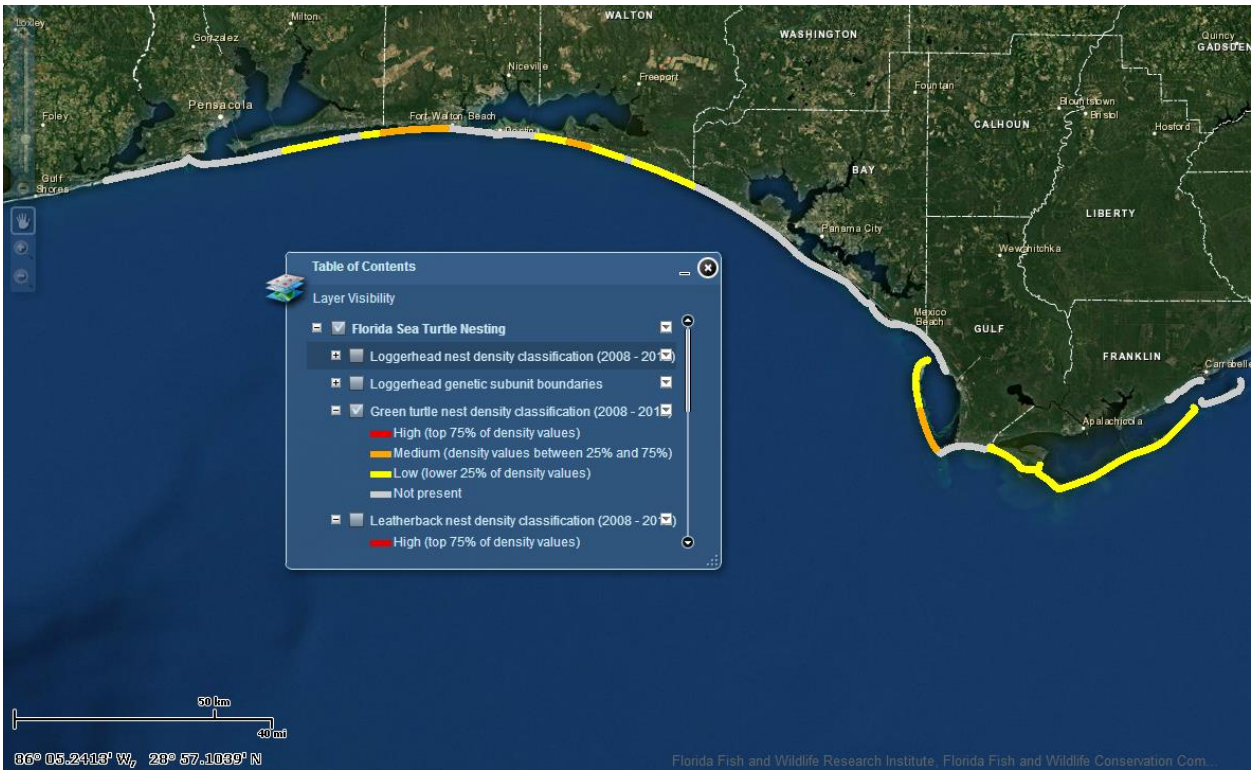

Figure 5. Map illustrating the nesting density of Green Sea Turtles in the project area. (Source FWC, 2013d)

Loggerhead Sea Turtle

Status of the Species and Critical Habitat

The loggerhead sea turtle was federally listed as a threatened species on July 28, 1978 (43 Federal Register [FR] 32800). On September 22, 2011, the listing was revised from a single global threatened species to a listing of nine Distinct Population Segments (DPS); four listed as threatened (Northwest Atlantic Ocean, South Atlantic Ocean, Southwest Indian Ocean, Southeast Indo-Pacific Ocean, and South Atlantic Ocean DPSs) and five listed as endangered (Northeast Atlantic Ocean, Mediterranean Sea, North Pacific Ocean, South Pacific Ocean, and North Indian Ocean DPSs). Five recovery units have been identified in the Northwest Atlantic Ocean DPS based on genetic differences and a combination of geographic distribution of nesting densities, geographic separation, and geopolitical boundaries. Recovery units are individually necessary to conserve genetic robustness, demographic robustness, important life history stages, or some other feature necessary for long-term sustainability of the species.

In July 2013, the NMFS proposed (78 FR 43005) designation of 36 marine areas within the Northwest Atlantic Ocean DPS as critical habitat. Public comments on the proposed critical habitat areas are requested through November 2013. In addition, the U.S. Fish and Wildlife Service (USFWS) proposed terrestrial critical habitat (nesting beaches) in a separate rulemaking on March 25, 2013 (78 FR 18000).

Life History

The loggerhead occurs throughout the temperate and tropical regions of the Atlantic, Pacific, and Indian Oceans. The loggerhead sea turtle grows to an average weight of about 200 pounds and is characterized by a large head with blunt jaws. Adults and subadults have a reddish-brown carapace. Scales on the top of the head and top of the flippers are also reddish-brown with yellow on the borders. Hatchlings are brown to dark gray in color. The loggerhead feeds on mollusks, crustaceans, fish, and other marine animals. The loggerhead may be found hundreds of miles out to sea, as well as in inshore areas such as bays, lagoons, salt marshes, creeks, ship channels, and the mouths of large rivers. Coral reefs, rocky places, and ship wrecks are often used as feeding areas (NMFS 2013a).

Females nest during the night and normally lay approximately 110 eggs per nest. Eggs take approximately 50 to 65 days to hatch depending on the incubation temperature in the nest. The gender of hatchlings is determined by the incubation temperature in the nest. Hatchlings emerge, proceed to the surf, and continue swimming away from land for approximately 20 to 30 hours. As post-hatchlings, loggerheads are pelagic and are best known from neritic waters along the continental shelf. This neritic posthatchling stage is weeks or months long (Witherington 2002) and may be a transition to the oceanic stage that loggerheads enter as they grow and are carried within ocean currents (Bolten 2003). During pelagic existence, loggerhead turtles are often associated with floating sargassum rafts or debris, which collect in areas where surface waters converge (Magnuson et al. 1990).

Somewhere between 7-12 years old, oceanic juveniles migrate to nearshore coastal areas (neritic zone) and continue maturing until adulthood. Growth rates vary widely, and age to maturity in the wild has been estimated to vary from 12 to 30 years. During spring, adults migrate from foraging to breeding and nesting areas where mating often occurs. Females mate and then nest multiple times (one to seven times per season; average approximately four nests per season) at approximately 14-day intervals (Magnuson et al. 1990, Ernst et al. 1994). Typically, females will nest every other, or every third year. Within the Northwest Atlantic, the majority of nesting activity occurs from April through September, with a peak in June and July (Williams-Walls et al. 1983, Dodd 1988, Weishampel et al. 2006). Nesting occurs within the Northwest Atlantic along the coasts of North America, Central America, northern South America, the Antilles, Bahamas, and Bermuda, but is concentrated in the southeastern U.S. and the Yucatán Peninsula in Mexico on open beaches or along narrow bays having suitable sand (Sternberg 1981, Ehrhart 1989, Ehrhart et al. 2003, NMFS and FWS 2008).

Population Dynamics

The loggerhead is commonly found throughout the North Atlantic including the Gulf of Mexico, the northern Caribbean, the Bahamas archipelago, and eastward to West Africa, the western Mediterranean, and the west coast of Europe. Florida beaches are of worldwide importance to loggerhead sea turtles. Approximately 80 percent of the global loggerhead population nests either on Florida beaches or in Oman, a country on the Arabian Peninsula.

Florida accounts for more than 90 percent of U.S. loggerhead nesting. However, loggerheads nest from Texas to Virginia, with total estimated nesting in the U.S. fluctuating between 47,000 and 90,000 nests per year over the past decade (NMFS and FWS 2008). About 80 percent of loggerhead nesting in the

southeast U.S. occurs in six Florida counties (Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward Counties) ((NMFS and FWS 2008)). Adult loggerheads are known to make considerable migrations between foraging areas and nesting beaches (Schroeder et al. 2003, Foley et al. 2009). During non-nesting years, adult females from U.S. beaches are distributed in waters off the eastern U.S. and throughout the Gulf of Mexico, Bahamas, Greater Antilles, and Yucatán (NMFS and FWS 2008).

Species Occurrence in Action Area

Figure 6 illustrates the locations where loggerhead sea turtles have been observed nesting in the project area. Nesting occurs on the beaches and shorelines, and project work will take place primarily in nearshore and open water habitat, thus, project work is not expected to directly affect nesting habitat. The project area is primarily medium density nesting (25%-75%). This is the case in the areas closest to Pensacola and St. Andrews Bays. High density (greater than 75%) nesting areas also exist, including the areas closest to the Apalachicola Bay sites, with small patches of low density (25%) nesting throughout. The Apalachicola project area is also adjacent to the proposed loggerhead critical habitat area LOGG-N-31 for which primarily encompasses the outer gulf side beaches of the barrier islands for the bay (Sand, Little St. George, St. George, Goose, and Marsh) (NOAA, 2013). Similarly, Santa Rosa Island, the barrier island for Pensacola Bay comprises the proposed loggerhead critical habitat area LOGG-N-33 (NOAA, 2013). The proposed project would not affect these habitats.

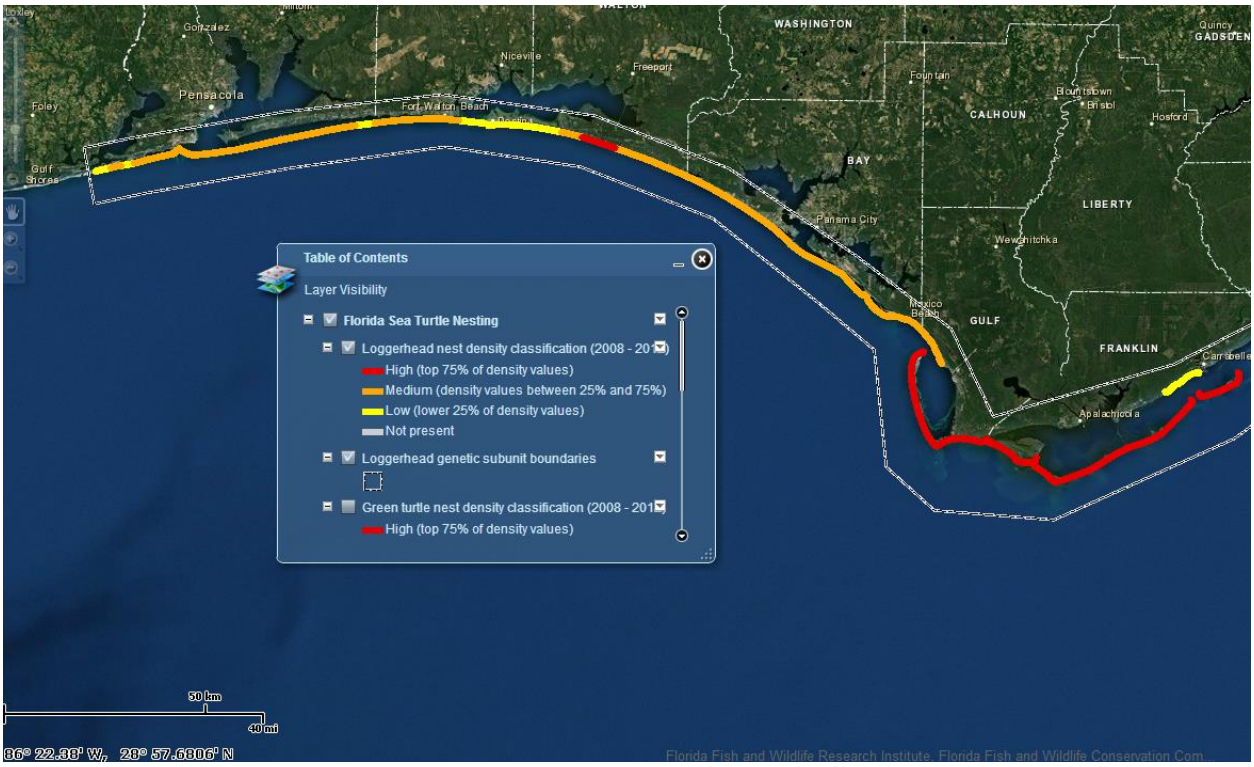

Figure 6. Map illustrating the observed nesting density of Loggerhead Sea Turtles in the project area.
(Source FWC, 2013d)

Hawksbill Sea Turtle

Status of the Species and Critical Habitat

The hawksbill sea turtle was federally listed as an endangered species on June 2, 1970 (35 FR 8491). The hawksbill is found in tropical and subtropical seas of the Atlantic, Pacific, and Indian Oceans. The species is widely distributed in the Caribbean Sea and western Atlantic Ocean. On average, adult Hawksbill turtles weigh 100-150 pounds, but can grow as large as 200 pounds, and are between 25-35 inches in length The top scutes are often patterned with streaks of orange, red, or black. The head is elongated and tapers sharply to a point with a beak-like mouth (NMFS 2013b).

Within the continental U.S., hawksbill sea turtle nesting is rare and is restricted to the southeastern coast of Florida (Volusia through Miami-Dade Counties) and the Florida Keys (Monroe County)

(Meylan 1992, Meylan et al. 1995); however, in sand, hawksbill tracks are difficult to differentiate from those of loggerheads and may not be recognized by surveyors. Therefore, surveys in Florida likely underestimate actual hawksbill nesting numbers (Meylan et al. 1995). In the U.S. Caribbean, hawksbill nesting occurs on beaches throughout Puerto Rico and the U.S. Virgin Islands (NMFS and FWS 1993). In Florida waters, hawksbills are observed on the reefs off Palm Beach, Broward, Miami-Dade, and Monroe Counties. Most sightings involve post-hatchlings and juveniles. These small turtles are believed to originate from nesting beaches in Mexico.

Critical habitat for the hawksbill sea turtle has been designated for selected beaches and/or waters of Mona, Monito, Culebrita, and Culebra Islands, Puerto Rico.

Life History

Hawksbills generally inhabit coastal reefs, bays, rocky areas, passes, estuaries and lagoons, in water depths of less than 70 feet. Similar to green sea turtles, hatchlings are believed to occupy the pelagic environment, taking shelter in Sargassum, floating algal mats, and drift lines of flotsam and jetsam. When they reach a carapace length of approximately 20 to 25 centimeters, hawksbill juveniles reenter coastal waters (NMFS 2013b). Coral reefs are widely recognized as the resident foraging habitat of juveniles, sub-adults, and adults. This habitat association is likely related to their diet of sponges, which need solid substrate for attachment. Hawksbills are omnivorous and prefer invertebrates, especially encrusting organisms, and will feed on plant material such as algae, seagrasses and mangroves (Carr 1952; Rebel 1974; Pritchard 1977; Musick 1979; Mortimer 1982). Hawksbills also occur around rocky outcrops and high energy shoals, which are also optimum sites for sponge growth (NMFS and USFWS 1993).

Hawksbills nest on average about 4.5 times per season at intervals of approximately 14 days (Corliss et al. 1989). In Florida and the U.S. Caribbean, clutch size is approximately 140 eggs, although several records exist of over 200 eggs per nest (NMFS and FWS 1993). On the basis of limited information, nesting migration intervals of two to three years appear to predominate. Hawksbills are recruited into the reef environment at about 14 inches in length and are believed to begin breeding about 30 years later. However, the time required to reach 14 inches in length is unknown and growth rates vary geographically. As a result, actual age at sexual maturity is unknown.

Population Dynamics

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 Yucatan Peninsula of Mexico, where several thousand nests are recorded annually in the states of Campeche, Yucatan, 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 1999). Estimates of the annual

number of nests for each of these areas are on the order of hundreds to a few thousand. Nesting within the southeastern U.S. and U.S. Caribbean is restricted to Puerto Rico, the U.S. Virgin Islands, and, rarely, Florida (Eckert 1995, Meylan 1999). 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 1999).

Species Occurrence in Action Area

Figure 7 illustrates the locations where hawksbill sea turtles have been observed in the project area. No hawksbill sea turtles have been observed in the project area.

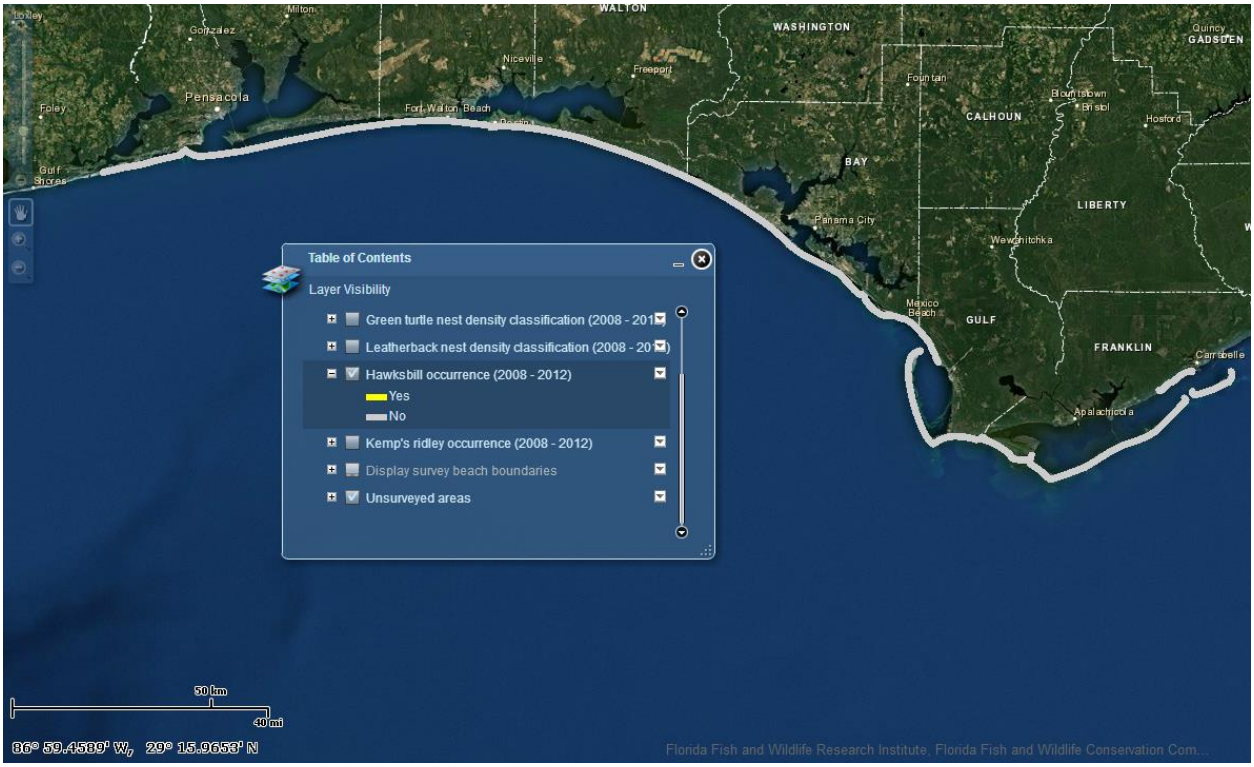

Figure 7. Map illustrating observations of Hawksbill Sea Turtle nesting in the project area. (Source FWC, 2013d)

Leatherback Sea Turtle

Status of the Species and Critical Habitat

The leatherback sea turtle was federally listed as an endangered species on June 2, 1970 (35 FR 8491). Leatherbacks have the widest distribution of the sea turtles with nonbreeding animals having been recorded as far north as the British Isles and the Maritime Provinces of Canada and as far south as Argentina and the Cape of Good Hope (Pritchard 1992). Excursions of foraging leatherbacks have been documented into higher-latitude, subpolar waters. They have evolved physiological and anatomical adaptations (Frair et al. 1972, Greer et al. 1973) that allow them to exploit waters far colder than any other sea turtle species.

Leatherbacks are the largest and deepest diving of all sea turtle species. Most adult leatherbacks average 6 feet in length and weigh from 500 to 1,500 pounds, but can reach up to 2,000 pounds. The carapace is distinguished by a leathery, oil-saturated connective tissue overlaying interlocking dermal bones. Hatchlings are dorsally mostly black and are covered with tiny scales. Jellyfish are the main staple of the leatherback diet, but they are also known to feed on other soft-bodied animals (NMFS 2013c).

Critical habitat has been designated for the Leatherback sea turtle in the U.S. Virgin Islands, Puerto Rico, and the U.S. West Coast (NMFS 2013c).

Life History

Leatherbacks nest an average of five to seven times within a nesting season, with an observed maximum of 11 nests (NMFS and FWS 1992). The interval between nesting events within a season is about nine to 10 days. Clutch size averages 80 to 85 yolked eggs, with the addition of usually a few dozen smaller, yolkless eggs, mostly laid toward the end of the clutch (Pritchard 1992). Nesting migration intervals of two to three years were observed in leatherbacks nesting on the Sandy Point National Wildlife Refuge, St. Croix, U.S. Virgin Islands (McDonald et al. 1991). Leatherbacks are believed to reach sexual maturity in six to 10 years (Zug and Parham 1996).

Adult females require sandy nesting beaches backed with vegetation and sloped sufficiently so the distance to dry sand is limited. Their preferred beaches have proximity to deep water and generally rough seas. Leatherback turtle nesting grounds are distributed worldwide in the Atlantic, Pacific, and Indian Oceans on beaches in the tropics and sub-tropics. The Pacific Coast of Mexico historically supported the world's largest known concentration of nesting leatherbacks. The leatherback turtle regularly nests in the U.S. Caribbean in Puerto Rico and the U.S. Virgin Islands. With the exception of a few nests on the west coast, leatherbacks nest almost exclusively on the east coast of Florida. In fact, about 50 percent of leatherback nesting occurs in Palm Beach County. Leatherback nesting in Florida occurs from April through July (FWC 2013e).

Population Dynamics

Leatherbacks have the widest geographic range of any sea turtle, and possibly any reptile (Ernst et al. 1994). They can be found worldwide in tropical and temperate waters of the Atlantic, Pacific, and Indian Oceans. They appear to be one of the most migratory sea turtles and are well adapted for open ocean existence. Small numbers of leatherbacks travel as far north as British Columbia and Newfoundland, and as far south as the Cape of Good Hope, Tasmania, and Argentina. Leatherbacks can also be found along the Atlantic and Pacific Coasts of the continental U.S., and occur throughout the Gulf of Mexico. The most recent population size estimate for the North Atlantic alone is a range of 34,000 to 94,000 adult leatherbacks (TEWG 2007).

Species Occurrence in Action Area

Figure 8 illustrates the locations where leatherback sea turtles have been observed nesting in the project area. Nesting occurs on the beaches and shorelines, and project work will take place primarily in open water habitat, thus, project work is not expected to directly affect nesting habitat. Leatherback sea turtles have been observed nesting at low density (less than 25% of density values) in approximately one third of the shorelines in the project area. Leatherback sea turtles are not present throughout approximately two thirds of the project area.

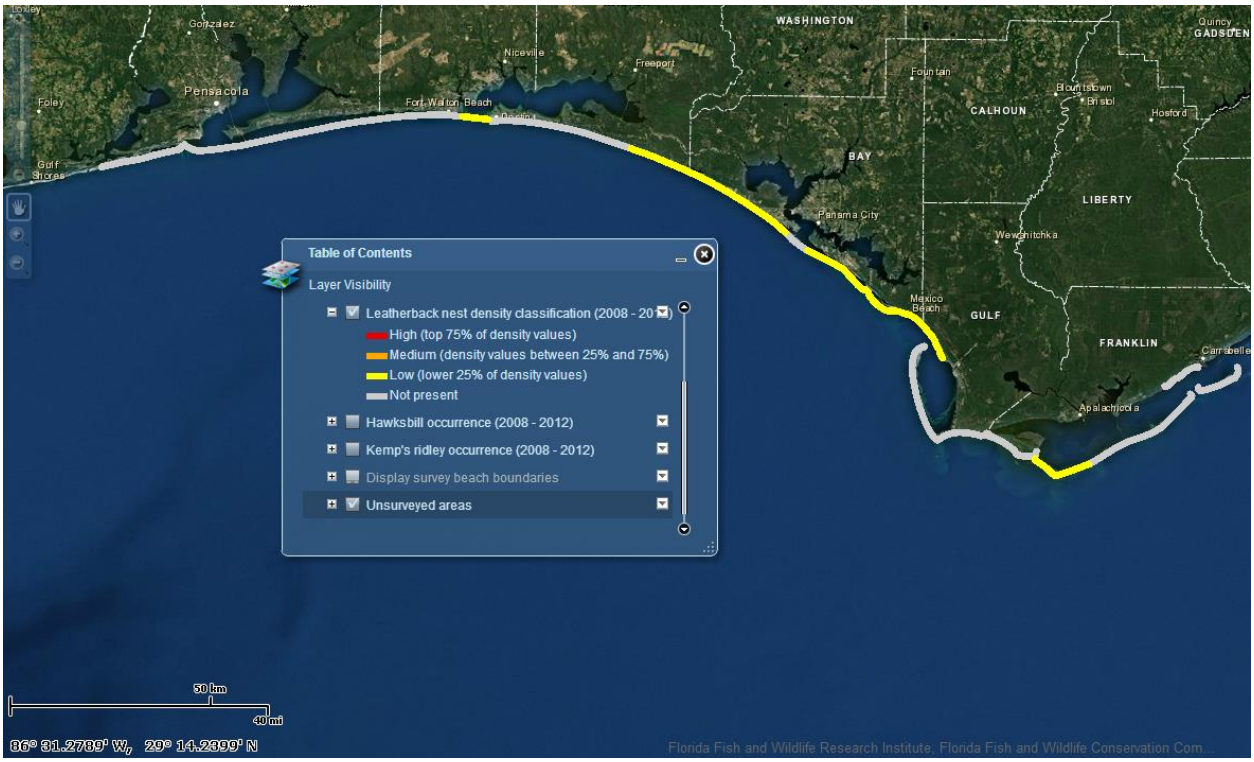

Figure 8. Map illustrating locations where Leatherback sea turtles have been observed nesting in the project area.
(Source FWC, 2013d)

Kemp's Ridley Sea Turtle

Status of the Species and Critical Habitat

The Kemp's ridley sea turtle was federally listed as endangered on December 2, 1970 (35 FR 18320). The Kemp's ridley has the most geographically restricted distribution of any sea turtle species. The range of the Kemp's ridley includes the Gulf coasts of Mexico and the U.S. and the Atlantic coast of North America as far north as Nova Scotia and Newfoundland. Adult Kemp's ridleys, considered the smallest sea turtle in the world, weigh an average of 100 pounds with a carapace measuring between 24-28 inches in length. The almost circular carapace has a grayish green color while the plastron is pale yellowish to cream in color. The carapace is often as wide as it is long. Their diet consists mainly of swimming crabs, but may also include fish, jellyfish, and an array of mollusks.

The majority of nesting for the entire species occurs on the primary nesting beach at Rancho Nuevo, Mexico (Marquez-Millan 1994). Hatchlings, after leaving the nesting beach, are believed to become entrained in eddies within the Gulf of Mexico, where they are dispersed within the Gulf and Atlantic by oceanic surface currents until they reach about 7.9 inches in length, at which size they enter coastal shallow water habitats (Ogren 1989). Adult Kemp's ridleys are believed to spend most of their time in the Gulf of Mexico, while juveniles and subadults also regularly occur along the eastern seaboard of the U.S. (USFWS and NMFS 1992). There have been rare instances when immature ridleys have been documented making transatlantic movements (USFWS and NMFS 1992).

No critical habitat has been designated for the Kemp's ridley sea turtle.

Life History

Nesting occurs from April into July during which time the turtles appear off the Tamaulipas and Veracruz coasts of Mexico. Precipitated by strong winds, the females swarm to mass nesting emergences, known as "arribadas or arribazones," to nest during daylight hours. The period between Kemp's ridley arribadas averages approximately 25 days (Rostal et al. 1997), but the precise timing of the arribadas is highly variable and unpredictable (Bernardo and Plotkin 2007). Some females breed annually and nest an average of one to four times in a season at intervals of 10 to 28 days. Analysis by Rostal (2007) suggested that ridley females lay approximately 3.1 nests per nesting season. Interannual remigration rate for female ridleys is estimated to be approximately 1.8 (Rostal 2007) to 2.0 years (Marquez-Millan et al. 1989). Age at sexual maturity is believed to be between 10 to 17 years (Snover et al. 2007).

Adult Kemp's primarily occupy "neritic" habitats. Neritic zones typically contain muddy or sandy bottoms where prey can be found. Their diet consists mainly of swimming crabs, but may also include fish, jellyfish, and an array of mollusks. Depending on their breeding strategy, male Kemp's ridleys appear to occupy many different areas within the Gulf of Mexico. Some males migrate annually between feeding and breeding grounds, yet others may not migrate at all, mating with females opportunistically encountered. Female Kemp's have been tracked migrating to and from nesting beaches in Mexico. Females leave breeding and nesting areas and continue on to foraging zones ranging from the Yucatán Peninsula to southern Florida. Some females take up residence in specific foraging grounds for months at a time (NMFS 2013d).

Population Dynamics

Most Kemp's ridleys nest on the coastal beaches of the Mexican states of Tamaulipas and Veracruz, although a small number of Kemp's ridleys nest consistently along the Texas coast (TEWG 1998). In addition, rare nesting events have been reported in Alabama, Florida, Georgia, South Carolina, and North Carolina. Historical information indicates that tens of thousands of ridleys nested near Rancho Nuevo, Mexico, during the late 1940s. The Kemp's ridley population experienced a devastating decline between the late 1940s and the mid-1980s.

The total number of nests per nesting season at Rancho Nuevo remained below 1,000 throughout the 1980s, but gradually began to increase in the 1990s. In 2009, 16,273 nests were documented along the 18.6 miles of coastline patrolled at Rancho Nuevo, and the total number of nests documented for all the monitored beaches in Mexico was 21,144 (USFWS 2009). In 2010, a total of 13,302 nests were documented in Mexico (USFWS 2010). In addition, 207 and 153 nests were recorded during 2009 and 2010, respectively, in the U.S., primarily in Texas.

Species Occurrence in Action Area

Figure 9 illustrates the locations where Kemp's ridley sea turtles have been observed nesting in the project area. Nesting occurs on the beaches and shorelines, and project work will take place primarily in open water habitat, thus, project work is not expected to directly affect nesting habitat. Kemp's ridley sea turtles have been observed nesting at low density (less than 25% of density values) on the barrier islands that border the Pensacola Bay project location. Kemp's ridley sea turtles have not been observed at the surveyed barrier islands for the other two locations, St. Andrew and Apalachicola Bays.

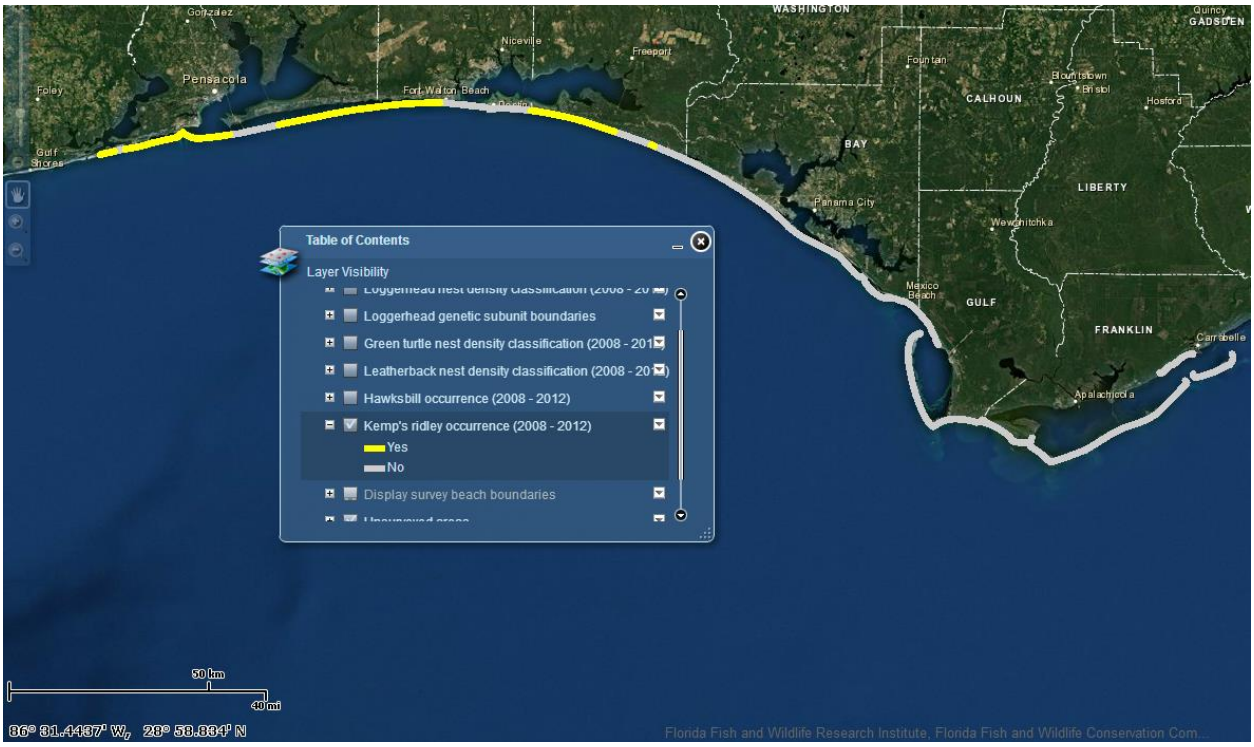

Figure 9. Map illustrating locations where Kemp's ridley sea turtles have been observed nesting in the project area.
(Source FWC, 2013d)

Environmental Baseline

Pensacola Bay System Environmental Baseline

The Pensacola Bay system has historically supported a rich and diverse ecology, productive fisheries, and considerable recreational opportunities, including the nation's largest protected seashore, Gulf Islands National Seashore. However, for many years point and nonpoint source pollution, direct habitat destruction, and the cumulative impacts of development throughout the watershed have combined to degrade the health and productivity of parts of the Pensacola Bay system. These impacts have made the Pensacola Bay watershed a priority for the State of Florida. State initiatives have helped restore impaired bayous, converted drainage ditches into stormwater gardens and led the purchase of a 1,500-acre bayside park, known as Jones Swamp Preserve. Additionally, the City of Pensacola has conducted several stormwater treatment projects to reduce flooding and pollution to Pensacola Bay.

Project GreenShores is a multi-million dollar habitat restoration and creation project along the urban shoreline of Pensacola Bay. This habitat restoration effort partners FDEP's Ecosystem Restoration Section with local and federal agencies, nongovernmental organizations, businesses and community volunteers to restore oyster reef, salt marsh and seagrass habitat within the Pensacola Bay System. Project GreenShores was constructed in phases and consists of two adjacent sites in Pensacola Bay. Site 1 was completed in 2003 and consists of 15 acres of estuarine habitat composed of seven acres of oyster reef and eight acres of salt marsh/seagrass habitat. Project GreenShores Site 2, constructed in the summer of 2007, encompasses the area of Pensacola Bay from the western shore of Muscogee Wharf up to and including Hawkshaw Lagoon. This site consists of three inter-tidal marsh islands and two submerged

breakwaters to reduce fetch driven wave energy before it reaches the inter-tidal marsh islands. Over time, the breakwaters have begun to also serve as oyster reef habitat as oyster larvae settle and grow.

Protection and restoration efforts for the Pensacola Bay system have also been conducted by the State of Florida through Water Management Areas and Coastal and Aquatic Preserves. The Yellow River Water Management Area covers 17,721 acres and includes 19 miles of river frontage. The Yellow River flows into East Bay at Escribano Point, which includes a significant portion of the remaining undisturbed estuarine habitat within the Pensacola Bay system. Florida has preserved a large portion of this area by purchasing 1,176 acres on the point, near the Yellow River Aquatic Preserve. This portion complements additional wetlands protection and preservation efforts on Garcon Point, an endangered species refuge totaling 3,245 acres, which protects Escambia and Blackwater bays. Some 30 miles of forested river corridor covering about 35,000 acres of floodplain is also preserved as the Escambia River Water Management Area to secure a buffer area that filters runoff and preserves water quality in an endangered system, which flows to Pensacola Bay. The extensive preserve also offers a continuous ecosystem of diverse habitats, rich in mature bottomland hardwood forest, pine uplands and estuarine marsh.

The Florida Coastal and Aquatic Preserves program has also made substantial efforts to protect and restore the greater Pensacola Bay system. The Yellow River Marsh Aquatic Preserve encompasses about 16,000 acres of the Yellow River, Blackwater Bay and East Bay, in the western panhandle of Florida. The aquatic preserve is a vital component in the Pensacola Bay System because it has been the least impacted by development and pollution. There are over 3,000 acres of salt and freshwater marshes and approximately 5,000 acres of forested wetlands. Eglin Air Force Base and the Northwest Florida Water Management District manage almost half of the uplands adjacent to the preserve which help buffer impacts to water quality. The Fort Pickens Aquatic Preserve encompasses about 30,000 acres of submerged lands in Escambia County adjacent to lands protected by the Gulf Islands National Seashore. The submerged lands along the northern sides of the surrounding barrier islands are characterized by shallow, saline waters, continuous and patchy seagrass beds, and salt marshes.

Other Consultations in Action Area to Date

In 2003, NMFS completed a regional biological opinion on hopper dredging in the Gulf ofMexico that included maintenance dredging in Gulf sturgeon critical habitat Units 8-14 and concluded that when existing navigation channels within designated critical habitat are dredged to only their current depth (i.e., maintenance-dredged), without improvements (e.g., deepening or widening), the project will not destroy or adversely modify Gulf sturgeon critical habitat.

On February 13, 2006, NMFS completed a biological opinion on the effects of Project GreenShores Phase II in Pensacola Bay, Escambia County. The assessment found that the project action area is less functional as a Gulf sturgeon migratory and foraging area than other areas within Pensacola Bay. The proposed Project GreenShores activity of installing breakwaters and creating salt marsh would result in the conversion of 28.7 acres of shallow submergent habitat to emergent and the temporary loss of productivity from 5.8 acres. NMFS concluded that the proposed action would not reduce the critical habitat's ability to support the Gulf sturgeon's conservation and, and proposed, is not likely to destroy or adversely modify designated Gulf sturgeon critical habitat.

On September 24, 2008, NMFS completed a biological opinion on a proposed action (F/SER/2008/03032) to dredge the current Maritime Park marina basin, install bulkheads, and create oyster reef breakwaters, tidal creeks, and salt marsh habitats. The current proposed project (i.e., construction of a marina and breakwater) is located within the same footprint of the action consulted on in the 2008 opinion. NOAA's 2008 biological opinion determined that 10.01 acres Gulf sturgeon critical

habitat would be impacted by the action. Through the consultation process, NMFS determined that effects from the 2008 project would not result in the destruction or adverse modification of critical habitat in Unit 9.

On April 10, 2013, NMFS completed a biological opinion on a proposed action (SAJ-2007-4728 (IP-MBH)) to construct the Community Maritime Park, Marina, and Breakwater, in Escambia County, Florida. The biological opinion determined that the project activities associated with the Community Maritime Park project would not reduce the critical habitat's ability to support the Gulf sturgeon's conservation. Following the project activities up to 11,380 square feet of critical habitat would cease to function as forage habitat, thereby reducing the prey availability. However, NMFS did not expect the loss of foraging habitat (prey availability) resulting from the construction activities to appreciably reduce the ecological function of Gulf sturgeon critical habitat. NMFS concluded the action, as proposed, was not likely to destroy or adversely modify designated Gulf sturgeon critical habitat.

Effect of the Proposed Action

Gulf Sturgeon

The proposed action was evaluated for impacts to Gulf sturgeon and their critical habitat. Gulf sturgeon mortality may occur from certain in-water activities including boat traffic. Mortality due to boat collisions is rare, but can occur especially in shallow waters. Potential impacts from project activities may be avoided by imposing work restrictions during sensitive time periods (i.e., spawning, migration, staging, feeding) when sturgeon are most vulnerable to mortalities. Cultching activities have been historically conducted from February to November. However, to avoid potential impacts to migrating Gulf sturgeon, the proposed construction activities may be scheduled to avoid the months in which Gulf sturgeon are more likely to use estuarine areas (May 1 through October 1). This is consistent with the desire to schedule placement in the Apalachicola and Pensacola Bay sites during the summertime period when these reefs are closed to harvest. As a result the projects will have a reduced chance of encountering Gulf sturgeon. The risks to Gulf sturgeon will be further mitigated as a result of the species' mobility and their ability and likely desire to avoid the project work areas as a result of noise and disturbance. As a result, of the low likelihood of encountering Gulf sturgeon at the project sites and as a result of incorporation of the *Sea turtle and Smalltooth Sawfish Construction Guidelines* (NOAA, 2006), which should further help reduce the risks of direct adverse impacts to the point they are not likely to be detectable or measureable, we believe the project will result in discountable impacts to Gulf sturgeon.

Critical Habitat

Within Gulf Sturgeon Critical Habitat Units 9 and 13, the following habitat features have been identified as important for review: (1) water quality; (2) migratory pathways; (3) Prey items, (4) riverine spawning sites, (5) flow regime, (6) sediment quality, and (6) abundant prey items necessary for normal behavior, growth, and viability of all life stages.

Water Quality

The project is not expected to adversely impact water quality. For a short duration after initial oyster cultch there will be some re-suspension of the in-situ sediments, and are expected to settle out naturally. Turbidity reduction devices would not be effective and cannot be used under this circumstance. The proposed activity will temporarily degrade water quality during the period while sediments settle out of the water column following cultch placement. These effects should be insignificant and thus not affect

sturgeon activities that depend on the maintenance of a certain quality of water for longer periods of time. In the longer term, re-establishing productive reefs will likely help improve water quality with the increased filtering capacity of productive oyster reefs.

Migratory Pathways

The proposed activity will not hinder sturgeon migration patterns given the relative amount of area involved in each of the three bays combined with the knowledge that the project is addressing existing oyster reefs instead of creating new reefs. As a result, the proposed activity will have insignificant impacts on the migration pathways and behavior of Gulf sturgeon.

Riverine spawning sites

The project site is not located within spawning areas, and thus will not affect spawning behavior or suitable substrates.

Flow regime

The proposed project will not alter flow patterns and this is not expected to negatively affect behavior, growth or reproductive activity.

Sediment quality

The proposed activity will not alter sediment composition as cultch is being placed on existing oyster reefs and thus it is expected that the project will not alter normal behavior, growth, and viability of all life stages of sturgeon.

Prey items

The project site is not located within a riverine area and will not alter or negatively affect foraging opportunities.

As a result, we believe the cultch placement for the oyster reefs will result in impacts that, cumulatively, are not likely to be detectable or measurable so are insignificant to Gulf sturgeon critical habitat.

Sea Turtles

The proposed action was evaluated for impacts to 5 threatened or endangered sea turtles and their critical habitat (Green, Loggerhead, Hawksbill, Leatherback, and Kemp's Ridley). The proposed project action area does not contain suitable nesting habitat for sea turtles; therefore no effects are anticipated to nesting sea turtles. However, in-water impacts to sea turtles using the proposed action area could occur. Based on nesting surveys it is unlikely that Hawksbill or Leatherback sea turtles will occur within the project action area (see discussion above). Nesting surveys indicate a low level or use near the project area and foraging habitat within the project area is limited for the Green and Kemp's Ridley sea turtles; therefore, their occurrence within the project action area is likely to be rare. Loggerhead sea turtles are a more frequent nester near the project area and have a broader range of marine habitat preferences. Therefore the occurrence of Loggerhead sea turtles in the project action area may be considered more likely than for the other species of sea turtles.

Sea turtle mortality may occur from certain in-water activities including boat traffic and dredging. Mortality due to boat collisions is rare, but can occur especially in shallow waters. Potential impacts from boat/barge operations associated with cultch placement may be avoided by requiring compliance during all in-water activities with the *Sea turtle and Smalltooth Sawfish Construction Guidelines* (NOAA, 2006).

In addition, sea turtles are mobile and will likely avoid the area due to project activity and noise. Project components would be constructed very close to the shoreline and are therefore not expected to impede sea turtle migratory routes. In summary, impacts to these species, if any, would be short-term and minor. If any sea turtles are found to be present in the immediate project area during restoration activities, construction would be halted until species moves away from project area. *Sea turtle and Smalltooth Sawfish Construction Guidelines* (NOAA, 2006) also include construction personnel education, use of "no wake/idle" speeds in proper locations, adhering to protection guidelines when a sea turtle is within 100 yards or activities, and reporting turtle injuries will be utilized to prevent and minimize impacts to sea turtles.

As a result, we believe the mobility of the sea turtles combined with the adherence to relevant in-water construction guidelines (NOAA, 2006) during cultch placement for the oyster reefs will result in impacts that are not likely to be measurable or detectable so are insignificant with respect to sea turtles.

Conservation Measures

Project components will be constructed in the months of May-October to avoid Gulf sturgeon inter-riverine migration movements. In addition, the Sea turtle and Smalltooth Sawfish Construction Guidelines (NOAA, 2006) (Appendix A) and the Standard Manatee Conditions for In-water Work (FWC, 2011) (Appendix B) will be implemented.

Determination of Effect

Based upon the findings of this BA, the proposed action "may affect, but is not likely to adversely affect" the following species under the purview of the NOAA Fisheries:

- Gulf Sturgeon - The restoration operations associated with this project may affect, but not likely to adversely affect and will not jeopardize the continued existence of the species.
- Gulf Sturgeon Critical Habitat – The project footprint does fall within identified Gulf sturgeon critical habitat units (9 and 13); however, it has been determined that the construction activities associated with this project will not adversely modify designated Gulf sturgeon critical habitat.
- Green Sea Turtle - The restoration operations associated with this project may affect, but not likely to adversely affect and will not jeopardize the continued existence of the species.
- Loggerhead Sea Turtle - The restoration operations associated with this project may affect, but not likely to adversely affect and will not jeopardize the continued existence of the species.
- Hawksbill Sea Turtle - The restoration operations associated with this project may affect, but not likely to adversely affect and will not jeopardize the continued existence of the species.
- Leatherback Sea Turtle - The restoration operations associated with this project may affect, but not likely to adversely affect and will not jeopardize the continued existence of the species.
- Kemp's Ridley Sea Turtle - The restoration operations associated with this project may affect, but not likely to adversely affect and will not jeopardize the continued existence of the species.

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Appendix A

SEA TURTLE AND SMALLTOOTH SAWFISH CONSTRUCTION CONDITIONS

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, FL 33701

SEA TURTLE AND SMALLTOOTH SAWFISH CONSTRUCTION CONDITIONS

The permittee shall comply with the following protected species construction conditions:

a. The permittee shall instruct all personnel associated with the project of the potential presence of these species and the need to avoid collisions with sea turtles and smalltooth sawfish. All construction personnel are responsible for observing water-related activities for the presence of these species.

b. The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing sea turtles or smalltooth sawfish, which are protected under the Endangered Species Act of 1973.

c. Siltation barriers shall be made of material in which a sea turtle or smalltooth sawfish cannot become entangled, be properly secured, and be regularly monitored to avoid protected species entrapment. Barriers may not block sea turtle or smalltooth sawfish entry to or exit from designated critical habitat without prior agreement from the National Marine Fisheries Service's Protected Resources Division, St. Petersburg, Florida.

d. All vessels associated with the construction project shall operate at "no wake/idle" speeds at all times while in the construction area and while in water depths where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will preferentially follow deep-water routes (e.g., marked channels) whenever possible.

e. If a sea turtle or smalltooth sawfish is seen within 100 yards of the active daily construction/dredging operation or vessel movement, all appropriate precautions shall be implemented to ensure its protection. These precautions shall include cessation of operation of any moving equipment closer than 50 feet of a sea turtle or smalltooth sawfish. Operation of any mechanical construction equipment shall cease immediately if a sea turtle or smalltooth sawfish is seen within a 50-ft radius of the equipment. Activities may not resume until the protected species has departed the project area of its own volition.

f. Any collision with and/or injury to a sea turtle or smalltooth sawfish shall be reported immediately to the National Marine Fisheries Service's Protected Resources Division (727-824-5312) and the local authorized sea turtle stranding/rescue organization.

g. Any special construction conditions, required of your specific project, outside these general conditions, if applicable, will be addressed in the primary consultation.

Revised: March 23, 2006
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Appendix B

STANDARD MANATEE CONSTRUCTION CONDITIONS FOR IN WATER WORK

STANDARD MANATEE CONDITIONS FOR IN-WATER WORK
2011

The permittee shall comply with the following conditions intended to protect manatees from direct project effects:

a. All personnel associated with the project shall be instructed about the presence of manatees and manatee speed zones, and the need to avoid collisions with and injury to manatees. The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing manatees which are protected under the Marine Mammal Protection Act, the Endangered Species Act, and the Florida Manatee Sanctuary Act.

b. All vessels associated with the construction project shall operate at "Idle Speed/No Wake" at all times while in the immediate area and while in water where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will follow routes of deep water whenever possible.

c. Siltation or turbidity barriers shall be made of material in which manatees cannot become entangled, shall be properly secured, and shall be regularly monitored to avoid manatee entanglement or entrapment. Barriers must not impede manatee movement.

d. All on-site project personnel are responsible for observing water-related activities for the presence of manatee(s). All in-water operations, including vessels, must be shutdown if a manatee(s) comes within 50 feet of the operation. Activities will not resume until the manatee(s) has moved beyond the 50-foot radius of the project operation, or until 30 minutes elapses if the manatee(s) has not reappeared within 50 feet of the operation. Animals must not be herded away or harassed into leaving.

e. Any collision with or injury to a manatee shall be reported immediately to the Florida Fish and Wildlife Conservation Commission (FWC) Hotline at 1-888-404-3922. Collision and/or injury should also be reported to the U.S. Fish and Wildlife Service in Jacksonville (1-904-731-3336) for north Florida or in Vero Beach (1-772-562-3909) for south Florida, and emailed to FWC at ImperiledSpecies@myFWC.com.

f. Temporary signs concerning manatees shall be posted prior to and during all in-water project activities. All signs are to be removed by the permittee upon completion of the project. Temporary signs that have already been approved for this use by the FWC must be used. One sign which reads *Caution: Boaters* must be posted. A second sign measuring at least 8½ " by 11" explaining the requirements for "Idle Speed/No Wake" and the shut down of in-water operations must be posted in a location prominently visible to all personnel engaged in water-related activities. These signs can be viewed at http://www.myfwc.com/WILDLIFEHABITATS/manatee_sign_vendors.htm. Questions concerning these signs can be forwarded to the email address listed above.