UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
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FEB 21 2007

F/SER32:KPB

Magalie R. Salas, Secretary
Federal Energy Regulatory Commission
888 First Street N.E., Room 1A
Washington, DC 20426

Dear Ms. Salas:

This constitutes the National Marine Fisheries Service's (NMFS) biological opinion (opinion) based on our review of the Federal Energy Regulatory Commission's (FERC) request for formal Endangered Species Act (ESA) section 7 consultation on the effects of the Gulf LNG Clean Energy Project near Bayou Casotte, Jackson County, Mississippi. The proposed action is to construct and operate a receiving, re-gasification, and sendout liquefied natural gas terminal. This opinion is based on project-specific information provided by FERC, as well as NMFS' review of published literature.

In the opinion, NMFS analyzed the proposed action's effects on endangered and threatened sea turtles, marine mammals, fish, and critical habitat. NMFS concludes in the opinion that the action, as proposed, is not likely to adversely affect listed species, and is not likely to destroy or adversely modify designated Gulf sturgeon critical habitat.

We look forward to continued cooperation with you on other FERC projects to ensure the conservation of our threatened and endangered marine species and designated critical habitat. We have enclosed other statutory requirements that may apply to this action, as well as additional information on NMFS' Public Consultation Tracking System to allow you to track the status of ESA consultations. If you have any questions, please contact Kyle Baker, fishery biologist, at (727) 824-5312, or by e-mail at kyle.baker@noaa.gov.

Sincerely,

Roy E. Crabtree, Ph.D.
Regional Administrator

Enclosures

cc: PPI/SP – Mendez
F - Lindow

File: 1514-22.O.1
Ref: F/SER/2006/05026

Additional Considerations for ESA Section 7 Consultations (Revised 12-6-2005)

Marine Mammal Protection Act (MMPA) Recommendations: The Endangered Species Act (ESA) section 7 process does not authorize incidental takes of listed or non-listed marine mammals. If such takes may occur an incidental take authorization under MMPA section 101 (a)(5) is necessary. Contact Ken Hollingshead of our NMFS Headquarters' Protected Resources staff at (301) 713-2323 for more information on MMPA permitting procedures.

Essential Fish Habitat (EFH) Recommendations: In addition to its protected species/critical habitat consultation requirements with NMFS' Protected Resources Division (PRD) pursuant to section 7 of the ESA, prior to proceeding with the proposed action the action agency must also consult with NMFS' Habitat Conservation Division (HCD) pursuant to the Magnuson-Stevens Fishery Conservation and Management Act's (MSA) requirements for essential fish habitat (EFH) consultation (16 U.S.C. 1855 (b)(2) and 50 CFR 600.905-.930, subpart K). The action agency should also ensure that the applicant understands the ESA and EFH processes; that ESA and EFH consultations are separate, distinct, and guided by different statutes, goals, and time lines for responding to the action agency; and that the action agency will (and the applicant may) receive separate consultation correspondence on NMFS letterhead from HCD regarding their concerns and/or finalizing EFH consultation.

Public Consultation Tracking System (PCTS) Guidance: PCTS is an online query system allowing federal agencies and U.S. Army Corps of Engineers' (COE) permit applicants to track the status of NMFS consultations under ESA section 7 and under MSA sections 305(b)2 and 305(b)(4): Essential Fish Habitat. Access PCTS via: www.nmfs.noaa.gov/pcts. Federal agencies are required to enter an agency-specific username and password to query the Federal Agency Site. The Corps Permit Site allows COE permit applicants the ability to check on the current status of Clean Water Act section 404 permit actions for which NMFS has conducted an ESA section 7 consultation with the COE since the beginning of the 2001 fiscal year (no password needed).

For COE-permitted projects, click on "Enter Corps Permit Site." From the "Choose Agency Subdivision (Required)" list, pick the appropriate COE district. At "Enter Agency Permit Number" type in the COE district identifier, hyphen, year, hyphen, number. The COE is in the processing of converting its permit application database to PCTS-compatible "ORM." An example permit number is: SAJ-2005-000001234-IPS-1. For the Jacksonville District, which has already converted to ORM, permit application numbers should be entered as SAJ (hyphen), followed by 4-digit year (hyphen), followed by permit application numeric identifier with no preceding zeros. E.g., SAJ-2005-123, SAJ-2005-1234, SAJ-2005-12345.

For inquiries regarding applications processed by Corps districts that have not yet made the conversion to ORM (e.g., Mobile District), enter the 9-digit numeric identifier, or convert the existing COE-assigned application number to 9 numeric digits by deleting all letters, hyphens, and commas; converting the year to 4-digit format (e.g., -04 to 2004); and adding additional zeros in front of the numeric identifier to make a total of 9 numeric digits. E.g., AL05-982-F converts to 200500982; MS05-04401-A converts to 200504401. PCTS questions should be directed to Eric Hawk at Eric.Hawk@noaa.gov. Requests for username and password should be directed to April Wolstencroft (PCTSUsersupport@noaa.gov).

Endangered Species Act - Section 7 Consultation
Biological Opinion

Action Agency: Federal Energy Regulatory Commission

Activity: LNG Clean Energy Project (Docket Nos. CP06-12 and CP06-13) Port of Pascagoula, Mississippi Sound

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

Approved by:

Roy E. Crabtree, Ph.D., Regional Administrator
National Marine Fisheries Service, Southeast Regional Office
St. Petersburg, Florida

Date Issued: Feb 2, 2007

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Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq*.), requires that each federal agency shall ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species. The National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) share responsibilities for administering the ESA. Section 7(a)(2) requires federal agencies to consult with the appropriate Secretary on actions that may affect a species listed or habitat designated under the ESA.

Consultation is required when a federal action agency determines that a proposed action "may affect" listed species or designated critical habitat. Consultation is concluded after NMFS determines the action is not likely to adversely affect listed species or designated critical habitat, or issues a biological opinion (opinion) that identifies whether the action is likely to jeopardize the continued existence of such species, or destroy or adversely modify critical habitat. The opinion establishes the amount or extent of incidental take of the listed species that may occur, develops measures (i.e., reasonable and prudent measures) to reduce the effect of take, and may recommend conservation measures to further conserve the species. Notably, no incidental destruction or adverse modification of critical habitat can be authorized, and thus there are no reasonable and prudent measures, only reasonable and prudent alternatives that must avoid destruction and adverse modification.

This document represents NMFS' opinion based on our review of impacts associated with Gulf LNG Energy, LLC and Gulf LNG Pipeline, LLC (collectively called Gulf LNG). The Federal Energy Regulatory Commission (FERC) is the permitting authority. This opinion analyzes project effects on listed species and Gulf sturgeon critical habitat in accordance with section 7 of the ESA. This opinion is based on project information provided by FERC and the best available information.

Consultation History

NMFS received a request from FERC on March 27, 2005, for a section 7 consultation on the proposed action. FERC determined that the proposed action may affect but is not likely to adversely affect listed species, and may affect critical habitat designated for the Gulf sturgeon. In order to assess the existing environmental resources in the Project area, a habitat characterization plan was developed and implemented in consultation with NMFS that would provide needed information for section 7 consultation on this project. A draft report was submitted to NMFS in June 2005 and a meeting held on July 6, 2005, to discuss the results of the surveys. During the July 6th meeting, potential impacts to the Gulf sturgeon and its habitat were discussed both at the berth area and at several of the potential dredge material disposal sites under consideration. In addition, items such as the need for periodic maintenance dredging, the permanent conversion of shallow subtidal habitat to deeper subtidal habitat, and other discharges were discussed in order to include the operational phase in the consultation process and the assessment of impacts for the Gulf sturgeon. A draft environmental impact statement DEIS, biological assessment, and draft mitigation plan were received by NMFS on May 30, 2006.

NMFS requested additional information on June 6, 2006, to which a reply was received on August 29, 2006. Formal consultation under the ESA was initiated on September 7, 2006.

1 DESCRIPTION OF THE PROPOSED ACTION AND THE ACTION AREA

Gulf LNG proposes to construct and operate a new LNG import, storage, and vaporization terminal. Gulf LNG will import LNG on LNG carriers (LNGCs) to the terminal for unloading, storage, and regasification for delivery via a natural gas sendout pipeline. The Gulf LNG terminal facility would include a ship berth and unloading facilities capable of accommodating one LNG ship at a time, LNG transfer systems, two 160,000 cubic meter (m^3) LNG storage tanks, 10 high-pressure submerged combustion vaporizers (SCVs), a vapor handling system; and ancillary utilities, buildings, and service facilities. The natural gas pipeline facilities would include a 5.0-mile-long, 36-in-diameter natural gas sendout pipeline and associated pipeline support facilities, including one meter station, three interconnects, one pig launcher, and one pig receiver. All pipelines and associated structures would be constructed and operated on land.

1.1 Project Area

The LNG terminal would be located on a 33.3-acre site within the Port of Pascagoula on the Mississippi Sound, just southeast of the mouth of the Bayou Casotte Harbor (Figure 1). Bayou Casotte is an estuary fed by two freshwater tributaries, the East Prong and West Prong, which drain the Bayou Casotte watershed (approximately 8.4 square miles in size). Mississippi Sound extends approximately 100 miles from Lake Borgne, Louisiana to Mobile Bay, Alabama, with a varying width of 7 to 15 miles. This long, shallow estuary is bordered on the north by small bays (St. Louis Bay, Biloxi Bay, Pascagoula Bay, and Grand Bay), marshes, bayous, rivers, and coastal beaches. To the south, the Gulf Islands, a series of narrow barrier islands and sandbars, separate the sound from the Gulf of Mexico. Mississippi Sound is primarily fed by the Escatawpa, Pascagoula, Tchoutacabouffa, Biloxi, Wolf, and Jourdan Rivers. Silty clay is the dominant sediment in the Mississippi Sound and the average depth at mean low water is about 6 ft. Wave action on the fine-grained sediments in the shallow sound creates a turbid environment. During peak river flows, muddy waters may reach and extend beyond the barrier islands.

1.2 Dredging

Construction of the marine facilities associated with the LNG terminal would require clamshell bucket dredging of about 61.3 acres in Mississippi Sound. Marine construction equipment would be required to construct the marine facilities, and most of the materials required for construction would be delivered by barge. Construction of the ship berth and maneuvering area would require the dredging of approximately 2.96 million cubic yards (yd^3) of material. The ship berth and associated maneuvering area would be dredged to an elevation of -42 ft mean lower low water (MLLW), with an additional 2 ft for advance maintenance and up to 2 ft of potential over-dredge allowance. A total area of about 1,200 ft wide by 2,200 ft long would be dredged. The sides of the maneuvering area would be contoured at a 5:1 slope. Gulf LNG would install rock riprap or concrete units on the slope parallel to the shoreline to provide scour protection from LNG ship propeller wash. Dredging operations and construction of the marine facilities are anticipated to take about 21 months to complete.

Based on estimated shoaling rates in the area, FERC estimates that between 115,000 and 180,000 yd^3 of material would have to be removed from the ship berth and maneuvering area every three years by maintenance dredging.

Gulf LNG is proposing to dispose of the dredged material at the existing Pascagoula Ocean Dredged Material Disposal Site (ODMDS). Placement of the maintenance dredge material is proposed to occur on an upland site adjacent to Gulf LNG, and will not affect Gulf sturgeon critical habitat. The Pascagoula ODMDS is located south of Horn Island and west of the Pascagoula Bay Channel, outside of any designated Gulf sturgeon critical habitat. The ODMDS is located approximately 13 miles from the Project site and covers an area of approximately 18.5 square nautical miles (24.5 square miles). Depths in the site vary from 30 ft in the north to 60 ft in the south. The boundary coordinates for the ODMDS are:

30°12’16”N 88°44’30”W
30°11’42”N 88°33’24”W
30°08’30”N 88°37’00”W
30°08’18”N 88°41’54”W.

1.3 Pile Driving and Construction of the Berth

Construction of the jetty structure and associated facilities, the breasting and mooring structures, and the aids-to-navigation would be conducted from marine-based construction equipment. The marine construction equipment would include large barges (i.e., 150 to 300 ft long and 50 to 100 ft wide) outfitted with cranes. The cranes would be used to lift piles into position, support pile-driving equipment, and lift various steel and concrete structures. Diesel powered pile-driving hammers would be used to install all piles for the structures associated with the marine facilities. The hammers would be internal combustion, open top hammers that are typically used for this type of construction. A total of approximately 369 piles ranging from 12-16 in diameters will be required to support structures for this project.

Other general equipment likely required during construction includes smaller hydraulic lifting cranes, gas- and diesel-powered air compressors, welding machines, and power generators. The construction barges are typically outfitted with spuds, which are large steel piles that can be dropped through openings in the hull of the barge to hold it in place while performing construction operations.

The marine facilities would consist of a single berth, including a single-level jetty platform supported on 56, 36-in-diameter steel pipe piles. The jetty platform would be designed to support LNG unloading arms, a vapor return arm, and associated structures. The jetty platform would be connected to land by means of approach and pipe trestle structures. The approach trestle would be supported by 66, 18-in-diameter piles and would accommodate vehicular and pedestrian traffic. About 120, 18-in-diameter piles would be required for the pipe trestle, which would support cryogenic LNG piping within 2-foot-high containment walls. The containment area would be sloped away from the face of the jetty platform on a grade of approximately 1% to the pipe trestle where containment and shoreward sloping would be continued. The jetty

platform and pipe trestle would be constructed at a minimum elevation of 27.3 ft above mean sea level.

A steel and earthen dike 45 ft wide and 25 ft tall would be constructed around the perimeter of the 33.3-acre LNG terminal site. The LNG terminal perimeter dike would consist of a vertical open-cell wall. The exterior and interior perimeter walls of the dike would be constructed of interlocking sheet piles driven to a depth of not less than 80 ft below finished grade. A reinforced earthen layer would be placed between the two sheet pile walls.

1.4 LNG Carriers

LNG could be shipped to the proposed LNG terminal from a variety of sources around the world, including Algeria, Egypt, Nigeria, Qatar, Trinidad, and Venezuela. At this time, Gulf LNG has not confirmed the source(s) of LNG supplies nor the size and capacity of LNGCs that would be used. The ships that transport LNG are specially designed and constructed to carry LNG for long distances. LNGC construction is highly regulated and consists of a combination of conventional ship design and equipment, with specialized materials and systems designed to safely contain liquids stored at a temperature of -260°F. The berth will be constructed to accommodate LNGCs ranging from 88,000 m^3 to approximately 150,000 m^3 in capacity. To allow for future increases in the size of LNGCs, the mooring and breasting dolphins are designed to accommodate LNG ships with capacities of up to 250,000 m^3. It is anticipated that up to 150 ships per year would unload LNG at the proposed facility. The actual number of ships would depend on the size of the ships calling on the LNG terminal over time.

A ballast control system, which permits simultaneous ballasting during cargo transfer operations, is also incorporated into each LNGC. This allows the LNGC to maintain a constant draft during all phases of its operation to enhance performance. Under normal operating conditions, ballast water would be taken onto the ship during LNG offloading at the marine terminal. A typical LNGC of the type in service today would take on about 11 to 14 million gal of ballast water during the offloading operations. Because ballast water is not discharged during unloading operations, no ballast water would be discharged into Mississippi Sound.

1.5 Action Area

The action area of the project includes all areas to be affected directly or indirectly by the action, and not merely the immediate area involved in the action (50 CFR 402.02). The action area is considered to be all terrestrial and aquatic environments of Mississippi Sound affected by the construction and operation of the LNG terminal and pipelines described above. The marine portion of the project area is considered to extend from the marine basin of the LNG terminal to include all LNGC traffic lanes within the Exclusive Economic Zone (EEZ) of the Atlantic Ocean, including the Gulf of Mexico (GOM) and Caribbean Sea.

1.6 Proposed Harm Avoidance Measures

In addition to other mitigation measures proposed for the LNG Clean Energy terminal, measures will be required for listed species and designated critical habitat. A more comprehensive description of all mitigation measures can be found in the March 7, 2006, mitigation plan prepared by Gulf LNG.

1.6.1. Training of Personnel

Environmental training will be provided to supervisors and staff in order to provide information on environmental permit conditions, pollution prevention requirements, reporting requirements, and other measures designed to allow the project to be constructed in compliance with permit conditions and to minimize environmental impacts.

1.6.2. Marine Pile/Sheet Driving

In all marine and shoreline construction activities of pile and sheet driving, environmental monitoring and measures to reduce noise transmission into the surrounding aquatic environment will be implemented. The following measures will be required to reduce impacts to protected species to discountable levels.

1. A 500-m safety zone will be established around a pile for sea turtles and marine mammals prior to beginning any pile driving in estuarine environments. In enclosed areas with structures limiting propagation (e.g., sea walls or channel banks), observations should focus on those aquatic areas most affected from the activity.

2. Bubble curtains will be used to attenuate noise levels to reduce received sound pressure levels by sea turtles, Gulf sturgeon, and bottlenose dolphins in the project area. Bubble curtains dampen or attenuate the sound transmitted through the bubble curtain. A bubble curtain consists of a circular or square-shaped air distribution manifold made of rubber, plastic, or steel tubing which surrounds the piling at various points below the water surface. An effective bubble curtain system distributes air bubbles around 100% of the perimeter of a pile over the full depth of the water column while it is being driven. Many small bubbles are preferable to few larger bubbles. The main components include a high-volume air compressor, primary feed line, and a distribution manifold. Bubble curtains need to checked and maintained regularly for effectiveness.

3. Each time a pile driving hammer is started, bubble curtains will be turned on and dry-firing or ramping-up of the hammer will be conducted for at least 30 minutes, and no greater than 40 minutes, to allow animals the opportunity to leave the area. Dry firing of a pile-driving hammer is a method of raising and dropping the hammer with no compression of the pistons, producing a lower-intensity sound than the full power of the hammer. Ramp-up involves slowly increasing the power of the hammer and noise produced over the ramp-up period.

4. Qualified observers will be used to visually monitor the safety zone for at least 45 minutes prior to beginning all pile driving activities. Each observer will be provided with the equipment necessary to conduct observations (e.g., a two-way radio dedicated to protected species communication, ear protection, polarized sunglasses, binoculars, and any necessary data recording equipment that may be required).

5. Observations may occur during dry-firing and ramping up of the pile driving hammer. If at any time a sea turtle or marine mammal is observed in the safety zone during dry-firing

or ramp-up, the hammer will be shutdown until the animal has left the safety zone of its own volition. Ramp-up must be repeated following each shutdown.

6. Following the initial 45-minute observations for protected species and a pile driver achieves full power, intermittent observations will occur at least twice a day to maintain watch for animals in the area, and ensure the bubble curtains are functioning properly. If at any time an animal is observed in the safety zone during pile driving, the pile driving activity shall cease until the animal has left the area of its own volition, or coordination with a stranding network representative has occurred, if the animal is injured.

7. Pile driving activities occurring at night may only be initiated if ramp-up/dry-firing procedures are followed, bubble curtains are utilized, and underwater noise monitoring indicates that the bubble curtain is effective at reducing sound pressure levels to at least 180 dB re 1µPa EFD across all frequencies at a safe distance from the pile driver. Gulf LNG will coordinate with NMFS on the development of protocols to verify field measurements of noise from pile driving that may be required.

8. Turbidity will be monitored around piles driven. If turbidity levels exceed water quality standards, turbidity curtains will be used to reduce the effects of turbidity around piles driven in Gulf sturgeon critical habitat.

9. Records will be maintained of all sea turtle and marine mammal sightings in the area, including date and time, weather conditions, species identification, approximate distance from the pile, direction and heading in relation to the pile driving, and behavioral observations. When animals are observed in the safety zone, additional information and corrective actions taken such as a shutdown of the pile driver, duration of the shut-down, behavior of the animal, and time spent in the safety zone will be recorded.

1.6.3. Habitat Measures

Gulf LNG has developed a Mitigation Plan and a Monitoring Plan to address habitat effects associated with dredging and other construction activities.

1. Gulf LNG proposes to conduct Gulf sturgeon habitat assessment surveys in the marine basin and terminal areas as part of its habitat monitoring program. Results of these surveys will compare baseline conditions of the pre-dredge area with recovery of the benthos and habitat conditions following completion of the dredging of the marine basin. Reports will by sent to NMFS' Southeast Regional Office.

2. Best management practices (BMPs) will be used for dewatering activities, should they be necessary during construction. The dewatering will occur so as to minimize the release of heavily sediment-laden water into sensitive resource areas, such as Gulf sturgeon critical habitat, as well as to prevent the discharge of contaminants.

3. Construction personnel will be required to follow procedures, methods, and reporting requirements of the project-specific stormwater pollution prevention plan and a spill prevention, control, and countermeasure plan. These plans will provide details on how to handle Stormwater during construction and how to minimize the potential for spills as well, as the control measures required in the event an accidental spill does occur during construction.

4. Erosion controls will be placed at the edge of work areas to define limit of work/no access boundaries and serve to control the runoff of storm water.

5. A 300-ft extension to an existing breakwater would restore approximately 1.9 acres of wetlands behind the breakwater. The breakwater will be adjacent to, but outside of designated Gulf sturgeon critical habitat.

6. Rock breakwaters will be constructed to avoid any further erosion of the shoreline adjacent to Gulf LNG. The breakwater will be placed along the geo-referenced historical shoreline; thus, avoiding designated critical habitat. Erosion control structures will be used during all shoreline construction activities.

1.6.4. LNGC Operations

Background

NMFS has determined that collisions with vessels can injure or kill protected species (e.g., endangered and threatened species, and marine mammals). The following standard measures must be implemented to reduce the risk associated with vessel strikes or disturbance of these protected species to discountable levels. NMFS should be contacted to identify any additional conservation and recovery issues of concern.

Protected Species Identification Training

Vessel crews will use an Atlantic and Gulf of Mexico reference guide that helps identify the species of marine mammals and sea turtles that might be encountered in U.S. waters of the Atlantic Ocean, including the Caribbean and Gulf of Mexico. Additional training or informational materials will be provided regarding information and resources available regarding federal laws and regulations for protected species, ship strike information, critical habitat, migratory routes and seasonal abundance, and recent sightings of protected species.

Vessel Strike Avoidance

LNGCs will be operated with the following measures to avoid causing injury or death to marine mammals and sea turtles:

1. Vessel operators and crews must maintain a vigilant watch for marine mammals and sea turtles to avoid striking sighted protected species.

2. When whales are sighted, maintain a distance of 100 yd or greater between the whale and the vessel.

3. When sea turtles or small cetaceans are sighted, attempt to maintain a distance of 50 yd or greater between the animal and the vessel whenever possible.

4. When small cetaceans are sighted while a vessel is underway (e.g., bow-riding), attempt to remain parallel to the animal's course. Avoid excessive speed or abrupt changes in direction until the cetacean has left the area.

5. Reduce vessel speed to 10 knots or less when mother/calf pairs, groups, or large assemblages of cetaceans are observed near an underway vessel, when safety permits. A single cetacean at the surface may indicate the presence of submerged animals in the vicinity; therefore, prudent precautionary measures should always be exercised. The vessel should attempt to route around the animals, maintaining a minimum distance of 100 yd whenever possible.

6. Whales may surface in unpredictable locations or approach slowly moving vessels. When an animal is sighted in the vessel's path or in close proximity to a moving vessel, reduce speed and shift the engine to neutral. Do not engage the engines until the animals are clear of the area.

Additional Requirements for the North Atlantic Right Whale

1. If a sighted whale is believed to be a North Atlantic right whale, federal regulation requires a minimum distance of 500 yd be maintained from the animal (50 CFR 224.103 (c)).

2. Vessels entering North Atlantic right whale critical habitat in the southeast U.S. (50 CFR 226.203) are required to report into the WHALESOUTH Mandatory Ship Reporting System (33 CFR 169).

3. Mariners should check with various communication media for general information regarding avoiding ship strikes and specific information regarding North Atlantic right whale sighting locations. These include NOAA weather radio, U.S. Coast Guard NAVTEX broadcasts, and Notices to Mariners.

4. Injured, dead, or entangled right whales will be immediately reported to the U.S. Coast Guard via VHF Channel 16.

Injured or Dead Protected Species Reporting

Vessel crews must report sightings of any injured or dead protected species immediately, regardless of whether the injury or death is caused by your vessel.

Report marine mammals to the Southeast U.S. Stranding Hotline: 305-862-2850
Report sea turtles to the NMFS Southeast Regional Office: 727-824-5312

In addition, if the injury or death was caused by a collision with your vessel, LNGC operators associated with Gulf LNG must immediately notify NMFS of the strike.

The vessel strike report will include the following information:

a. the time, date, and location (latitude/longitude) of the incident;

b. the name and type of the vessel involved;

c. the vessel's speed during the incident;

d. a description of the incident;

e. water depth;

f. environmental conditions (e.g., wind speed and direction, sea state, cloud cover, and visibility);

g. the species identification or description of the animal, if possible; and

h. the fate of the animal.

If a FERC-related activity is responsible for the injury or death, the responsible parties should remain available to assist the respective salvage and stranding network as needed.

2 STATUS OF LISTED SPECIES AND CRITICAL HABITAT

The endangered and threatened species, and designated critical habitat under the jurisdiction of NMFS that appear in Table 1 occur in the action area. No listed marine mammals are expected to occur in the pipeline or terminal area, but may be affected by LNGCs associated with Gulf Clean Energy Project operation. Within the action area, NMFS has only designated critical habitat for the Gulf sturgeon.

2.1 Effects Considered and Discounted

NMFS has analyzed several aspects of this project during consultation with FERC for potential impacts to listed species and their habitats. These effects were considered for their potential to affect listed species and critical habitat. In considering project activities that may adversely affect listed species, proposed harm avoidance measures were assessed for their effectiveness at reducing the likelihood of impacts occurring to discountable levels, or by reducing the magnitude of potential impacts to insignificant levels.

2.1.1 Vessel Operation and Marine Mammals

Ships transit into the GOM via the most direct safe route to Gulf LNG. Although the source of LNG supplies for the proposed LNG terminal has not yet been identified, LNGCs calling on Gulf LNG could be expected to arrive from any existing or future production countries.

Table 1. Listed species and critical habitat in the action area.

Common Name	Scientific Name	Status
Marine Mammals		
sperm whale	*Physeter macrocephalus*	endangered
North Atlantic right whale	*Eubalaena glacialis*	endangered
sei whale	*Balaenoptera borealis*	endangered
fin whale	*Balaenoptera physalus*	endangered
humpback whale	*Megatera novaeangliae*	endangered
blue whale	*Balaenoptera borealis*	endangered
Sea Turtles		
leatherback sea turtle	*Dermochelys coriacea*	endangered
Kemp's ridley sea turtle	*Lepidochelys kempii*	endangered
hawksbill sea turtle	*Eretmochelys imbricata*	endangered
green sea turtle[a]	*Chelonia mydas*	threatened
loggerhead sea turtle	*Caretta caretta*	threatened
Fish		
Gulf sturgeon[b]	*Acipenser oxyrinchus desotoi*	threatened

[a]Green turtles are listed as threatened, except for breeding populations of green turtles in Florida and on the Pacific coast of Mexico, which are listed as endangered.
[b]Gulf sturgeon critical habitat unit 8 is designated in the action area.

An effects analysis provided by FERC concluded that the major shipping routes into the GOM would not traverse oceanographic areas where North Atlantic right whales are typically known to occur. The following description of potential LNG carrier routes is based on several assumed points of origin of LNG for the Gulf LNG Terminal, including the Middle East and Mediterranean Region, the west coast of Africa, the eastern Caribbean, and the northeast coast of South America. The description of these potential routes provides information on where LNG carriers would most likely transit. The following is the summary of potential LNG carrier ports of origin and potential routes for the importation of LNG to the Gulf LNG terminal:

Origin #1: *Middle East and Mediterranean Region*

- Depart the Mediterranean Sea at the Straits of Gibraltar to enter the Atlantic Ocean.
- Transit west across the Atlantic Ocean.

- Enter the U.S. EEZ in one of the following two locations and turn south to follow the east coast of Florida: 1) north of the Little Bahama Bank (roughly at latitude 27.5^{o}N), or 2) through the Northwest Providence Channel (roughly at latitude 26.0^{o}N).
- Both of these locations are approximately 150 miles and 240 miles, respectively, south of the Southeastern Right Whale Reporting Boundary at latitude 30.0^{o}N.
- Transit south then west through the Straits of Florida.
- Turn to the northwest after passing the Dry Tortugas (located approximately 70 miles west of Key West) to enter the Gulf of Mexico.
- Transit northwest across the Gulf of Mexico to the Port of Pascagoula.

Origin #2: *West Coast of Africa*

- Transit west across the Atlantic Ocean to the Old Bahama Channel (located between the Bahamas and the north coast of Cuba).
- The LNG carrier will likely transit through the U.S. EEZ as it passes north of Puerto Rico.
- Transit west-northwest through the Old Bahama Channel and exit into the Straits of Florida.
- Enter the U.S. EEZ in the Straits of Florida south of Key West.
- Turn to the northwest after passing the Dry Tortugas (located approximately 70 miles west of Key West) to enter the Gulf of Mexico.
- Transit northwest across the Gulf of Mexico to the Port of Pascagoula

Origin #3: *Eastern Caribbean and Northeast Coast of South America*

- Transit northwest across the Caribbean Sea to the Mona Pass (located between Puerto Rico and the Dominican Republic).
- The LNG carrier will likely transit through the U.S. EEZ as it passes west of Puerto Rico.
- After passing through the Mona Pass, transit west-northwest through the Old Bahama Channel and exit into the Straits of Florida.
- Enter the U.S. EEZ in the Straits of Florida south of Key West.
- Turn to the northwest after passing the Dry Tortugas (located approximately 70 miles west of Key West) to enter the Gulf of Mexico.
- Transit northwest across the Gulf of Mexico to the Port of Pascagoula.

Based on this summary of potential LNG carrier routes on the high seas to the Gulf LNG terminal, the following general regions may experience the greatest shipping density by LNG carriers:

- East Coast of Florida, south of latitude 27.5º North;
- Straits of Florida, south of the Florida Keys;
- Waters north and west of Puerto Rico; and

- Waters of the Gulf of Mexico (each LNG carrier will transit these waters).

FERC will implement NMFS' vessel strike avoidance measures for protected species. As a precautionary measure, North Atlantic right whales were considered in this consultation in the event this species is encountered on the high seas. Since LNGCs will operate outside the typical range of North Atlantic right whales en route to the GOM, NMFS believes that with implementation of these measures, the potential for a vessel strike with right whales from an LNGC associated with Gulf LNG is so low, it is considered discountable.

Adverse reactions by whales to vessel activity have been recorded, and all are vulnerable to collisions with vessels, with incidents of strikes with juveniles and calves occurring more frequently than with adult animals. Some individuals may be able to detect and avoid underway vessels; however, the behavior of some individuals and age classes, and the behavioral characteristics of some species, may result in an increased vulnerability to disturbance and injury from vessels operating at speeds over 10 knots (e.g., sick animals, resting animals, and calfs).

LNGCs have the potential to affect listed whales, especially in deeper, pelagic waters where vessels are underway at greater speeds. A vessel's operational speed influences the probability of animal detection and reaction time. Reported ship collision accounts suggest that serious injury to whales rarely occurs at speeds below 10 knots (Laist et al. 2001). A vessel's operational speed influences the probability of animal detection and reaction time. At slower vessel speeds, a particular location ahead of the vessel is within visual range for a longer period of time before the vessel arrives at that location. For example, a vessel traveling at 16 knots that sees a whale 1,000 m ahead will arrive at the whale's position in 2.02 minutes; at 10 knots, the vessel will arrive at the whale's position in 3.23 minutes.

With implementation of NMFS' vessel strike avoidance measures, by maintaining a lookout for marine mammals and taking prudent actions to avoid collisions with them, NMFS believes that the likelihood of collisions between LNGCs and marine mammals will be reduced to discountable levels.

2.1.2 Vessel Operation and Sea Turtles

Vessel characteristics such as hull design and operational speeds may greatly affect the risk to different species. Large, deep-draft merchant vessels create a considerable bow wave because of their bulbous-bow hull design and large displacement tonnage. The bulbous bow reduces hull resistance to the water by displacing the water upward and ahead of the hull region, thereby reducing the magnitude of both the pressure and suction fields. As a result of this design, flotsam and other relatively small objects at the surface are typically pushed away from vessels with a bulbous bow. By displacing the water upward and ahead of the hull region, bulbous-bow designs thereby reduce the likelihood of potential impacts with sea turtles and other small objects in the water by displacing them. With implementation of NMFS' vessel strike avoidance measures, NMFS concludes that any potential effects on sea turtles as a result of vessel traffic are discountable.

2.1.3 Construction Activities

Pile driving, dredging, and construction of the terminal are expected to occur over a total period of 21 months, with pile driving occurring over a period of about 9 months. Listed species of marine mammals are not found in the construction area and will not be affected; however, during this period sea turtles and Gulf sturgeon may be disturbed by noise and human activity associated with construction of the marine terminal. The primary impacts of dredging and pile driving that may affect sea turtles and Gulf sturgeon are discussed in more detail below.

Pile Driving Noise

Gulf LNG estimates that pile driving for the LNG terminal would occur over 10-hour shifts, 6 days per week, for a period of about 37 weeks. Loud, high-energy, or behavior-altering noises may adversely affect listed species. Pile driving noise is a relatively broad-band signal that may be audible to many species over long distances. Some pile driving projects have resulted in injury and mortality of fishes at close distances to the piles being driven. As with explosions, the potentially injurious effects of pile driving on animals are likely proportional to the body mass of the animal, with animals of less mass being more susceptible to injury. There is a potential for sea turtles and Gulf sturgeon to experience hearing injury if they are in the immediate vicinity when a pile driver hammer is first dropped; however, these effects will be incurred in the immediate vicinity of the pile being driven. The potential for injurious effects can be avoided by dry-firing or ramping up a pile driving hammer (i.e., slowly increasing the noise levels over a given period to allow animals to move away before potentially injurious levels are reached), using observers, and deploying bubble curtains around piles to dampen noise levels.

A more likely effect to animals located further from pile driving is temporary hearing impairment or a behavioral response to the noise. The sound waves produced by pile driving projects may harass animals by acting as an acoustic deterrent from the construction area. Deterrence may be an important effect of pile driving if it disrupts feeding, mating, or sheltering of individuals. Additionally, if sea turtles were motivated to remain in the area due to prey abundance or other factors, they may be susceptible to hearing loss or damage due to repeated exposure over time to the loud noise produced from the pile driving.

Underwater sound levels above typical ambient noise levels and above harassment thresholds could be expected to propagate great distances from the pile driving activity. The propagation environment (e.g., water depth, bottom type, and other environmental conditions) and hearing sensitivity of the animal exposed are factors in determining the type of impacts that may be expected to occur. Additionally, the noise levels produced are dependent upon the type of pile, hammer, type of pile, and diameter of the pile. The measurements of pile driving noise to date are highly variable due to differing environmental conditions and pile driving methods; therefore, when specific data are unavailable, NMFS recommends a suite of harm avoidance measures be implemented to avoid impacts to listed species such as ramp-up of the hammer, establishment of an impact zone, and the use of bubble curtains to reduce noise levels. Although the pile driving noise is not a continuous signal, repeated blows from the hammer at small intervals (generally one to several seconds apart) could potentially result in adverse effects on hearing abilities, or long-term avoidance of the area resulting from prolonged pile driving

activity (weeks to months) without these harm avoidance measures. With implementation of the suite of pile driving harm avoidance measures in the *Proposed Harm Avoidance Measures* section above, including ramping up of the pile driver, use of bubble curtains, and the use of observers to monitor for listed species, the potential for adverse effects occurring to listed species will be reduced to discountable levels.

Dredging

Clam shell bucket dredging is proposed to deepen the marine basin. The area proposed for dredging is relatively shallow (from 0-8 ft deep) and has a sand substrate. Five species of sea turtles and Gulf sturgeon can be found in action area (Table 1); however, due to the shallow water of the dredge area (0-8 ft), leatherbacks are not expected to be found in the area to be dredged, and are not considered in the following assessment for this activity. Additionally, forage items of green and hawksbill sea turtles are not found in the dredge area; therefore, the occurrence of these species is believed to be low, but transients may potentially occur. Kemp's ridleys and loggerhead sea turtles are expected to most commonly occur in the area.

Clam shell bucket dredges are not known to take sea turtles, presumable due to the noisy, slow-moving nature of this type of dredging, and the ability of sea turtles to swim away from the dredge area in response to the activity. However, a shortnose sturgeon, a similar species to Gulf sturgeon, was taken by a mechanical clam shell bucket dredge in the Northeast U.S. (J. Crocker, June 10, 2003, pers. comm. to S. Bolden). This is the only reported take of a sturgeon species in a non-hopper dredge; therefore, the risk of takes appears to be extremely low. There may be a risk of Gulf sturgeon takes in areas where animals congregate, such as foraging areas in passes between barrier islands. In our November 2003 Gulf of Mexico Regional Biological Opinion on Hopper Dredging, we concluded that non-hopper type dredges are unlikely to adversely affect sea turtles or Gulf sturgeon due to the fact relatively slow-moving clamshell dredges are noisy and these species can avoid them under normal circumstances. Additionally, the analysis of potential effects to Gulf sturgeon foraging habitat discussed below, finds that the occurrence of sturgeon in the dredge area is believed to be very low based on telemetry data. The risk of a clam shell bucket dredge associated with Gulf LNG taking listed species of sea turtle or Gulf sturgeon is insignificant.

The effects of dredging activities were also assessed for their potential to affect benthic foraging habitats of sea turtles and Gulf sturgeon. Two hard-shelled species of sea turtles (loggerheads and Kemp's ridleys) forage in naturally turbid waters, such as Mississippi Sound, and their ability to successfully find prey is not expected to be significantly affected by any increase in turbidity from the proposed dredging. However, the dredging may temporarily reduce the availability of benthic prey species. While dredging is occurring, there is ample foraging habitat in adjacent areas to sustain sea turtle foraging. Following dredging, the area is expected to be rapidly re-colonized and be available to sea turtles. Therefore, the potential effects to foraging sea turtles are expected to be so minor, they are insignificant.

The Gulf sturgeon is an anadromous fish; adults spawn in freshwater then migrate to feed and grow in estuarine/marine habitats. After spawning in the upper river reaches, both adult and subadult Gulf sturgeon migrate to the estuaries, bays, and the Gulf of Mexico and return to the coastal rivers in early spring (i.e., March through May) when river water temperatures range from 16°C to 23°C (Huff 1975, Carr 1983, Wooley and Crateau 1985, Odenkirk 1989, Clugston et al. 1995, Foster and Clugston 1997, Fox and Hightower 1998, Sulak and Clugston 1999, Fox et al. 2000). Surveys have located adult Gulf sturgeon in rivers predominantly in the summer months (May-August) with adults rare or absent in the rivers during fall and winter months when they migrate seaward into the adjacent estuarine and marine habitats (Craft et al. 2001, Berg 2004). Gulf sturgeon may potentially be in the dredging construction area during winter months (between September 1 through April 30) when this species is foraging in estuarine and marine habitats.

A telemetry study of Gulf sturgeon tagged in the Pascagoula River (MASGC 2004) found movement of sturgeon out of freshwater habitats in the winter primarily utilized the barrier islands offshore of the project area, as well as habitats in or near the Pascagoula estuary. The study suggests that movement east or west along the shore is rather limited, such as into the dredge area of this project, but rather Gulf sturgeon remain in the estuaries of their river, or migrate out into the Gulf of Mexico around nearby barrier islands and passes. No Gulf sturgeon were found in the area of the proposed project during a telemetry study conducted between 2001 and 2004 (Figure 3). Although telemetry locations of sturgeon in the project area were not found and the probability of Gulf sturgeon occurring in the construction area is believed to be low, the movement of sturgeon into these areas cannot be entirely discounted. However, the strong affinity for sturgeon around the barrier islands and the Pascagoula estuarine environments indicate that project area may not be commonly occupied by Gulf sturgeon at this time. In the event some fish were to pass through or utilize the area for foraging, sturgeon are highly mobile and may avoid the construction area due to project activity and noise. Based on the above assessment, the dredging of the marine basin is not expected to result in any measurable effects to Gulf sturgeon and the potential effects of this activity are considered insignificant.

2.1.4. Summary of Effects to Listed Species

In summary, NMFS concludes green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles; and Gulf sturgeon are not likely to be adversely affected by the proposed action.

2.2 Critical Habitat Likely to be Affected

Gulf sturgeon critical habitat was jointly designated by NMFS and USFWS on April 18, 2003 (50 CFR 226.214). Critical habitat is defined in section 3(5)(A) of the ESA as (i) the specific areas within the geographic area occupied by a species, at the time it is listed in accordance with the Act, on which are found those physical or biological features (I) essential to the conservation of the species and (II) that may require special management considerations or protection; and (ii) specific areas outside the geographic area occupied by a species at the time it is listed, upon a determination that such areas are essential for the conservation of the species. "Conservation" is defined in section 3(3) of the ESA as the use of all methods and procedures that are necessary to bring any endangered or threatened species to the point at which listing under the ESA is no longer necessary.

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

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

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

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

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

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

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

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

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

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

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

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

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

As stated in the final rule designating Gulf sturgeon critical habitat (68 FR 13399), the following activities, among others, when authorized, funded or carried out by a federal agency, may destroy or adversely modify critical habitat:

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

(2) Actions that would appreciably reduce the suitability of Gulf sturgeon spawning sites for egg deposition and development within a designated critical habitat unit, such as impoundment; hard-bottom removal for

navigation channel deepening; dredged material disposal; in-stream mining; and land uses that cause excessive sedimentation;

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

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

(5) Actions that would alter water quality within a designated critical habitat unit, including temperature, salinity, pH, hardness, turbidity, oxygen content, and other chemical characteristics, such that it is appreciably impaired for normal Gulf sturgeon behavior, reproduction, growth, or viability, such as dredging; dredged material disposal; channelization; impoundment; in-stream mining; water diversion; dam operations; land uses that cause excessive turbidity; and release of chemicals, biological pollutants, or heated effluents into surface water or connected groundwater via point sources or dispersed non-point sources;

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

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

2.3 Effects to PCEs Considered and Discounted

The proposed action will occur in critical habitat unit 8. The modification of 61.3 acres of unvegetated bay bottom may affect the PCEs in this unit. Of the seven PCEs of Gulf sturgeon critical habitat discussed above, four are found in critical habitat unit 8: 1) abundant food items; 2) water quality; 3) sediment quality; and 4) migratory pathways. The following PCEs were

considered, and discounted for the potential to be adversely affected by the proposed Gulf LNG terminal: water quality, migratory pathways, and sediment quality.

2.3.1 Water Quality

Water discharges from the SCVs would generate 15-20 gallons of water per minute. Following aeration and pH adjustment, water will be discharged into the berth area where it will mix with water in Mississippi Sound. Discharges will occur 20 ft below the waters surface to take advantage of the buoyancy difference between the discharged water and the estuarine waters on the marine basin. The temperature of the water when discharged is expected to be between 15°C and 21°C. The typical seasonal range of water temperature in Mississippi Sounds is between 9°C and 32°C. During winter when Gulf sturgeon may be in the area foraging, the discharge temperature would be warmer than that of the ambient waters. Modeling provided by Gulf LNG concluded that the mixing zone would extend between 5 ft and 20 ft from the point of discharge. Although some minor changes in temperature, salinity, pH, and oxygen content may be expected, the effects of the SCV discharges are expected to be extremely localized and will returning to ambient levels a short distance from the point of discharge.

Approximately 2.96 million yd^3 of sediments will be removed to create a turning basin for LNGCs. Because of the considerable distance between the dredge site and the ODMDS located five miles out in the Gulf of Mexico, clamshell dredging using bottom dumping barges or scowls is the only practical method to dredge and dispose of material produced during construction of the turning basin. The sediment in the area to be dredged consists primarily of sands, followed by clays and silts. Gulf LNG funded a sediment characterization study in the area to be dredged so that any potential impacts could be identified. The results of the study did not indicate any biologically significant levels of contaminants in the sediments to be dredged. As a conservation measure, BMPs will be used for dewatering activities. Dewatering will occur so as to minimize the release of heavily sediment-laden water into sensitive resource areas, as well as to prevent the discharge of contaminants.

With regard to turbidity from dredging, Gulf LNG notes that the proposed project site is typified by high levels of total suspended solids and frequent stochastic events that are sources of high turbidity. Water conditions at the project area were very turbid during SCUBA surveys conducted for Gulf LNG in May 2005. During these surveys, divers led by Dr. Daryl Parkyn of the University of Florida noted that visibility was less than 10 cm, which indicates over 200 nephelometric turbidity units (NTU). These conditions were a result, at least in part, of wind-induced resuspension of fine grained sediments through the extensive shallow regions (less than 3 ft deep). Dredging of the ship berth area would reduce the degree of wind-induced re-suspension, ultimately decreasing turbidity in the immediate area.

Turbidity resulting from dredging activities is not in itself a problem for Gulf sturgeon, which naturally feed in some of the most turbid and stained environments in the Gulf of Mexico. The waters of Mississippi Sound are naturally turbid. The introduction of sediment, and associated turbidity, could locally increase the amount of organic material and/or nutrients in the affected areas, which could lead to an increase in biological oxygen demand; however, this potential effect would be short-term and only last for the duration of the dredging, and the implementation

of BMPs should reduce these effects. These short-term effects on biological oxygen demand are not expected to have a measurable effect on the quality of the habitat. Based on the above analysis of impacts associated with dredging and SCV water discharges, NMFS believes the effects to the status of this PCE are discountable, within unit 8 or designated Gulf sturgeon critical habitat overall.

2.3.2 Migratory Pathways

Effects on migratory pathways as a PCE in unit 8 were considered in this opinion. The shallow-water project in the project site area is not known to provide a Gulf sturgeon migratory pathway (Figure 2). A telemetry study of Gulf sturgeon tagged in the Pascagoula River (MASGC 2004) found movement of sturgeon out of freshwater habitats in the winter; sturgeon primarily utilized the barrier islands offshore of the project area, as well as habitats within or near the Pascagoula estuary. The study suggests that movement east or west along the shore is rather limited, such as into the dredge area of this project, but rather Gulf sturgeon remain in the estuaries of their river, or migrate out into the Gulf of Mexico around nearby barrier islands and passes. No Gulf sturgeon were found in the area of the proposed project during a telemetry study conducted between 2001 and 2004 (Figure 3). Although telemetry locations of sturgeon in the project area were not found, the movement of sturgeon into these areas cannot be entirely discounted. However, the strong affinity for sturgeon around the barrier islands and the Pascagoula estuarine environments indicate that project area may not be commonly occupied by Gulf sturgeon at this time.

Although the future importance and utilization of this area may be important to the conservation and recovery of this species, the potential effects to the movement of Gulf sturgeon would only be expected during the construction phase of the project; however, sturgeon are not expected to migrate through this area. Therefore, the project will not reduce or eliminate Gulf sturgeon access to nearby habitats or adjacent to the project site and will not result in measurable impacts to the status of this PCE as a result of this project, or within unit 8 or designated Gulf sturgeon critical habitat overall.

2.3.3 Sediment Quality

Based on the information collected from the benthic survey conducted for this project, no impacts to sediment quality are expected from construction associated with the project. Bore hole samples were collected to determine the sediment composition below the seafloor that would be expected following dredging of the turning basin. The samples collected suggest that both the existing surficial sediments and sediments 40 ft below the surface are composed primarily of sands. Therefore, it is likely that the sediments following dredging would have a similar composition as the existing sediment in the area. Dredging activities are not expected to have any impact on sediment quality in the area.

2.3.4 Summary of Effects to PCEs

In summary, the PCEs of water quality, sediment quality, and migratory pathways are likely to be adversely affected by the proposed action. The primary route of modification will come from the creation of a new marine turning basin to accommodate LNGCs servicing the terminal and

the affects of this activity on the PCE of abundant prey items. Due to construction of the marine turning basin and potential for adverse to abundant prey items, NMFS believes that designated critical habitat for the Gulf sturgeon may be adversely affected by the project.

3 ENVIRONMENTAL BASELINE

This section identifies and discusses past and ongoing human and natural factors leading to the current status of the designated critical habitat within the action area. The environmental baseline is a "snapshot" of the action area at a specified point in time and includes state, tribal, local, and private actions already affecting the critical habitat that will occur contemporaneously with the consultation in progress. Unrelated federal actions affecting the critical habitat that have completed formal or informal consultation are also part of the environmental baseline, as are federal and other actions within the action area that may benefit critical habitat.

3.1 Status of Critical Habitat within the Action Area

Of the fourteen units designated as Gulf sturgeon critical habitat, only unit 8 will be impacted by the proposed action. Of the seven genetically distinct subpopulations, unit 8 provides winter feeding and migration habitat for Gulf sturgeon from the Pascagoula River and Pearl River subpopulations. The proposed action will impact only a small portion of unit 8; affecting approximately 61.3 acres of the designated unit.

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

Unit 8 provides juvenile, subadult and adult feeding, resting, and passage habitat for Gulf sturgeon from the Pascagoula and the Pearl River subpopulations; fish are consistently located both inshore and around/between the barrier islands (i.e., Cat, Ship, Horn, and Petit Bois) within

this unit (Reynolds 1993, Ross et al. 200l, and Rogillio et al. 2002). Gulf sturgeon have also been documented within one nmi off the barrier islands of Mississippi Sound. Substrate in this unit ranges from sand to silt, all of which contain known Gulf sturgeon prey items, including lancelets (Menzel 1971, Abele and Kim 1986, American Fisheries Society 1989, Heise et al.1999, Ross et al. 2001a, and Rogillio et al. 2002).

3.2 Factors Affecting Critical Habitat within the Action Area

The joint designation of Gulf sturgeon critical habitat by NMFS and USFWS will benefit the species, primarily through the ESA section 7 consultation process. When critical habitat is designated, other federal agencies are required to consult with NMFS on actions they carry out, fund, or authorize, to ensure that their actions will not destroy or adversely modify critical habitat. In this way, a critical habitat designation will protect physical and biological features that are essential to the conservation of the species. Designation of critical habitat may also enhance awareness within federal agencies and the general public of the importance of Gulf sturgeon habitat.

3.2.1 Federal Actions

Federal agencies that consult on potential impacts to Gulf sturgeon critical habitat include the COE, the Department of Defense (DOD), the Environmental Protection Agency (EPA), FERC, and the Nuclear Regulatory Commission (NRC). Dredging and dredged material disposal, and military activities including training exercises and ordnance detonation, have the potential to impact designated critical habitat. In November 2003, NMFS completed a regional biological opinion on hopper dredging in the Gulf of Mexico that includes maintenance dredging in Gulf sturgeon critical habitat units 8-14, and it concluded that when channels within designated critical habitat are dredged to only their current depth, without improvements (i.e., deepening or widening), the project will not destroy or adversely modify Gulf sturgeon critical habitat. NMFS generally conducts more numbers of formal consultations on potential impacts to the species than on potential impacts to Gulf sturgeon critical habitat. Previous formal consultations conducted by NMFS on designated Gulf sturgeon critical habitat concluded that proposed actions would not result in destruction or adverse modification. Numerous informal consultations with the DOD, COE, EPA, FERC, and NRC analyzing potential impacts to designated critical habitat have been conducted.

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

Actions impacting wetlands abutting Gulf sturgeon critical habitat are regulated, managed, and mitigated via numerous COE nationwide permits. Furthermore, federal Essential Fish Habitat (EFH) consultation requirements pursuant to the Magnuson-Stevens Fishery Management and Conservation Act minimize and mitigate for losses of wetlands, and preserve valuable Gulf sturgeon habitat.

Recurrent federal projects within critical habitat unit 8 include hopper dredging of shipping channels for passage of ships (military and commercial). NMFS recently completed a biological opinion on Bayou Casotte LNG terminal, located adjacent to the proposed Gulf LNG terminal on Bayou Casotte. NMFS is not aware of any other federal projects occurring contemporaneously within the project area.

3.2.2 State or Private Actions

Increasing coastal development and ongoing beach erosion will result in increased demands by coastal communities, especially beach resort towns, for periodic privately-funded or federally-sponsored beach renourishment projects. These activities may affect Gulf sturgeon critical habitat by burying nearshore habitats that serve as foraging areas.

State regulated aqua- and mariculture activities may affect Gulf sturgeon critical habitat indirectly through water discharge and directly if escapement were to occur. Introduction of cultured natives, or non-natives, could lead to inter- and intraspecies resource competition that would directly impact abundance of prey within Gulf sturgeon critical habitat. The impacts from these activities are difficult to measure; however, where and when possible, conservation actions are being implemented through the ESA section 7 process, ESA section 10 permitting, and state permitting programs to monitor or study impacts from these sources.

3.2.3 Conservation and Recovery Actions Shaping the Environmental Baseline

During 2004 through 2006, NMFS continued to work with federal agencies on reducing impacts of actions that may affect Gulf sturgeon or its designated critical habitat through ESA section 7 consultations. In 2006, NMFS, along with U.S. Geological Survey, organized and held the annual Gulf sturgeon workshop for researchers and managers. The information exchanged at the meeting allows the Gulf sturgeon science and conservation community to provide updates on the latest scientific and other developments with respect to the implementation of the Gulf sturgeon recovery plan.

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

4 EFFECTS OF THE ACTION ON GULF STURGEON CRITICAL HABITAT

As discussed above, the PCE of abundant prey items in critical habitat unit 8 may be affected by the proposed project. The potential impact on this PCE is analyzed below. This biological opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statutory provisions of the ESA to complete the following analysis with respect to critical habitat.

4.1 Prey Abundance

The benthic community will experience short-term disturbance following dredging. Dredging may reduce species richness by up to 80% and species abundance and biomass by up to 90%

(Desprez 2000). As discussed in the *Characterization of Designated Critical Habitat for Gulf of Mexico Sturgeon Southeast of Bayou Casotte, Mississippi* (Appendix B of the Biological Assessment prepared for this project), the benthic community in the ship berth and maneuvering area is dominated by macroinfuanal species that are known colonizers (e.g., the polychaete *Mediomastus* spp. and the bivalve *Gemma gemma*). These opportunistic species are highly dominant numerically, comprising over 60% of all benthic macroinfauna. Soft-bottom benthic communities experience obvious changes following dredging activities. Although changes in the benthic species composition are expected, the dredge site contains few key prey types utilized by Gulf sturgeon (e.g., ghost shrimp, acorn worms, and hanstorid amphipods). Although the benthic community will undergo drastic changes during dredging, these effects are not long lasting, as polychaetes, oligochaetes, and other first-colonizing species begin to quickly inhabit the disturbed area. Through natural processes and their rapid population growth, these opportunistic species take advantage of the unoccupied space created in the newly exposed sediments, paving the way for later succession species.

The Minerals Management Service has performed a number of studies of dredging effects and recolonization, some associated with offshore sand mining operations. In one of the studies, species abundance, biomass, and richness declined immediately after dredging but recovered quickly, and by the following spring (within 9 to 12 months of the end of dredging), no detectable differences were found between the dredged and undisturbed areas (Hammer et al. 2005). Abundance also recovered quickly after a second dredging operation, although biomass and richness remained reduced the next spring. The report also indicated that some measures of infaunal communities, such as diversity or density, may lead to inaccurate conclusions, and suggest that looking at functional guilds may be more appropriate for assessing impacts. Using this approach, they found that polychaetes and amphipods that recolonized borrow sites were small-bodied, surface feeding species while adjacent undisturbed areas had infaunal communities consisting of large-bodied organisms that feed deeper in the sediment, and concluded that a successional stage community may exist for 2 to 3 years or longer.

A study assessing the impacts of aggregate dredging on benthic macrofauna off the coast of the United Kingdom found that following episodic disturbance, typical benthic macrofauna were replaced by large numbers of mobile species that were able to rapidly recolonize sediments (Newell et al. 2004). The study also stated that a zone of enhanced biomass occurred outside the dredge site for a distance up to 1.2 miles. The study stated that a similar zone of enhanced biomass occurred outside of a site in Queensland, Australia. The study concluded that, in general, species diversity was restored to within 70%-80% of reference locations within 100 days of the end of dredging activities, population density was restored to 60%-80% within 175 days, but that restoration of biomass by growth of individuals was not complete even after 18 months.

In addition to infauna, dredging can affect epifauna, and in one study using trawls off Duval County, Florida, the number of taxa and individuals greatly exceeded control areas 4 months after dredging and remained higher for up to 7 to 13 months (Applied Biology Inc. 1979). In another study, no differences in pre- and post-dredging epifaunal communities were observed at 8 and 16 months post-dredging at a borrow site off Egmont key in Florida (Blake et al. 1996). A

study for the MMS by Byrnes et al. (1999), conducted off the Alabama coast at depths ranging from 28 to 60 ft, concluded:

> *Effects on infaunal populations primarily will occur through removal of individuals along with sediments. Effects are expected to be short-term and localized… Early stage succession will begin within days… through larval recruitment dominated by opportunistic taxa, such as the polychaetes Mediomastus and Paraprionospio and bivalves such as Tellina. Later successional stages of benthic recolonization will be more gradual. Immigration of motile annelids, crustaceans, and echinoderms into impacted areas will begin soon after excavation.*

Although the findings of individual studies of the recolonization of benthic communities following dredging vary, substantial recovery generally occurred in less than 1 year and complete recovery occurred within time frames shorter than Gulf LNG's proposed 3-year maintenance dredging cycle. The studies referenced above found that initial recolonization of dredged areas would commence in a matter of days or weeks, and that these areas would become functional benthic communities similar to pre-dredge conditions or to adjacent reference locations in approximately 12 to 18 months; however, later successional stages that have been correlated to the mass of benthic recolonization would be more gradual. Additionally, by changing the water depth of the area, there is a potential for a shift in benthic community composition. Because the numerically dominant species are expected to recolonize the area (i.e., the polychaete *Mediomastus* spp. and the bivalve *Gemma gemma*), the potential changes in community composition are not expected to have a lasting effect on the abundance of Gulf sturgeon prey items following the short-term disturbance from dredging, and subsequent recovery period. Because recolonization is expected to occur, NMFS does not expect any long-term impacts to the status of this PCE; however, periodic disturbance from maintenance dredging may impede the long-term recovery of a mature benthic community.

Because maintenance dredging is proposed to occur every three years, it is estimated that between 115,000 yd^3 and 180,000 yd^3 of material would be removed each 3-yr cycle. Dredging would be coordinated to occur at the same time as maintenance dredging of Bayou Casotte by the U.S. Army Corps of Engineers to reduce the duration of turbidity impacts; however, periodic disruption of prey availability and benthos during these later successional stages is likely to result from maintenance dredging since the community will not be allowed to mature to later successional stages between subsequent maintenance dredging every three years. Based on the above analysis, NMFS concludes that the PCE of prey abundance will be adversely affected from dredging activities. Therefore, NMFS has to determine whether the conservation of the Gulf sturgeon subpopulations using this area will be impacted by prey reduction in the foraging area, such that the adverse affects constitute prohibited destruction or adverse modification of critical habitat.

Gulf sturgeon sub-populations using affected critical habitat: Seven genetically distinct riverine subpopulations are recognized (Stabile et al. 1996): Pearl, Pascagoula, Escambia, Yellow/Blackwater, Choctawhatchee, Apalachicola and Suwannee. Individuals from the Pearl River and Pascagoula River are believed to be the primary subpopulations utilizing Gulf

sturgeon critical habitat unit 8, although some mixed foraging groups from other subpopulations likely occurs along barrier islands, this is outside of the action area for this project. Overall, Gulf sturgeon critical habitat unit 8 provides juvenile, subadult and adult feeding, resting, and passage habitat for Gulf sturgeon. Based on surveys and telemetry studies of the Gulf sturgeon populations in the action area, the actual number of Gulf sturgeon utilizing the construction area is likely small. The Pascagoula River (Heise et al. 2002) and Pearl River (Rogillio et al. 2002) subpopulations are estimated to support 234 and 430 fish, respectively. These survey estimates are from data collected prior to Hurricane Katrina, and some, particularly the Pearl River population estimate, are likely to be reduced once new surveys are completed.

Availability of Gulf sturgeon prey in action area: Dredging of the berth and turning basin will convert subtidal, non-vegetated estuarine habitat from 0 to -8 ft depths to –42 ft MLLW. Upon completion of the dredging, the water depth of 61.3 acres of habitat will be permanently deepened by removal of sediments. Benthic organisms removed by dredging activities typically have rapid recolonization rates. Impacts to are expected to last between 20 and 27 months (8 to 9 months for the actual dredging period and 12 to 18 months for recovery). The depth of the dredged area will be permanently modified, but the effects on prey abundance are expected to be temporary. Although the full recovery of the benthos will be disturbed by periodic disturbance from maintenance dredging throughout the lifetime of the Gulf LNG terminal, and the abundance of prey items will vary within the three-year dredge cycle, the habitat will remain available to Gulf sturgeon.

Gulf sturgeon absence in the project area is significant as adults are known to forage sparingly in freshwater and depend almost entirely on estuarine and marine prey for their growth (Gu et al. 2001). Because adults and subadults are known to lose up to 30% of their total body weight while in freshwater, and subsequently compensate the loss during winter feeding in marine areas (Carr 1983, Wooley and Crateau 1985, Clugston et al. 1995, Morrow et al. 1998, Heise et al. 1999, Sulak and Clugston 1999, Ross et al. 2000), one would expect the sturgeon, after having spent at least six months in the river fasting, to concentrate around food resources and immediately begin foraging. Although an overall decrease and fluctuation in abundant prey items is expected throughout the lifetime of Gulf LNG due to maintenance dredging, the proposed marine basin is not currently used by Gulf sturgeon for foraging. Additionally, the dredging is not expected to reduce the PCE's ability within unit 8 to support Gulf sturgeon conservation as ample, quality foraging habitat is available in other areas of critical habitat unit 8. Therefore, NMFS concludes that the proposed project's impacts on prey abundance are not expected to reduce the overall designated critical habitat's ability to support the conservation of Gulf sturgeon.

Synthesis of Effects on Gulf Sturgeon Critical Habitat

Dredging impacts related to Gulf LNG will result in the modification of 61.3 acres of Gulf sturgeon critical habitat by deepening the existing area from 0-8 ft depths to –44 ft. The area is not currently known to be utilized by Gulf sturgeon; however, their current absence does not preclude future use of the area for foraging or as a migration corridor. The change in depth is not expected to result in significant changes to existing prey species in the area since these species are considered colonizing species, and substrate composition is expected to be predominantly

sands, as in pre-dredge conditions. Because some benthic community composition changes may occur (e.g., biomass) and there will be a recovery period required for the benthic community to re-establish itself, some adverse effects to prey abundance are expected. Since Gulf sturgeon are not currently known to utilize this area for winter foraging or migration and the area will still function as a potential foraging for Gulf sturgeon in the future, NMFS believes that the modification of this particular 61.3 acres of critical habitat will not preclude the habitat in unit 8 from providing for the conservation of the species.

5 CUMULATIVE EFFECTS

ESA section 7 regulations require NMFS to consider cumulative effects in formulating their biological opinions (50 CFR 402.14). Cumulative effects include the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this opinion. Because many activities that affect marine habitat involve some degree of federal authorization (e.g., through Mineral Management Service or COE), NMFS expects that ESA section 7 consultation will occur for future actions that could affect designated Gulf sturgeon critical habitat unit 8. In addition, other activities identified in the environmental baseline are expected to continue to affect unit 8 at similar levels into the foreseeable future.

6 CONCLUSION

After reviewing the current status of the Gulf sturgeon's critical habitat in unit 8, the environmental baseline, the effects of the proposed action, and the cumulative effects, it is NMFS' biological opinion that the proposed action will not reduce the critical habitat's ability to support the Gulf sturgeon's conservation. NMFS concludes that the action, as proposed, is not likely to destroy or adversely modify designated Gulf sturgeon critical habitat.

7 INCIDENTAL TAKE STATEMENT

NMFS does not anticipate that the proposed action will incidentally take any species, and no take is being authorized.

8 CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authority to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species, to help implement recovery plans, or to develop information. NMFS believes that FERC should implement the following conservation recommendation:

> In addition to the 3-yr port-construction prey and habitat assessment planned, post maintenance assessments should be continued between the first and second maintenance dredge cycles. Assessments of the recolonization rates and community compositions of the dredge area would help to determine long-term effects on Gulf sturgeon prey

availability and thereby assist in future assessments of impacts to designated critical habitat. The monitoring should include community structure, deposition rates, types of material deposited, and recovery rates of each successional stage. It is recommended that the study be continued from completion of basin construction through at least one cycle of maintenance dredging (for a minimum of 6 years), scheduled to occur on a three-year cycle.

In order for NMFS to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, NMFS requests notification of the implementation of any conservation recommendations.

9 REINITIATION OF CONSULTATION

This concludes formal consultation on the proposed action. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if (1) the amount or extent of taking specified in the incidental take statement is exceeded, (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered, (3) the identified action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in the biological opinion, or (4) a new species is listed or critical habitat designated that may be affected by the identified action.

FIGURES

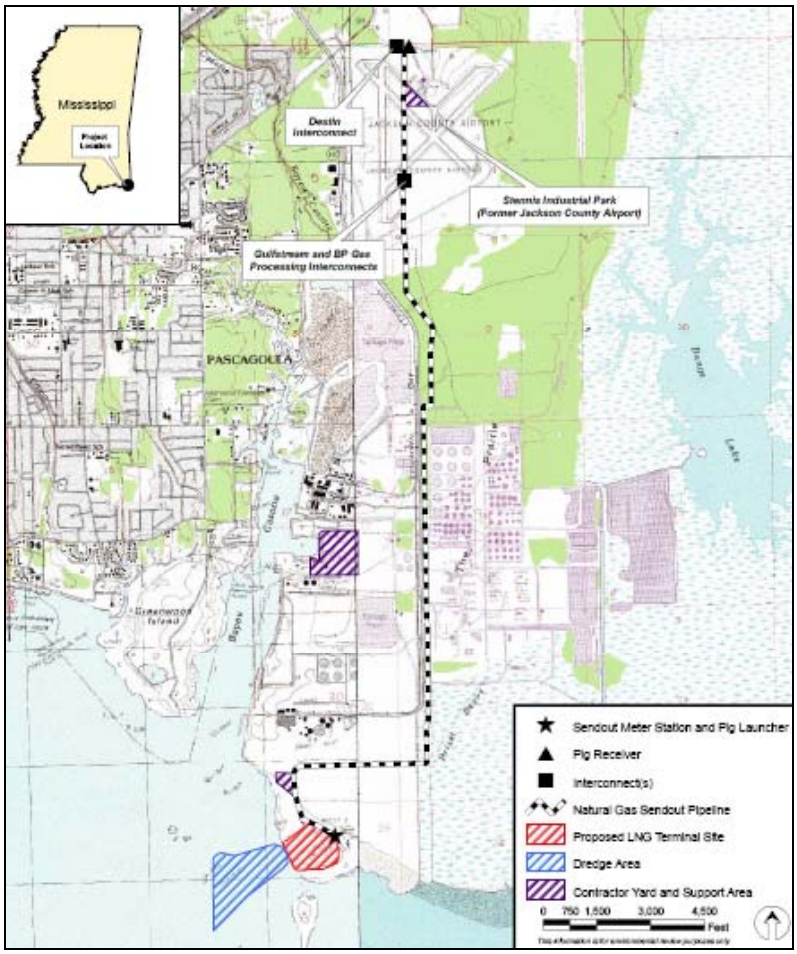

Figure 1. The proposed construction site and existing support area of the Gulf LNG Clean Energy terminal.

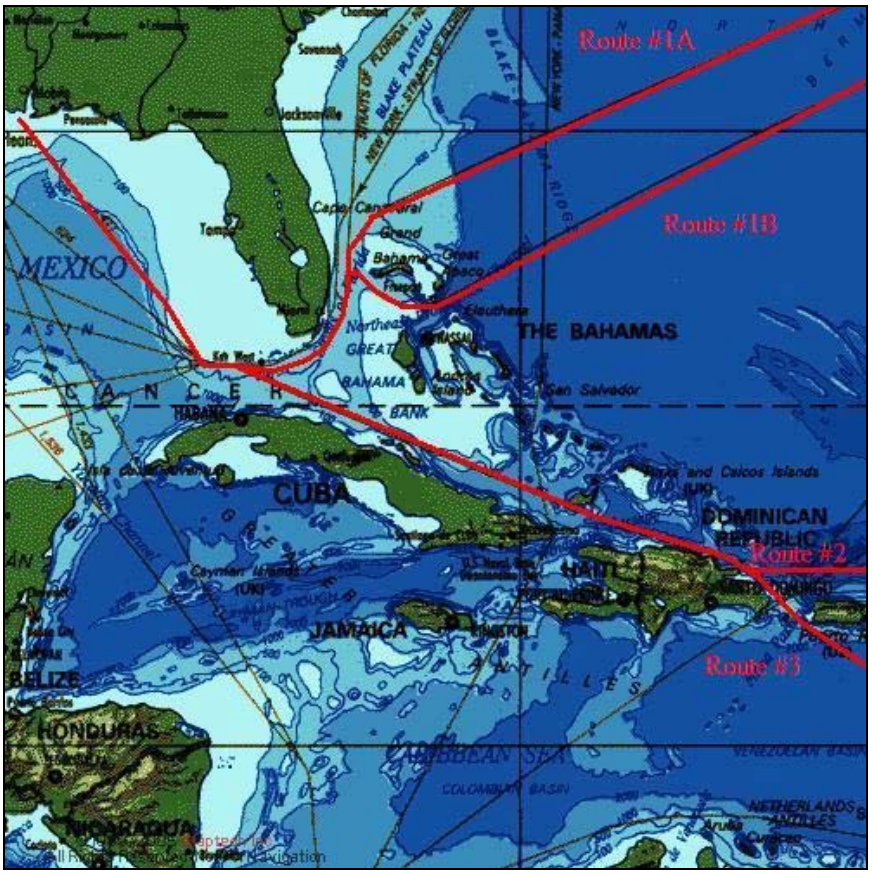

Figure 2. Vessel traffic routes to the LNG terminal.

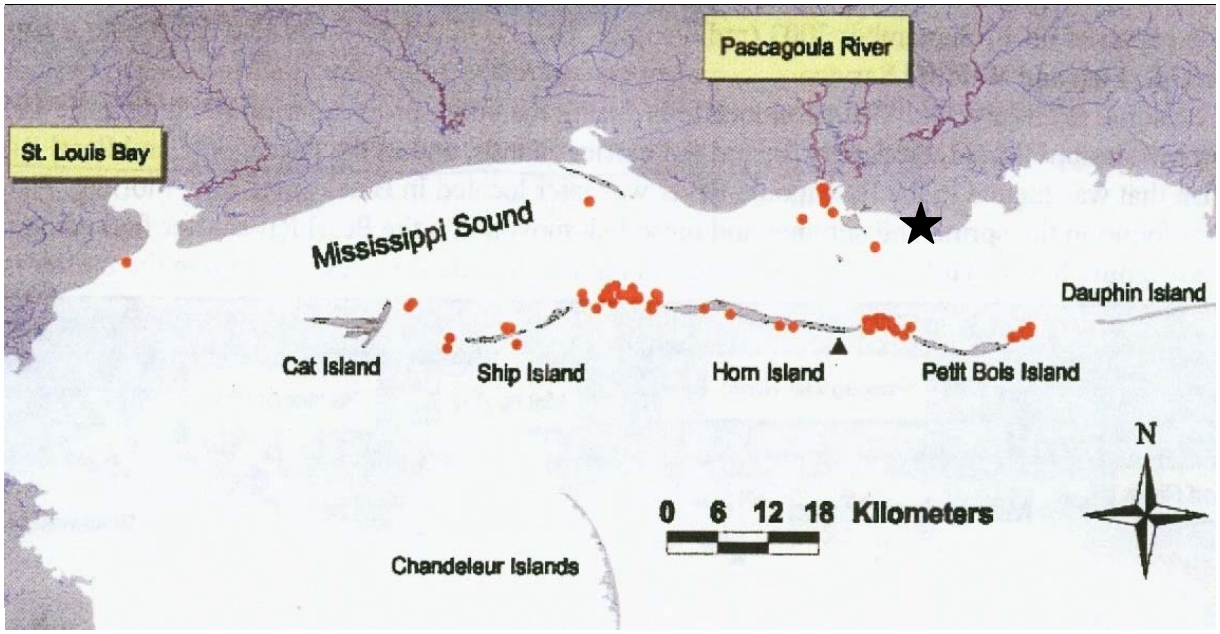

Figure 3. Marine telemetry location for Gulf sturgeon tagged between 1999-2004. Most fish were tagged in the West Pascagoula River; however, some points are of fish tagged in the Pearl River. Telemetry locations were obtained between 2001-2004. A star indicates The Gulf LNG project site.

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