Expansion of the George Vancouver (Liberty Ship) Artificial Reef (BA-336) in Texas State Waters of the Gulf of Mexico (Freeport Reef Project)

Biological Assessment

Prepared by TPWD on behalf of the Trustees

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Project Description

The proposed Freeport Reef Project would increase the amount of reef materials in a currently permitted artificial reef site (BA-336), the George Vancouver (Liberty Ship) Artificial Reef, located within Texas state waters in the Gulf of Mexico and approximately 6 miles from Freeport, Brazoria County, Texas (Figure 1). The current reef site is permitted for 160 acres, but only has materials in 40 acres. The 40 acres contain the Vancouver Liberty Ship, an obsolete 441-foot WWII ship (placed in 1976), as well as additional reef material including 1-ton+ quarry rock, concrete culverts, and 100 pyramid structures similar to the proposed pyramids for this Project (Figure 2). The proposed Project would place predesigned concrete pyramids in the remaining portions of the 160-acre permitted area onto substrate at a water depth of 55 feet.

Figure 1. Location of the Freeport Reef Project along the Texas coast in the Gulf of Mexico.

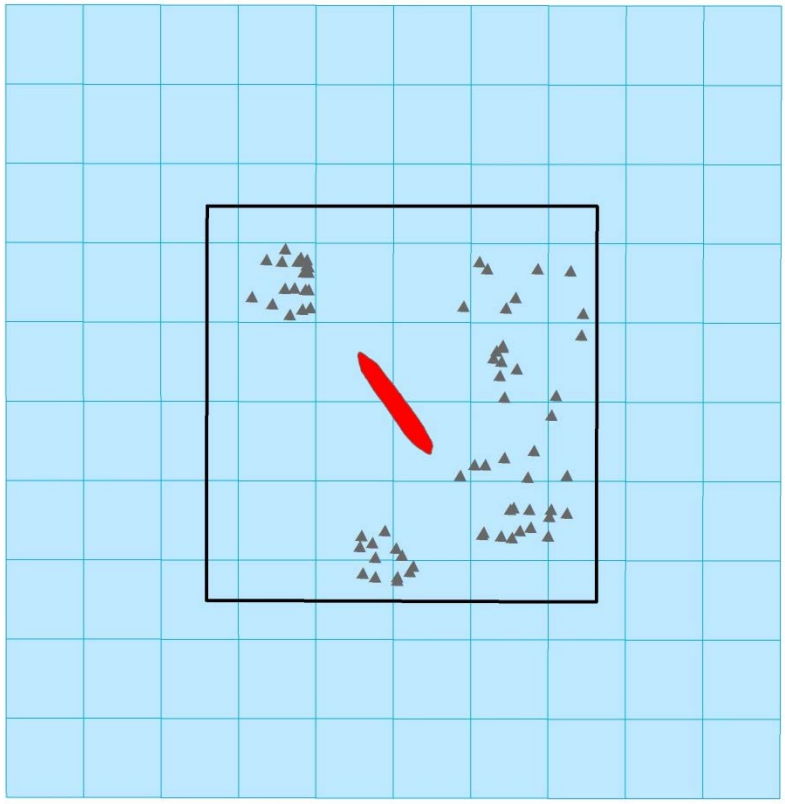

Figure 2. Diagram of the 160-acre Freeport Reef Project area. The gray triangles indicate the area where concrete pyramids are currently located. The red oval depicts the location and orientation of the Liberty Ship. Other artificial reef materials are currently in the Project area within the area designated by the black square.

Project Location

The Freeport Reef Project is located in Texas state waters in the Gulf of Mexico in the Outer Continental Shelf Block, Brazos (BA-336) (Figure 1). It is located about 6 miles offshore from Brazoria County, Texas at a center point of 28.793009 N, 95.347796 W (North American Datum 1983). The permitted area is 160 acres of sandy substrate at a water depth of 55 feet. The reef site has been permitted for a 33-foot clearance (33 feet of clear water between the surface and any reef material), which allows for a 22-foot profile of material off the ocean bottom.

The predominant sediment is clay overlain with deposits of sand and silt, mainly from the Mississippi River. The soft bottom habitat is not a unique habitat of concern like the hard bottom, deepwater coral, and deepwater community habitats. Except for the existing artificial reef structures and plugged oil well, the substrate generally consists of flat to gently sloping soft bottom with no submerged aquatic vegetation present and no dynamic physical features, or hard bottom outcrops, which would support corals.

The water quality in this area is highly influenced by input of sediment and nutrients from the Mississippi and Atchafalaya Rivers. A turbid surface layer of suspended particles is associated with the freshwater plume from these rivers. The river system supplies nitrate, phosphate, and silicate to the

shelf (Minerals Management Service 2005). Although the Mississippi–Atchafalaya River System accounts for greater than 90% of freshwater discharge into the northern Gulf of Mexico, there are times when the Brazos River is the main source of fresh water to the inner Texas shelf. The Brazos River is the only major Texas river that does not discharge into an embayment system (DiMarco et al. 2012).

Water quality in the Gulf of Mexico is sufficient to support aquatic life use, recreation use, and general use. However, there are restricted consumption advisories due to elevated levels of mercury in edible tissues. Information regarding the recommended level of consumption for fish that could contain high mercury levels is described on the Texas Parks and Wildlife Department's website (http://www.tpwd.state.tx.us/regulations/outdoor-annual/fishing/general-rules-regulations/fish-consumption-bans-and-advisories). There are no significant currents in the Project area. There may be some surface currents during storm events, but these would be temporary and not expected to impact the reefs which would be about 45 - 55 feet below the water surface.

The location for the Freeport Reef Project was selected after request for and consideration of public input and in accordance with site selection guidelines set out in the Texas Artificial Reef Fishery Management Plan (TPWD 1990).

Construction and Installation

Surveys of the Project area have been conducted in order to to avoid all hard bottom substrates and previously deployed artificial reef materials. This Project would involve deploying approximately 800-950 three-sided predesigned concrete pyramids (Figure 3) in the Project area. The predesigned concrete pyramids would be complex and have a large surface area which would attract marine life. The predesigned concrete pyramids would be made of materials to match a natural reef in pH and substrate using concrete, limestone, and rebar or other similar materials. Pyramid structures that have been used previously for artificial reefs had a rebar frame inside of a 6,000-pound concrete structure built to withstand storm events. The structures also had a 10-foot by 10-foot by 10-foot footprint designed to prevent settling and scouring and were 8 feet high. This Project would use similarly structured pyramids. Each pyramid should penetrate the substrate no more than 2 feet, and the structures would be randomly spaced over the 160-acre permitted reef avoiding existing artificial reef materials and the 164-foot buffer surrounding the Liberty Ship.

Figure 3. An example of the predesigned pyramid structures.

Texas' artificial reefs are generally placed by commercial marine contractors selected through a competitive bid process and contracted by TPWD, who holds the permit for the reef site. A dynamically positioned vessel (i.e. not anchored) would slowly deploy the pyramids by lowering them into specific positions via crane. During pyramid deployment, position is usually maintained visually by use of a temporary marker buoy attached to the first pyramid deployed.

It is expected that the pyramids would be transported directly from the manufacturer, therefore a designated staging and stockpiling site is not anticipated. The contractor may choose to have the pyramids built locally, likely working with a local concrete company. Previously purchased pyramids were built in an empty lot at the Port of Corpus Christi.

Request for Proposals (RFPs) to complete the artificial reef Project would be developed and publicly noticed for bid when funds are secured. The process of requesting bid proposals, bid review, and award of contracts may take 4 to 6 months. Once contracts for Project implementation are awarded, construction of the pyramids is expected to take 3 to 8 months to complete. If transportation is required, it is expected to take 1-2 weeks depending upon where the manufacturer is based and transportation method (type of vessel). Based on previous artificial reef projects completed in Texas, it is anticipated that one crane barge, one tugboat, one supply barge, two excavators, and two small trucks may be used during reef deployment. Deployment of the pyramids into the Project area is expected to take a maximum of 4 days, working 14 hours per day (daylight hours), but is dependent on weather conditions. The date the contract is awarded may impact the timing of the Project. Contracts awarded towards the end of the year (August – December) may not be completed until the following spring or early summer, depending on weather conditions. Before and after reef construction, surveys would be used to verify the correct placement of materials in the Project area.

Operations and Maintenance

Ongoing maintenance for the artificial reef would not be necessary as long as there is no significant movement of artificial reef materials, which is not expected to occur. A U.S. Coast Guard (USCG) approved marker buoy is already installed at the Freeport reef site and will be maintained per USCG requirements. Regular maintenance of the buoy marker would include cleaning the chain, replacing the reflective TPWD decal as needed, and replacing or repairing the buoy as needed. No ongoing maintenance beyond the annual surveys and buoy maintenance is anticipated. Monitoring and maintenance activities would be managed by the TPWD's Artificial Reef Program.

Federally-listed Species and Critical Habitat

In September 2013, we reviewed your agency's Section 7 Consultation website for a list of species and critical habitat that may be present within the project area. There are species of coral in the Gulf of Mexico that have been proposed for listing. The proposed corals tend to favor water depths of 70 to 130 feet and hard bottom substrates. These species would not be impacted because water depths are shallow (about 55 feet deep) and all hard bottom substrates will be avoided. No endangered or threatened species are known to use the Project area as primary habitat for foraging, breeding, or resting, nor has this area been designated as critical habitat for any of the sea turtle species. The only endangered species in this portion of the Gulf of Mexico are sea turtles and whales. Of the five listed

endangered whale species (sperm whale, sei whale, fin whale, blue whale, and humpback whale) (Texas T&E and Critical Habitat via NOAA_130314.pdf; NOAA Fisheries 2005), only the sperm whale is considered to commonly occur in the Gulf of Mexico. The sperm whale is predominantly found in deep ocean waters, generally deeper than 3,280 feet, on the outer continental shelf (Davis et al. 2002).

Due to the relatively shallow depth of 55 feet in the Project area, the sperm whale, or any other endangered whale, is not likely to be present during the deployment of the materials. Five species of endangered or threatened species of sea turtles were identified as possibly being present in the Project area: loggerheads, green, hawksbill, Kemp's ridley, and leatherback turtles (Table 1). Sea turtle life history is described below. Information was provided by the Texas Parks and Wildlife Department and the National Park Service (http://training.fws.gov/csp/oilspill/training/orientation/turtles/Turtles_in_the_Gulf_of%20Mexico.pdf).

Table 1. List of protected species regulated by NOAA's in relation to the Endangered Species Act that could potentially be present in the Project area.

Species	**Federal Status**
Green Sea Turtle *(Chelonia mydas)*	Threatened
Hawksbill Sea Turtle *(Eretmochelys imbricata)*	Endangered
Kemp's Ridley Sea Turtle *(Lepidochelys kempii)*	Endangered
Leatherback Sea Turtle *(Dermochelys coriacea)*	Endangered
Loggerhead Sea Turtle *(Caretta caretta)*	Threatened

Green Sea Turtle

The green sea turtle is named for the greenish color of the fat in the body. It is considered a large sea turtle with an average carapace length of 36 to 48 inches and weight ranging from 250 to 450 pounds. Adults reach sexual maturity between 8 and 13 years of age. Their diet consists of mostly seagrasses and algae, with small amounts of animal foods such as sponges, crustaceans, sea urchins, and mollusks. During the day, green sea turtles feed in the seagrass beds that grow in shallow waters. At night, they sleep on the shallow bottom and sometimes out of the water on rocky ledges. The turtles migrate from nesting areas to feeding grounds, which are sometimes several thousand miles away. Most turtles migrate along the coasts, but some populations are known to migrate across the ocean from nesting area to feeding grounds.

Hawksbill Sea Turtle

Hawksbill sea turtles are named for their hawk-like beak. They typically have a carapace that reaches 30 to 40 inches in length and weigh from 95 to 165 pounds. This sea turtle has a highly variable diet consisting mostly of invertebrates such as sponges, jellyfish, crustaceans, sea urchins, and mollusks.

Hawksbill sea turtles are the most tropical of all sea turtles. Hawksbill turtles live in clear offshore waters of mainland and island shelves.

Kemp's Ridley Sea Turtle

Kemp's ridley sea turtles are the most endangered sea turtle worldwide. Their carapaces are typically 23 to 27 inches long and they weigh around 75 to 100 pounds. Their diet consists primarily of crabs, but they will also eat shrimp, clams, snails, jellyfish, sea stars, fish, and sea urchins. Young sea turtles can be found floating on large mats of *Sargassum*. Sexual maturity is reached at about 10-15 years for females. Little is known about the males.

Leatherback Sea Turtle

Leatherback sea turtles are the largest species of sea turtles with a carapace length of up to 8 feet and weighing around 1,300 pounds. Adults are believed to reach sexual maturity between 3 and 4 years of age, although the age at which wild turtles reach maturity may be greater. Leatherbacks feed mainly on pelagic (open ocean) soft-bodied invertebrates such as jellyfish and tunicates. Their diet may also include squid, fish, crustaceans, algae, and floating seaweed. The leatherback sea turtles prefer the open ocean and they move into coastal waters only during the reproductive season. Leatherbacks inhabit primarily the upper reaches of the open ocean, but unlike other sea turtles, they are able to change their body temperature and they can descend into deep waters from 650 to 1,650 feet in depth.

Loggerhead Sea Turtle

Loggerhead turtles are generally 31 to 45 inches in carapace length and weigh 170 to 500 pounds. Juveniles and adults consume a wide variety of prey such as conchs, clams, crabs, horseshoe crabs, shrimps, sea urchins, sponges, fishes, squids, and octopuses. During migration through the open sea, loggerheads eat jellyfishes, pteropods, floating mollusks, floating egg clusters, squids, and flying fishes. Loggerhead hatchlings and juveniles are frequently associated with sea fronts (areas where ocean currents converge), downwellings, and eddies, where floating open ocean animals gather. During this period, young turtles float on rafts of seaweed with the currents, feeding on organisms associated with sargassum mats. Loggerheads are capable of living in a variety of environments, such as in brackish waters of coastal lagoons, river mouths, and tropical and temperate waters above 50 degrees Fahrenheit.

Management Actions to Protect Federally-listed Species

Deployment of the artificial reef materials will only take about 4 days, limiting the duration of any potential impacts. Reef materials will be attached to a device that will slow their decent to allow for proper placement, and sink slowly enough for sea turtles and other animals to relocate from the deployment area. During reef deployment, a monitor would be present that would be able to halt work if sea turtles, smalltooth sawfish, whales, or other federally-listed species are in the Project area. Work would be halted until such time as the area is deemed safe to continue the operation (i.e., species have left the area). Additionally, sea turtle and smalltooth sawfish construction conditions would be followed (NOAA Fisheries 2006).

Potential Effects

During Project implementation, any negative effects that might occur on marine and anadromous fishery resources would be minimal. The controlled rate of descent of the reef materials will allow mobile species (including sea turtles) to relocate from the reef deployment area and avoid injury. Additionally, compliance with the *Sea Turtle and Smalltooth Sawfish Construction Conditions* will further reduce the risk. Collisions between marine species (including sea turtles) and marine vessels used during construction will be prevented by using a slow transit speed to and from the Project area. Post construction, the artificial reef may attract sea turtles.

Sport fishermen boating to and from the artificial reef are not likely to have an effect on sea turtles. The risk of vessel strikes on sea turtles is discountable. The addition of a new artificial reef to the area may cause an increase in vessel traffic to the area, but this will generally coincide with fair weather patterns and calm sea states that will largely allow boaters to detect and avoid any sea turtles in their path, as they would normally avoid hitting any floating objects. Rougher sea conditions, which could make it difficult to spot sea turtles would compel boats to slow down, thus reducing the risk of a collision.

Conclusions

This Biological Assessment demonstrated that within the Freeport Reef Project area, sea turtles are the only federally-listed species which could potentially occur, no critical habitat is present, and appropriate management actions will be used to minimize the risk of any adverse impacts. Impacts from this Project may be beneficial (e.g. creating additional reef foraging habitat), insignificant (e.g. a temporary increase in noise from vessels deploying the artificial reef materials), or discountable (e.g. construction activities may disturb the marine environment such that sea turtles will avoid the area during deployment). Therefore, this Project is not likely to adversely affect species covered by the Endangered Species Act (loggerhead, green, hawksbill, Kemp's ridley, and leatherback sea turtles). We request your concurrence with our determination.

References

**Documents cited above which end in .pdf have been submitted to the Sharepoint site and are available to you. If you are unable to access these documents, please let us know and we will make sure a copy is available to you.

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