

**FINAL
MITIGATION PLAN**

**MARINE BENTHIC RESOURCE SURVEY
FORT SAN GERONIMO
SAN JUAN, PUERTO RICO**

**CONTRACT NUMBER: W912EP-08-D-0004
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LIST OF ACRONYMS

AEROSTAR	Aerostar Environmental Services, Inc.
CAP	Continuing Authority Program
cm	centimeter
DGPS	Digital Global Positioning System
DOI	Department of Interior
EA	Environmental Assessment
EO	Executive Order
Fort	Fort San Geronimo
ft	feet
FWCA	Fish and Wildlife Coordination Act
GIS	Global Information System
ID	identification
in	inches
IPRC	Institute of Puerto Rican Culture
m ²	meters squared
msl	mean sea level
NMFS	National Marine Fisheries Service
NOAA	National Oceanographic and Atmospheric Administration
PBS&J	PBS&J, an Atkins Company
PCE	primary constituent element
pcf	pounds per cubic feet
PL	Public Law
PRDNER	Puerto Rico Department of Natural and Environmental Resources
PVC	polyvinyl chloride
SAV	Submerged Aquatic Vegetation
SCUBA	Self Contained Underwater Breathing Apparatus
SHPO	State Historic Preservation Office
TO	Task Order
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service

ABSTRACT

A U.S. Army Corps of Engineers (USACE) sponsored construction project is proposed to protect Fort San Geronimo (Fort) from continued degradation due to wave-induced erosion. To facilitate the environmental commitments of the project, the USACE required documentation and assessment of the current environmental conditions in the vicinity of the Fort and a review of mitigation options, including avoidance and minimization measures to be implemented for the project. To characterize the coral community within the survey area, a combination of video transects and quadrat data were collected as well as mapping of individual colonies. All individual coral colonies with diameters >4.0 inches (>10.2 cm) within the survey area were identified and documented. To document the edge of the seagrass bed within the survey area, biologists first conducted a preliminary reconnaissance swim using snorkel to identify the seagrass bed area. To map the edge of the seagrass bed, the biologist then swam directly above the edge of bed, followed closely behind by a snorkeler using the Trimble Geo-XT handheld Digital Global Positioning System (DGPS) unit, running ArcPad 7.0. Quadrats were conducted by biologists on Self Contained Underwater Breathing Apparatus (SCUBA) to assess the seagrass community assemblage and density. Within the project area and the surrounding habitat, 108 coral colonies were mapped. Of these 108 colonies, 43 colonies will be impacted by the proposed project. To minimize and avoid impacts to these corals, a recipient site has been identified and the protocols to relocate these colonies while reducing stress are covered in detailed in this mitigation plan. In addition to addressing the coral impacts, this mitigation plan describes the USACE's commitment to minimize and avoid impacts to seagrass and water quality during the construction of the revetment and temporary access road. The functions and values that will be maintained resulting from this mitigation effort will be the minimization of the overall reduction of loss of phenotypic genetic composition of corals through the transplantation process.

1.0 INTRODUCTION AND BACKGROUND

A U.S. Army Corps of Engineers (USACE) sponsored construction project is proposed to protect Fort San Geronimo (Fort) from continued degradation due to wave-induced erosion. To facilitate the environmental commitments of the project, the USACE required documentation and assessment of the current environmental conditions in the vicinity of the Fort and a review of mitigation options, including avoidance and minimization measures to be implemented for the project. The objective of the project was to: 1) determine the presence, location, species composition, density and extent of marine vegetation and any nearshore hardbottom/reef resources; 2) document this information in an environmental baseline report; and 3) use the benthic survey data to design and develop mitigation alternatives.

This mitigation plan provides the proposal to avoid and minimize impacts to coral and seagrass habitat found on and around the Fort. The mitigation plan is based on agency coordination with the National Marine Fisheries Service (NMFS), along with the marine resources benthic survey conducted from October 25 to 27, 2010 to map and characterize the benthic habitats in the vicinity of the Fort. As coral habitat is considered an aquatic resource of national importance, the proposed mitigation plan will address the following regulatory policies:

- Presidential Executive Order (EO) 13089 on Coral Reef Protection
- Fish and Wildlife Coordination Act
- Essential Fish Habitat under the Magnuson-Stevens Fishery Conservation and Management Act
- NMFS Mitigation Policy (FR 46(15))

Authority and funding for the proposed project are provided by the small shore protection project program of the Continuing Authority Program (CAP). The shore protection program of the CAP is commonly referred to as Section 103 in reference to the Rivers and Harbors Act of 1962. The CAP was authorized by Section 3 of Public Law (PL) 727, approved on August 13, 1946. The local, non-Federal sponsor is the Institute of Puerto Rican Culture (IPRC).

The Mitigation Plan is being prepared to support the USACE Jacksonville District construction activities. This work was performed by Aerostar Environmental Services, Inc. (AEROSTAR) and its subcontractor PBS&J, an Atkins Company (PBS&J) through the USACE under Contract Number W912EP-08-D-0004, Task Order (TO) 0013.

1.1 Project Background and Need

Fort San Geronimo is located in the capital city of San Juan, Puerto Rico. This small Fort is located on a small rock promontory overlooking the western side of the inlet to Condado Lagoon (Figure 1). This inlet, called “El Boquerón”, serves as the easternmost connection of San Juan Bay with the Atlantic Ocean. The Fort’s main structure, measuring ~170 foot (ft) by ~100 ft, is connected to the mainland by a ~180-ft long stone bridge. It was built on a rocky plateau that is generally 1 to 3-ft relative to mean sea level (msl).

Fort San Geronimo was built in the second part of the 16th century. The existing Fort structure was built at the location of an earlier fort that was destroyed in 1598. The construction of the

structure was commissioned to protect the islet of San Juan. In 1797, the Fort was especially useful in defending the island from the attacks of British naval forces. After the attack by the British, the Fort was seriously damaged and required reconstruction. Fort San Geronimo continued to act as a military post until the early 20th century. In 1957, the Fort was transferred to the IPRC and in 1983 it was added to the list of the National Register of Historic Places. (USFWS 2005; USACE 2008)

Over the past five centuries, the walls and foundation of Fort San Geronimo have sustained severe damage due to the impact of wave action and weathering. Of particular concern is the condition of the north, east, and south walls and foundation. On the northern side of the Fort a rocky ridge extends along the plateau forming a breakwater. Despite this protective feature the waves incident on the north wall are attenuated to some degree by the influence of the inner and outer beach rock reefs located seaward of the structure. The east side of the Fort is relatively protected by an emergent island. The rock plateau on the southern side of the Fort is at its narrowest. Along this side of the Fort the bottom begins to slope away from the outer Fort wall only a few feet from the Fort's foundation. Waves incident on the east and south walls are also diffracted through a gap in the inner reef. Although the foundation, for the most part, is under water, footing stones can be seen on the south side of the Fort bridge along the water line. The west side of the Fort is protected by the shoreline and the shallow waters (-1 to -2 ft, msl) of the rocky plateau between the Fort and the shoreline. (USACE 2008)

The purpose of this project is to protect Fort San Geronimo from continued degradation due to wave-induced erosion. The USACE and the local project sponsor, the IPRC, propose to implement structural alternatives to prevent the erosion affecting the foundation of Fort San Geronimo.

1.2 Environmental Commitments

In the July 2008 Environmental Assessment (EA), the USACE and contractors committed to avoid and minimize impacts on the aquatic marine environment by utilizing the best available technologies for environmental protection. This document adheres to this commitment. As previously committed to the USACE, a detailed benthic survey was conducted within the project area and the data collected during this survey was used to develop a mitigation plan involving coral transplant and monitoring. This mitigation plan was developed and will be circulated to the interested agencies and will integrate comments and suggestions from Commonwealth and federal agencies. This plan includes coral species densities, coral colony locations, and alternative recipient sites for transplanted coral colonies, as well as monitoring effort frequency and duration.

The USACE and contractors commit to avoid and minimize impacts upon the aquatic marine environment by utilizing the best available technologies for environmental protection. These commitments will be included in the project's construction specifications. The USACE proposed to mitigate for adverse effects to coral communities by, prior to commencement of construction activities, perform a detailed benthic survey and implement a coral transplant and monitoring plan.

1.3 Agency Coordination

Under the Fish and Wildlife Coordination Act (FWCA), the USACE has conducted a lengthy process of coordinating the actions with the Federal resources agencies on impacts resulting from the proposed project. The coordination commenced with the completion of the July 2008 EA, which was subsequently reviewed by the various interested Federal agencies. The following agencies reviewed the EA, as dictated by the FWCA, and the specific communications are located in Appendix A:

- Department of Interior (DOI), Fish and Wildlife Service, Boquerón Field Office
- State Historic Preservation Office (SHPO)
- Institute of Puerto Rican Culture (IPRC)
- National Marine Fisheries Service, Protected Resource Division, National Oceanographic and Atmospheric Administration (NOAA)
- National Marine Fisheries Service (NMFS), Habitat Conservation Division
- Commonwealth of Puerto Rico, Planning Board
- Commonwealth of Puerto Rico, Department of Natural and Environmental Resources (PRDNER)

In general, the comments received in response to the EA, and USACE's responses to these comments, address concerns relating to potential water quality impacts from turbidity during construction and impacts to corals and seagrasses. It was the position of NMFS that impacts to threatened and endangered species was not likely based on the preferred alternative and this includes the *Acropora* complex.

Copies of the final Environmental Baseline Survey Report (December 2010) and Draft Mitigation Plan (December 2010) were circulated to federal and Commonwealth of Puerto Rico resource agencies with a cover letter dated December 20, 2010. The following agencies responded to the circulation of the draft Mitigation Plan:

- the Fish and Wildlife Service (FWS), by letter dated January 18, 2011; and
- the National Marine Fisheries Service (NMFS) via e-mail dated January 14, 2011.

Prior the preparation of the final Mitigation Plan, the USACE responded to all the comments provided by FWS and NMFS. Responses were provided via e-mails dated January 20, 2011 and February 2nd, 2011, respectively. For additional information, refer to Appendix A.

2.0 ON-SITE RESOURCES

The following section presents the technical approach and methodologies utilized to document and assess the coral/hardbottom and seagrass communities within the study area. Field surveys were conducted from October 25 to 27, 2010. Subsurface conditions in the survey area varied greatly and were largely dependent upon tidal stage and wave action. Water clarity was good throughout the survey period.

2.1 Survey Area

Figure 2 details the project survey area, which is described by the following approximate boundaries:

- Northern survey boundary – 6 feet seaward of the Fort’s northern wall
- Southern survey boundary – 100 feet seaward of the southern face of the Fort bridge
- Western survey boundary – the existing shoreline located west of the Fort
- Eastern survey boundary – Variable. The northern half of this area, the survey area was between the Fort wall and the rock outcropping. On the southern half of the eastern Fort wall, the survey area extended to the eastern terminus of the rock outcropping.

2.2 Preliminary Reconnaissance

A preliminary reconnaissance of the project area was conducted prior to data collection. The preliminary reconnaissance allowed the survey team to identify the habitat types present within the project area and to determine the most suitable methodologies for assessing the benthic communities. In addition, the reconnaissance illuminated potential safety concerns and practical field issues. The preliminary reconnaissance revealed that subsurface conditions in the survey area varied greatly and were largely affected by depth, wave action, and tidal stage. The methodologies described below represent best possible efforts toward reconciling a challenging worksite while applying the methodologies required by the NMFS/NOAA to the maximum extent practicable.

2.3 Coral/Hardbottom Community Assessment

2.3.1 General Approach

The preliminary reconnaissance revealed that no *Acroporid* corals are present within the survey area. Thus, it was not necessary that NMFS *Acropora* spp. survey protocol be conducted at the project location. In addition to the lack of any *Acroporids* within the project boundary during the field reconnaissance, NMFS (September 10, 2008) stated, “NMFS has determined that the project area does not contain the Primary Constituent Element (PCE) for listed coral species’ designated critical habitat.” Because the survey was being conducted for the purposes of estimating impacts from the proposed construction, it was determined that the mapping of individual coral colonies would provide the most valuable information in terms of estimating and minimizing impacts to the coral community. Thus, the field efforts focused on identifying and mapping those coral colonies >4.0 inches (in) (>10.2 centimeter [cm]) in diameter. The ultimate goal of these mapping efforts was to estimate impacts to the coral community and to determine potential avoidance/minimization and mitigation options.

To characterize the coral community within the survey area, a combination of video transects and quadrat data were collected. Four video transects were conducted throughout the survey area. Quadrats to assess the coral community were collected north of the Fort and in the shallow area south of the bridge. Figure 3 details the locations of the video transects and quadrats conducted within the survey area.

East of the Fort

The eastern wall of the Fort experienced heavy wave action during the entire survey period. In order to maintain diver safety and equipment integrity, benthic survey data were not collected along the eastern wall of the Fort structure. Visual observation of the area revealed a rocky, partially exposed platform between the Fort structure and the emergent island. This revetment was subject to heavy wave action and covered with turf algae. No corals were observed in this area.

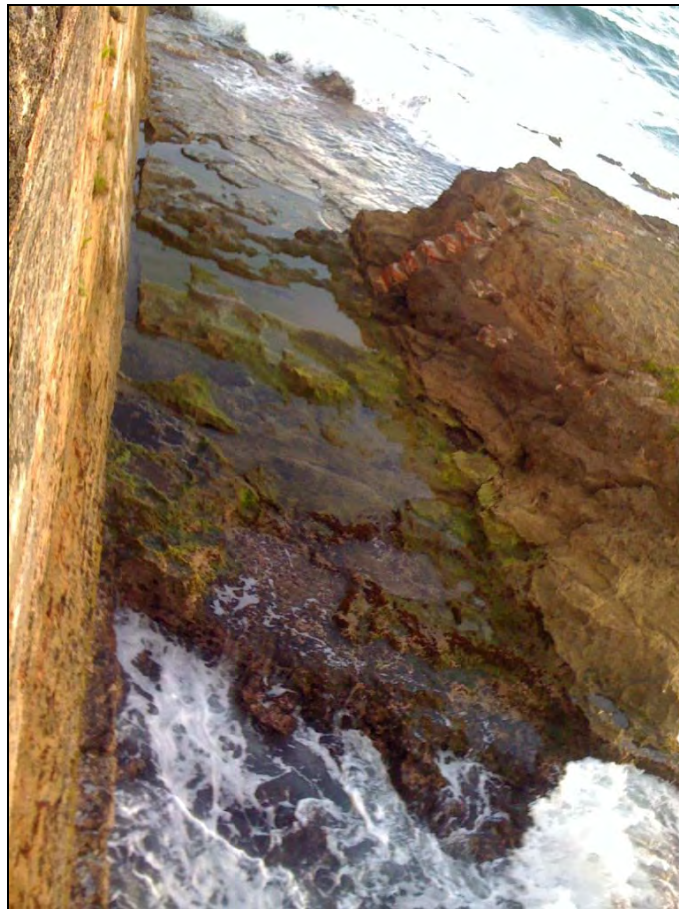
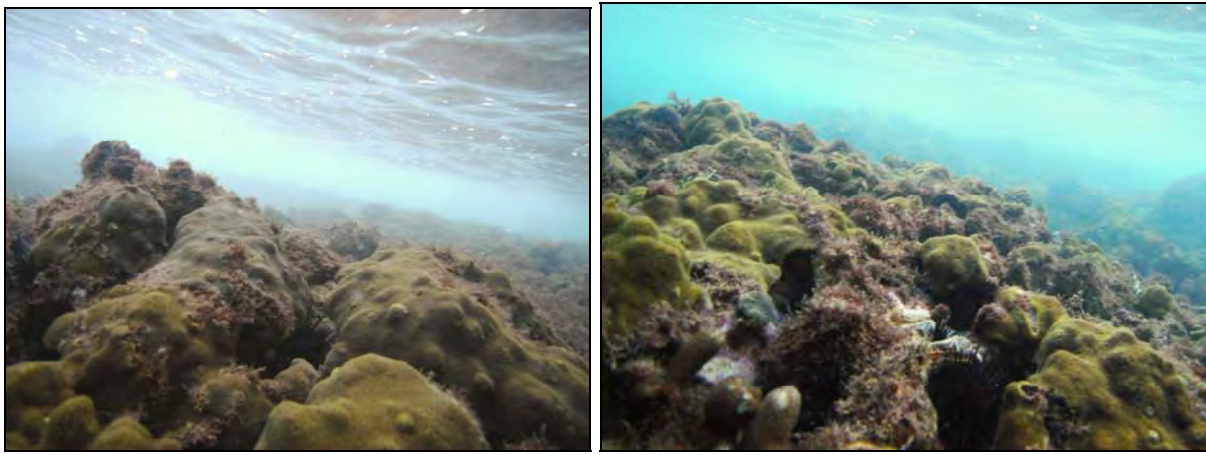


Image 1. View along the eastern wall of the Fort, facing north. Note the turf algae coating the exposed, rocky platform between the Fort's eastern wall (left) and the exposed island (right).

North of the Fort

The preliminary reconnaissance of the project area revealed that it would not be possible to collect video transect data and conduct coral mapping throughout the entire survey area north of the Fort.

Along the northern wall of the Fort, the survey was conducted only during the lowest tide level. This area is occupied by a very shallow rocky shelf and at higher tides, water turbulence associated with waves breaking over the emergent rock ridge/breakwater located north of the Fort made assessments impossible in this area. The northern wall of the Fort exhibited the highest coral cover within the project area, where the coral community consisted of multiple, smaller encrusting and platy corals, rather than distinct colonies (Images 2 and 3). Mapping of individual coral colonies in this area was not effective and depths were not adequate to conduct video transects; thus, quadrats were determined to be the best method for documenting the coral community and assemblage (Image 4). Figure 3 details the locations of these quadrats.



Images 2 and 3. Coral community assemblage at the northeastern corner of the Fort.

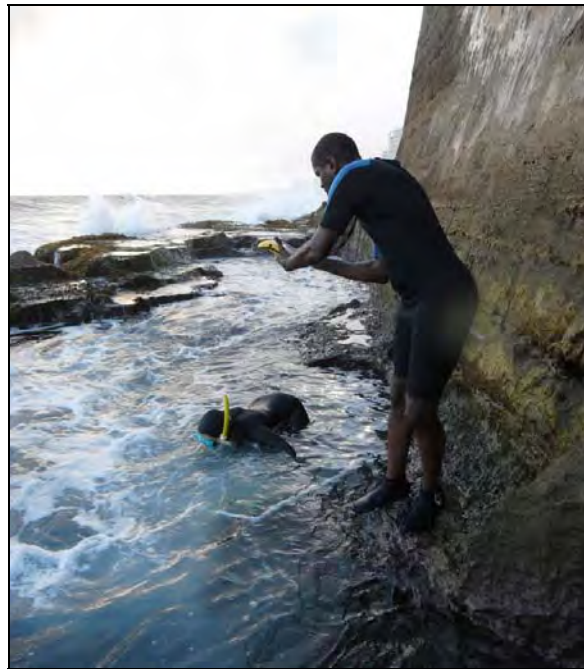
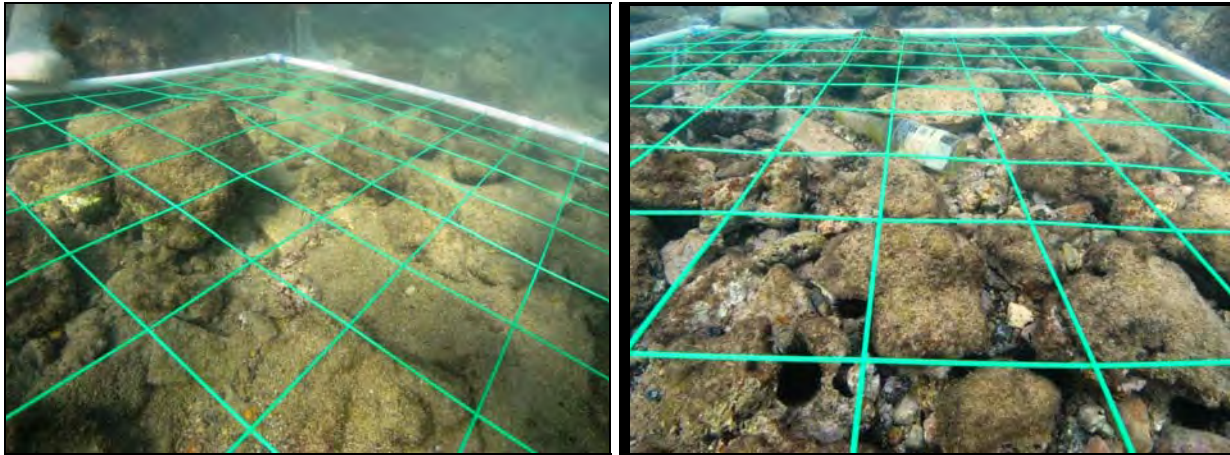


Image 4. Biologist conducts quadrat survey at the northeastern corner of the Fort. Quadrat location is documented using a Trimble DGPS unit.

Further west, in the vicinity of the bridge, the substrate consisted of a cemented sand platform with rubble and sand. The water was deeper with lower wave energy, making it possible to conduct a video transect in this area. Individual coral colonies with a diameter greater >4 in (10.2 cm) were mapped as described in Section 2.3.2.1. Figure 3 details the video transect location.

South of the Fort (West of the Relic Caisson Structure)

The area south of the Fort bridge was occupied by rubble and sand and was strongly influenced by tidal flow through the bridge spillways. At low tide, the depths and lower water flow in this area made a video transect possible. Individual coral colonies located along the Fort structure were mapped. Moving further south from the bridge, the area of rubble and sand becomes very shallow and did not allow for video transects; thus, eight quadrats were conducted to assess the benthic community (Images 5 and 6). Further south from here, depths increased over rubble and sand substrate, allowing for a video transect and individual coral mapping efforts. Figure 3 details the location of the video transects and quadrats.



Images 5 and 6. Quadrats conducted in the area of rubble and sand located south of the Fort bridge and west of the relic caisson structure of the Fort. Figure 2 details the quadrat locations.

South of the Fort (East of the Relic Caisson Structure)

East of the relic caisson structure (Image 7), a solid rocky platform with unconsolidated rubble and boulders projected horizontally out from the southern wall of the Fort (Images 8 and 9). This community was dominated by macroalgae and turf algae, sponges, and occasional small corals.



Image 7. Photograph (facing west) of the relic caisson structure and rubble/boulders located adjacent to it.



Image 8. Photograph of the Fort's southern wall, facing north-northeast. The wall is visible in the background.



Image 9. Photograph (facing west) of the rocky solid slab revetment adjacent to the Fort's southern wall. The benthic community in this area is dominated by the macroalgae, *Dictyota* sp., with occasional coral colonies.

Moving away from the Fort, the solid slab transitioned to unconsolidated rubble and large boulders and sloped down into sand (Image 10). Individual coral colonies were mapped and a video transect was conducted in this area.



Image 10. Photograph of the area of unconsolidated rubble and large boulders that sloped down into sand.

During the entire survey period, heavy wave action and surge were present in the eastern portion of the survey area closest to the inlet (El Boquerón). Thus, to maintain diver safety and equipment integrity, benthic survey data were not collected in the easternmost portions of the survey area. Much of the substrate in this area showed evidence of heavy currents and wave

action, as indicated by sand ripples and unattached drift algae.

2.3.2 Methods

2.3.2.1 Coral Colony Mapping

All individual coral colonies with diameters >4.0 in (>10.2 cm) within the survey area were identified and documented. As can be seen in Figure 3, corals were also mapped outside of the defined survey area. Mapping outside of the benthic survey boundaries was conducted to 1) demonstrate the continuity of the coral community outside of, and adjacent to, the survey area and 2) demonstrate that the location of the proposed construction activity minimizes impacts to the coral community. A map of the individual coral colony locations was produced by biologists using mask, snorkel and Geographical Information System (GIS). A Trimble Geo-XT handheld Digital Global Positioning System (DGPS) unit, running ArcPad 7.0, was utilized to document the coral colony locations. The following data were recorded for each mapped coral colony: coral species, colony dimensions, benthos type, and potential for relocation (i.e., colony relocation possible, colony relocation not possible, or partial colony removal).

2.3.2.2 Video Transects

Four video transects were collected within the survey area, one located north of the Fort and three located south of the Fort (Table 1). Transect lines were deployed in an effort to document the benthic communities within the survey area.

Biologists laid out fiberglass surveyor’s tape along each transect. A Trimble Geo-XT handheld DGPS unit, running ArcPad 7.0, was utilized to document the start and endpoint of each transect. Biologists swam slowly along each transect, videotaping perpendicular to the substratum at a constant height of 20 cm from the bottom. The digital video camera used was a Sony DCR-VX2000 in an underwater housing fitted with a wide-angle lens. A weighted line beneath the video housing ensured that the camera remained a constant distance above bottom. If surge forced the diver off of the transect line, the diver returned to the point of disturbance and resumed filming.

TABLE 1. Video Transects

Transect #	Substrate and Relative Location	Transect Length
1	Beach rock located north of the Fort bridge	70 ft (21.3 m)
2	Rubble south of the Fort bridge	40 ft (12.2 m)
3	Rubble west of the relic caisson structure	50 ft (15.2 m)
4	Rock revetment south of the Fort’s southern wall	70 ft (21.3 m)

The video transect data were collected for the purposes of documenting representative areas of the benthic habitat within the survey area. The videos were not analyzed to describe the benthic community composition because the additional methodologies utilized during the survey (i.e.,

coral colony mapping, quadrat data collection, and representative species lists) provide the necessary information. The video transects will serve as a record of the benthic community structure and will be stored for future purposes, if needed.

2.3.2.3 Quadrats

To document and characterize the coral community within the survey area, *in situ* percent cover estimates of coral cover were performed on a total of 17 1.0-meters squared (m^2) polyvinyl chloride (PVC) quadrats. Nine quadrats were conducted along the northern wall of the Fort and eight quadrats were conducted within the area of shallow rubble located southwest of the Fort's southwestern corner. Figure 3 details the location of these quadrats. Each 1.0 m^2 PVC quadrat was divided into 100 equal (10 cm^2) cells to assist in the estimation of percent cover. Those 10 cm^2 cells that contained coral would be counted as equivalent to 1% coral cover.

During quadrat data collection, the biologist recorded the total number of cells containing coral (each cell representing 1% of the quadrat) to determine the total percent cover of coral within the quadrat (Image 11). In addition, the biologist recorded the total number of cells occupied by each individual coral species to estimate the percent cover by species. It should be noted that this method may provide an overestimation of the actual percent cover because it does not distinguish between those 10 cm^2 cells that are only partially occupied by coral and those cells that are entirely occupied by coral. The quadrat data were entered into Microsoft Excel spreadsheets and analyzed to determine the mean percent cover of coral and percent cover by individual coral species.

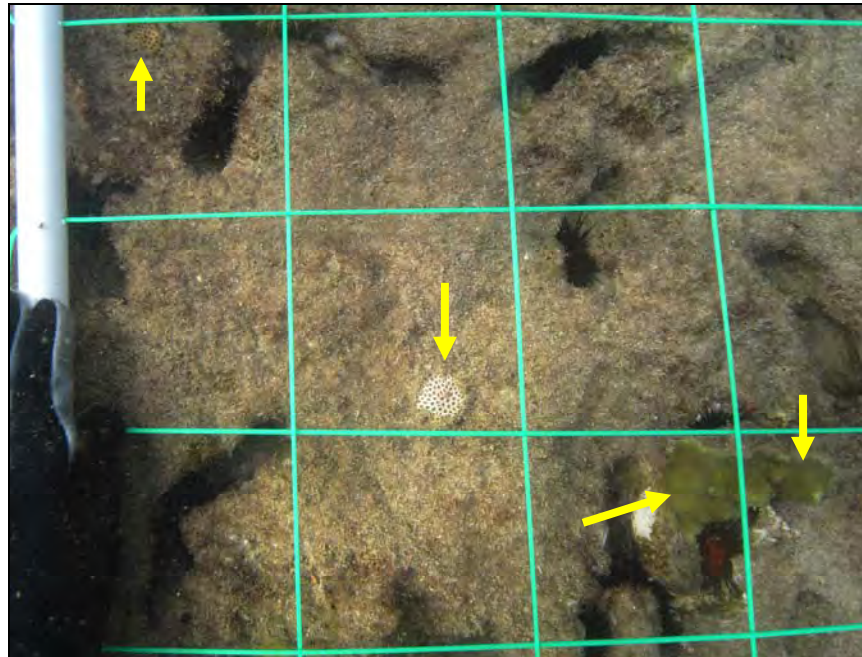


Image 11. Photograph of a portion of a quadrat conducted on the north side of the Fort. Arrows indicate the corals identified and documented by the biologist to estimate percent cover of coral.

2.4 Seagrass Community Assessment

The objectives of the seagrass community assessment were 1) to determine the location of the

seagrass bed within the project survey area and 2) to estimate the density and species composition of seagrass within the survey area.

2.4.1 Methods

2.4.1.1 Seagrass Habitat Mapping

To document the edge of the seagrass bed within the survey area, biologists first conducted a preliminary reconnaissance swim using snorkel to identify the seagrass bed area. To map the edge of the seagrass bed, the biologist then swam directly above the edge of bed, followed closely behind by a snorkeler using the Trimble Geo-XT handheld DGPS unit, running ArcPad 7.0.

Quadrats were conducted by biologists on Self Contained Underwater Breathing Apparatus (SCUBA) to assess the seagrass community assemblage and density. Quadrats were positioned haphazardly throughout the seagrass area. The location of each quadrat was documented using a handheld Garmin GPSMAP 60Csx unit by a surface team member on a paddleboard. Using peanut buoys, the divers signaled to the surface team member who then positioned the GPS at the quadrat location and recorded the quadrat location.

2.4.1.2 Seagrass Coverage

In situ percent cover estimates of seagrass percent cover were performed on a 26 1.0-meter squared (m²) PVC quadrats divided into 100 equal (10 cm²) cells. Figure 4 details the location of these quadrats. The quadrats were assessed for 1) the number of cells containing each species and 2) the total number of seagrass-containing cells. The quadrat data were entered into Microsoft Excel spreadsheets. The percent cover will be equated to cover classes based on a modified Braun-Blanquet technique (Table 2), which is commonly used in estimations of vegetative coverage. These data collected were analyzed to determine the mean percent cover of seagrass and percent cover by individual seagrass species.

TABLE 2. Braun-Blanquet Classification Scores

Braun-Blanquet Classification	
Score	Submerged Aquatic Vegetation (SAV) Description
0	Absence
0.1	Single individual ramet (less than 5% cover)
0.5	Few individual ramets (less than 5% cover)
1	Many individual ramets (less than 5% cover)
2	5-25% cover
3	25-50% cover
4	50-75% cover
5	75-100% cover

3.0 ALTERNATIVES

According to the July 2008 EA, the USACE developed four primary structural alternatives, in addition to the No Action alternative, to protect Fort San Geronimo from continued degradation due to wave-induced erosion. The four structural alternatives and the No Action alternative are described briefly below.

The basic features of Fort San Geronimo and its immediate environment are shown in Image 12. The main structure of the Fort is approximately 170 feet long by 100 feet wide, and is connected to the mainland by a 180-foot stone bridge. The Fort is built on a rocky plateau which extends outward from the Fort's outer walls in all directions. This plateau is generally 1 to 3 feet deep, relative to msl. An emergent rocky ridge (+1 to +2 feet, msl) extends along the northern edge of the plateau and serves as a breakwater, substantially reducing the energy of large storm waves from the Atlantic before they reach the Fort. An emergent island on the east side of the Fort likewise protects this side of the structure from direct wave attack. The rock plateau is at its narrowest along the south side of the Fort, where the bottom begins to slope away from the outer Fort wall only a few feet from the Fort's foundation. The west side of the Fort is protected by the shoreline and the shallow waters (-1 to -2 feet, msl) of the rocky plateau between the Fort and the shoreline.



Image 12. Fort San Geronimo Area Features

3.1 Alternative 1: Concrete Scour Apron

A concrete apron would be constructed around the perimeter of the Fort to isolate the foundation from direct contact with seawater (Illustration 1). Quick-setting, low mobility grout would be used to construct the wall. Approximately 265 cubic yards of grout would be required for construction of the apron. The grout would be poured directly onto the existing rock bottom and

against the Fort's exterior wall.

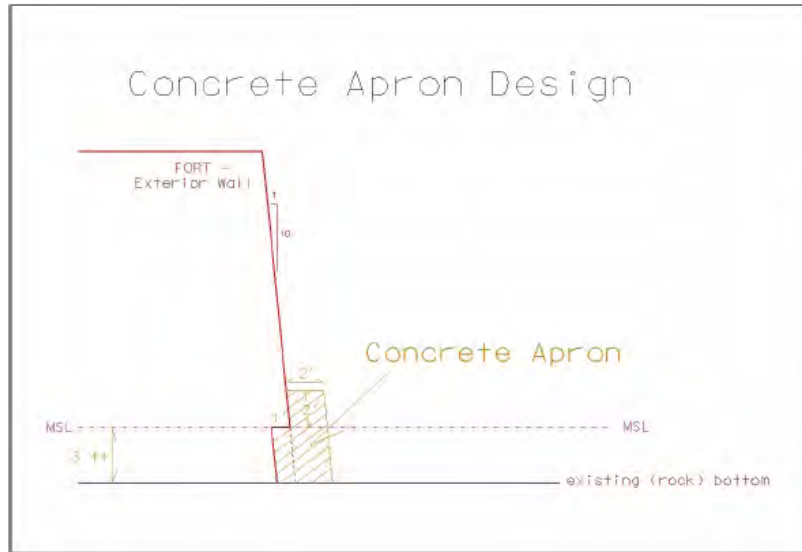


Illustration 1. Concrete Scour Apron Proposed Design

3.2 Alternative 2: Concrete Apron and Rubble Revetment

A rubble-mound revetment would be constructed immediately seaward of the scour apron around the Fort's perimeter in order to protect the apron from direct wave impact and to reduce wave run-up on the Fort. The median armor stone size of the revetment would be two tons. The revetment would lie entirely on the natural rock shelf that supports the Fort and no filter cloth or foundation layers would be required; armor stone would be placed directly on the existing bottom. Proposed dimensions of the revetment are shown in Illustration 2. Approximately 1,670 cubic yards (3,100 tons) of armor stone would be required for construction of the revetment, based on a unit weight of 165 pounds per cubic feet (pcf). Approximate footprint of the grout apron and revetment combined would be 11,800 square feet (0.27 acres).

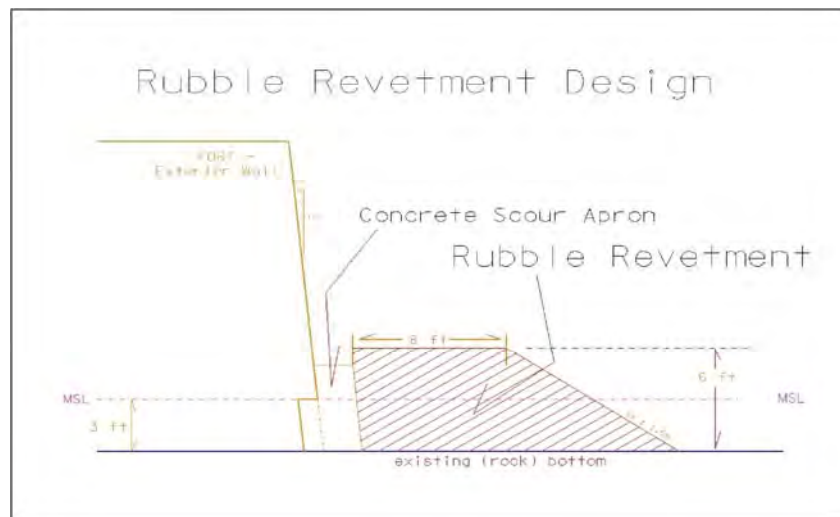


Illustration 2. Scour Apron and Rubble Revetment Proposed Design

To construct the concrete apron and the rubble revetment, a temporary construction access would be built from the shore to access the southwestern corner of the Fort's foundation. The access ramp would be approximately 25 feet wide and 85 feet long (2,125 square feet).



Image 13. Plan View of Revetment and Access Route Footprint

3.3 Alternative 3: Concrete Apron and Limited Revetment (Preferred Alternative)

Subsequent to the review and evaluation of the various factors of each of the four alternatives, Alternative 3 was selected as the Preferred Alternative and is being evaluated in this mitigation plan. Whereas the full revetment option would completely encircle the Fort, the limited revetment option would protect only the areas of the Fort which have experienced the most damage and are the most vulnerable to future damages. These areas extend along the southern 30 feet of the east wall, around the southeast corner of the Fort, and along approximately 120 feet of the south wall as shown in Image 14. The endpoints of this revetment encompass the two areas of wave energy focusing. Each of the triangular areas of wave energy focusing would be filled in with 2-ton armor stone to reduce wave impacts on the Fort. The revetment cross-section shown in Illustration 2 would be constructed along the south wall, connecting the two areas of wave energy focusing. The concrete scour apron, as depicted in Illustration 1, will encircle the entire perimeter of the Fort's foundation. Approximately 500 cubic yards of 2-ton, 165 pcf armor stone would be required to construct this limited revetment option. This alternative represents the USACE Preferred Alternative and recommended plan.



Image 14. Approximate Footprint of Limited Revetment Alternative

3.4 Alternative 4: Concrete Apron, Full Revetment and Rubble Breakwater

In combination with the concrete apron and rock revetment, a rubble-mound breakwater was initially considered for construction seaward of the Fort to reduce the size of incoming waves. The breakwater would be 350 feet long, and would extend along the existing natural rock ledge to the north of the Fort. A simplified cross-section of the breakwater is shown in Illustration 3. As with the revetment in Alternative 2, the breakwater would be built on bedrock and no filter fabric or bedding layers would be required. The median armor stone size for the break water would be 5 tons and the total volume of armor stone required would be 1,900 cubic yards (3,450 tons), based on a unit weight of 165 pcf. The approximate footprint of the breakwater would be 7,600 square feet (0.17 acres). Access to the breakwater site would be gained from the shore, along the southern fringe of the rocky outcrops to the north of the Fort. Upon completion of the scoping process, this alternative was eliminated from further consideration.

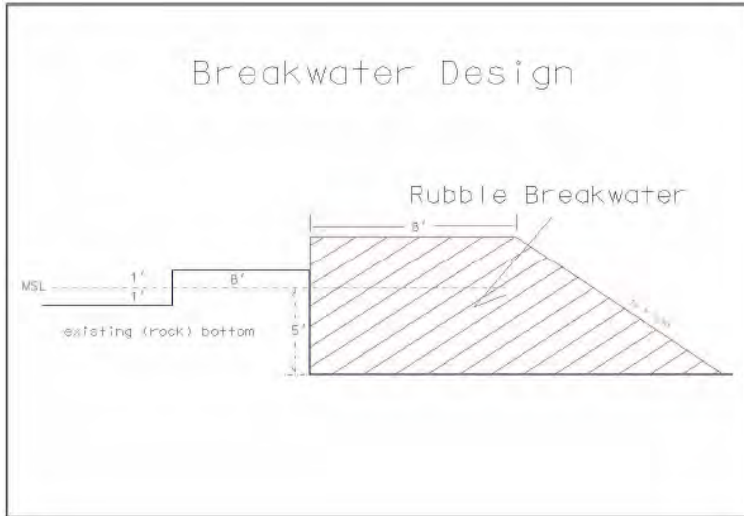


Illustration 3. Proposed Breakwater Design



Image 15. Proposed Breakwater Location and Access Ramp View

3.5 No Action Alternative (Status Quo)

Under the No Action Alternative, the Fort would remain in its current state and no structural protection measures would be implemented. Selection of the No Action Alternative would result in continued wave-induced erosion of the Fort's foundation and eventual loss of this historically significant structure.

4.0 MITIGATION PLAN

The purpose of this mitigation plan is to provide guidance and illuminate commitments to address and offset the potential unavoidable loss of phenotypic genetic composition of corals located on the shallow benthos around the Fort from the proposed construction effort. This proposed mitigation plan focuses on coral relocation methods and minimization of water quality impacts. All of the procedures for coral relocation will be undertaken prior to construction. Additionally, standard best management practices will be utilized to mitigate for temporary construction impacts to water quality, such as potential increases in turbidity.

During construction, even with avoidance and minimization practices, temporary and permanent impacts will occur. Figure 5 shows the footprint of the proposed construction effort. Permanent impacts will occur due to the installation of the 2-foot concrete apron around the base of the Fort, the scour fill placed on the south side of the bridge, and from the limited revetment constructed along the southern portion of the Fort. Temporary impacts will occur due to the installation of the 5-foot construction buffer needed to install the concrete apron around the base of the Fort and installation of the temporary access road (easement) for construction material. The location of the temporary access road (easement) was relocated to avoid and minimize impacts to coral communities. The functions and values that will be maintained resulting from this mitigation effort will be the minimization of overall reduction of loss of phenotypic genetic composition of corals through the transplantation process.

4.1 Coral

4.1.1 Affected Corals

During the coral/hardbottom community assessment, a total of 108 individual coral colonies with diameters >4.0 in (>10.2 cm) were identified, documented, and mapped within the vicinity of the survey area. Figure 3 shows the locations of the individual coral colonies that were mapped in the Fort vicinity during the October 2010 benthic survey. As can be seen in Figure 3, corals were mapped outside of the defined benthic survey area. Mapping outside of the benthic survey boundaries was conducted to 1) demonstrate the continuity of the coral community outside of, and adjacent to, the survey area and 2) demonstrate that the location of the proposed construction activity minimizes impacts to the coral community.

Of these 108 colonies, 43 colonies will be impacted by the proposed construction activities. Table 3 indicates the species of each impacted coral, along with the colony dimensions, benthos type, and potential for relocation (i.e., colony relocation possible, colony relocation not possible, or partial colony removal). Figures 6 and 7 show the locations of the mapped colonies that will be impacted on the north and south sides of the Fort, respectively. A review of the corals listed in the petition to list 83 corals as found in 50 CFR Parts 223 and 224 was also conducted. There are no corals within the project limits that are identified in this petition for proposed actions under the Endangered Species Act (ESA).

On the north side of the Fort, five mapped corals will be impacted by the proposed construction activities. Of these corals, relocation is not possible for one colony and four partial colonies will be relocated.

On the south side of the Fort, 38 corals will be impacted by the proposed construction activities. Of these corals, relocation is not possible for 11 colonies, 10 colonies will be moved in their entirety, and 17 colonies will be partial colonies will be relocated.

TABLE 3: Impacted Coral Within the Coral Area

Map_ID	Latitude	Longitude	Photo Name	Species	Colony Type	Length (in)	Width (in)	Height (in)	Attachment	Relocation Possible
ID1	N18° 27.773'	W66° 5.068'	PA001	<i>Porites astreoides</i>	encrusting	4.5	4.5	-	seawall	Yes - partial colony
ID2	N18° 27.772'	W66° 5.069'	PA002	<i>Porites astreoides</i>	encrusting	8	4	-	seawall	Yes - partial colony
ID5	N18° 27.774'	W66° 5.074'	SR005	<i>Siderastrea radians</i>	encrusting	4	3	-	large boulder	No
ID6	N18° 27.763'	W66° 5.066'	DS006	<i>Diploria strigosa</i>	encrusting	4.5	4	-	small rubble	Yes - entire colony
ID7	N18° 27.763'	W66° 5.068'	DS007	<i>Diploria strigosa</i>	encrusting	5.5	5	-	small rubble	Yes - entire colony
ID8	N18° 27.763'	W66° 5.068'	PP008	<i>Porites porites</i>	branching	4	3.5	-	medium boulder	Yes - entire colony
ID9	N18° 27.761'	W66° 5.068'	DS009	<i>Diploria strigosa</i>	encrusting	7.5	7	-	medium boulder	Yes - entire colony
ID10	N18° 27.763'	W66° 5.070'	PP010	<i>Porites porites</i>	branching	5	4	-	benthos	Yes - entire colony
ID11	N18° 27.762'	W66° 5.072'	DS011	<i>Diploria strigosa</i>	encrusting	7.5	3.5	-	medium boulder	Yes - entire colony
ID41	N18° 27.771'	W66° 5.068'	PA041	<i>Porites astreoides</i>	encrusting	13	8	-	seawall	Yes - partial colony
ID42	N18° 27.772'	W66° 5.068'	PA042	<i>Porites astreoides</i>	encrusting	4.5	3	-	seawall	Yes - partial colony
ID43	N18° 27.772'	W66° 5.069'	PP043	<i>Porites porites</i>	branching	7	4	-	seawall	No
ID44	N18° 27.772'	W66° 5.069'	PA044	<i>Porites astreoides</i>	encrusting	18	13	-	seawall	Yes - partial colony
ID45	N18° 27.772'	W66° 5.069'	AG045	<i>Agaricia</i> sp.	encrusting	5	3.5	-	seawall	No
ID46	N18° 27.772'	W66° 5.069'	AG046	<i>Agaricia humilis</i>	encrusting	6	4	-	seawall	No
ID47	N18° 27.772'	W66° 5.070'	PA047	<i>Porites astreoides</i>	encrusting	4.5	2.5	-	seawall	Yes - partial colony
ID48	N18° 27.772'	W66° 5.070'	AG048	<i>Agaricia</i> sp.	encrusting	7	6	-	seawall	No
ID49	N18° 27.772'	W66° 5.070'	AG049	<i>Agaricia</i> sp.	encrusting	6	4	-	seawall	No
ID50	N18° 27.772'	W66° 5.071'	PA050	<i>Porites astreoides</i>	encrusting	16.5	10	-	seawall	Yes - partial colony
ID51	N18° 27.774'	W66° 5.074'	PA051	<i>Porites astreoides</i>	encrusting	5	4	-	seawall	Yes - entire colony
ID52	N18° 27.774'	W66° 5.074'	SR052	<i>Siderastrea radians</i>	encrusting	4	3.5	-	seawall	No
ID53	N18° 27.775'	W66° 5.074'	SR053	<i>Siderastrea radians</i>	encrusting	4.5	3	-	seawall	No
ID54	N18° 27.782'	W66° 5.062'	PA055	<i>Porites astreoides</i>	encrusting	5	4	-	seawall	Yes - partial colony
ID70	N18° 27.759'	W66° 5.063'	PP070	<i>Porites porites</i>	branching	4	2	2	large boulder	Yes - partial colony
ID71	N18° 27.758'	W66° 5.060'	DC071	<i>Diploria clivosa</i>	encrusting	8	7	-	small rubble	Yes - entire colony
ID72	N18° 27.757'	W66° 5.061'	DC072	<i>Diploria clivosa</i>	encrusting	7.5	8	-	small rubble	Yes - entire colony
ID73	N18° 27.758'	W66° 5.059'	DS073	<i>Diploria strigosa</i>	encrusting	8	8	-	medium rubble	Yes - entire colony
ID74	N18° 27.758'	W66° 5.057'	PA074	<i>Porites astreoides</i>	encrusting	5	4.5	-	medium rubble	Yes - partial colony

Map ID	Latitude	Longitude	Photo Name	Species	Colony Type	Length (in)	Width (in)	Height (in)	Attachment	Relocation Possible
ID75	N18° 27.757'	W66° 5.055'	DS075	<i>Diploria strigosa</i>	encrusting	5.5	4.5	-	small rubble	Yes - partial colony
ID76	N18° 27.758'	W66° 5.053'	PA076	<i>Porites astreoides</i>	encrusting	5	4	-	medium boulder	Yes - partial colony
ID77	N18° 27.757'	W66° 5.053'	PP077	<i>Porites porites</i>	branching	6	3	1.5	medium boulder	Yes - partial colony
ID78	N18° 27.757'	W66° 5.053'	PP078	<i>Porites porites</i>	branching	5	3	2	large boulder	Yes - partial colony
ID79	N18° 27.755'	W66° 5.052'	DC079(1)	<i>Diploria clivosa</i>	encrusting	10	8	-	large boulder	Yes - partial colony
ID80	N18° 27.755'	W66° 5.052'	DC079(2)	<i>Diploria clivosa</i>	encrusting	8	6.5	-	large boulder	Yes - partial colony
ID82	N18° 27.757'	W66° 5.054'	PA081	<i>Porites astreoides</i>	encrusting	4.5	3	-	seawall	Yes - partial colony
ID84	N18° 27.755'	W66° 5.053'	DC083	<i>Diploria clivosa</i>	encrusting	7.5	5.5	-	large boulder	No
ID85	N18° 27.755'	W66° 5.051'	PA084	<i>Porites astreoides</i>	encrusting	4	2.5	-	boulder	Yes - partial colony
ID87	N18° 27.754'	W66° 5.047'	PA086	<i>Porites astreoides</i>	encrusting	7.5	3.5	-	large boulder	Yes - partial colony
ID88	N18° 27.781'	W66° 5.059'	DS090	<i>Diploria strigosa</i>	encrusting	6.5	5	-	benthos	Yes - partial colony
ID89	N18° 27.782'	W66° 5.059'	PA091	<i>Porites astreoides</i>	encrusting	7	7	-	boulder	Yes - partial colony
ID90	N18° 27.781'	W66° 5.061'	PA092	<i>Porites astreoides</i>	encrusting	7.5	7	-	seawall	Yes - partial colony
ID91	N18° 27.782'	W66° 5.062'	AG093	<i>Agaricia humilis</i>	encrusting	4	4	-	seawall	No
ID92	N18° 27.753'	W66° 5.041'	VT094	<i>Gorgonia ventalina</i>	N/A	4	-	12	medium boulder	Yes - partial colony

Notes:

PP078 and PP077 mapped as same point

DC079(11 and DC079(2) mapped as same point

4.1.2 Avoidance and Minimization of Impacts

Various options were evaluated in a best effort to avoid/minimize impacts to corals from the proposed project. Impacts to corals will be minimized by selecting an appropriate location for the temporary access road and by relocating corals from the project impact area.

The October 2010 benthic survey revealed a very low mean total coral cover (1.13% +/- 0.79%) consisting of only two species, *Siderastrea radians* and *Favia fragum* in the area south of the Fort bridge and west of the relic caisson structure. All the colonies in this area are <4.0 inches in diameter. Thus, this area was selected for installation of the temporary access road. Figure 5 shows the proposed location for the temporary access road.

To minimize impacts to coral, 31 coral colonies suitable for relocation will be relocated (fully or partially) from the area of construction. Two potential best management practice strategies were evaluated for the proposed coral relocation: 1) relocate removed corals to an adjacent suitable recipient site and/or 2) cache removed corals on-site during construction and subsequent reattachment within the project footprint post-construction. Both options would require preconstruction coordination with the selected contractor and relocation activities will be dependent upon the final construction methodologies implemented for this project. Due to the 24-month period of performance, the caching option was eliminated from further consideration.

If the construction schedule allows, transplantation should avoid the warmer months of the year to potentially increase survivorship of the transplanted corals.

Loggerhead (*Caretta caretta*) and hawksbill (*Eretmochelys imbricate*) are considered endangered species and are known to occur within the project area utilizing seagrass beds for foraging habitat. In addition, according to communications with NMFS, these turtles are known to nest on the beach adjacent to the Condado Plaza Hotel. In order to avoid impacts to these protected species during coral relocation operations, the NOAA Fisheries Service Vessel Strike Avoidance Measures and Reporting for Mariners will be implemented and adhered to during all in-water motorized vessel use. These avoidance measures include, but are not limited to:

1. Vessel operators and crews should maintain a vigilant watch for sea turtles to avoid striking sighted protected species.
2. When sea turtles are sighted, attempt to maintain a distance of 50 yards or greater between the animal and the vessel whenever possible.
3. Turtles may surface in unpredictable locations. When an animal is sighted in the vessel's path or in close proximity to a moving vessel and when safety permits, reduce speed and shift the engine to neutral. Do not engage the engines until the animals are clear of the area.

4.1.3 Relocation

The mitigation plan was developed using relocation protocols having the highest potential for success. An appropriate relocation protocol will provide reduced stress on the coral during the relocation process. The success rate of coral transplanting projects and methods used previously within the Caribbean was assessed in the *Final Report - Investigations of Mitigation for Coral Reef Impacts in the U.S. Atlantic: South Florida and the Caribbean* as being 80 to 90%.

4.1.4 Recipient Site

For the purposes of the coral relocation effort, those coral colonies within the project impact area will be relocated to a recipient site location. Potential recipient sites were evaluated at the time of the October 2010 benthic survey effort. In an effort to identify an appropriate recipient site, project biologists evaluated this entire area, including the areas south of the breakwater, as well as the artificial reef modules (associated with the Condado Lagoon Taíno Reef Trail Project) located within this area.

The area east and southeast of the inlet contains a swimming beach (Playita del Condado), protected on the north side by a breakwater. Image 16 shows the proposed recipient site, which is located across the inlet, south of the breakwater. The recipient site contained the same coral species and composition as the project site. In addition, the proposed recipient site exhibited similar site characteristics to the project site, including depths and high wave energy. The high wave energy at the proposed recipient site, much like at the impact site, reduces the potential for sedimentation.

The other portions of the assessed area highlighted in Image 16, were excluded from further

discussions and removed from being classified as potential recipient sites due to the substantially different characteristics from the project site. The area east of the recipient site and south of the breakwater experienced wave energy that differed from the project site and contained lower densities of corals, possibly due to increased sedimentation in these areas. The artificial reef modules associated with the Condado Lagoon Taíno Reef Trail Project are located south of the breakwater, in calmer waters with greater depths than the project site. Several of the artificial reef modules contained small coral recruits; however, heavy sedimentation was visible on the modules. The differences in depth, wave action, and sedimentation from the project site indicate that the reef modules are not an ideal recipient site location. The recipient site is described geographically by the following approximate coordinates

- Southeast Corner: N18° 27.708'/ W66° 4.976'
- Northeast Corner: N18° 27.718'/ W66° 4.976'
- Southwest Corner: N18° 27.708'/ W66° 4.992'
- Northwest Corner: N18° 27.718'/ W66° 4.992'

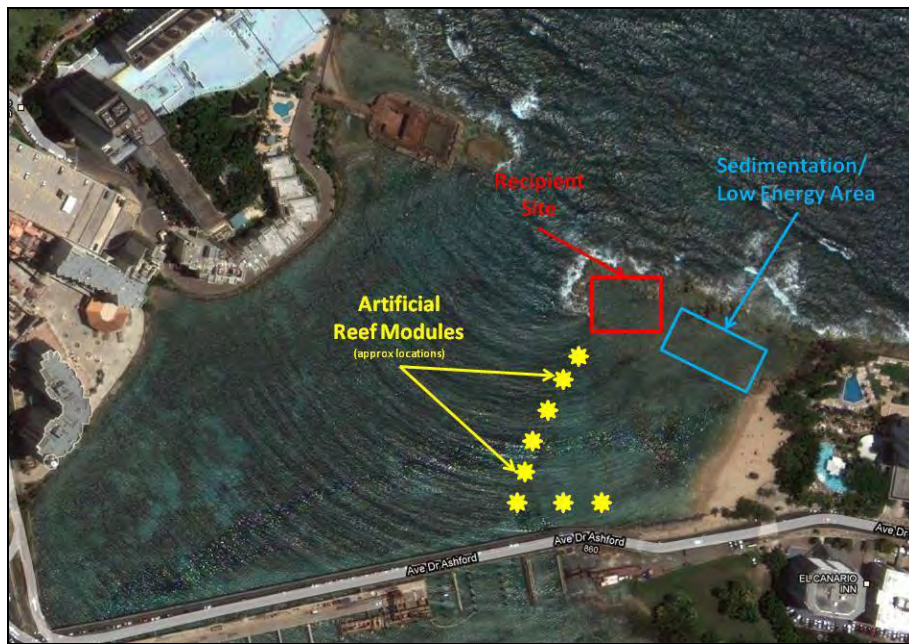


Image 16. Approximate location of the proposed coral recipient site MAKE SURE MAP PRINTS RECIPIENT SITE

4.1.5 “Best Effort” Removal Proposed at NE Corner of Fort

High coral densities (42.78% +/- 4.13%) were documented along the northern wall of the Fort (on the Fort structure and on the hardbottom in this area). Coral cover was the highest at the very northeastern corner and declined towards the west. Six species of coral were documented within this area: *Porites astreoides*, *Porites porites*, *Agaricia humilis*, *Siderastrea radians*, *Diploria strigosa*, and *Favia fragum*. The coral community consists of multiple, smaller encrusting and plate corals, rather than distinct colonies. Thus, a complete removal of all coral colonies (and subsequent relocation) would not be possible in this area, which is also subject to substantial wave energy. A “best effort” will be employed to minimize impacts to corals in this area, which will consist of the removal of coral colonies that have the highest likelihood of

remaining intact during removal and that are apparently healthy (free of obvious disease). This “best effort” will include the time required to remove, transplant and map these corals within the recipient site once transplanted. The removal and transplanting of these corals will follow the guidelines established in Section 4.1.6. No additional mitigation beyond the “best effort” will be conducted for this area of the project site.

4.1.6 Removal and Attachment Methodologies

The protocols described in this section have been developed by individuals from the Florida Keys National Marine Sanctuary. These protocols are designed to reduce stress on the coral animal and to increase the success (coral survivorship) or the relocation project.

Several of the corals that will be impacted at the project site are attached to moveable rocks or small boulders (Table 3). In these instances, the entire rock/boulder will be transported to the recipient site. The stones or boulders containing the attached coral that are able to be relocated, will be cemented to the substrate at the recipient site. Care will be taken to avoid touching the coral colony during transport. In order to reduce stress to the coral from transport and to increase the likelihood of success, the coral colonies should remain submerged in seawater within their transport container and the seawater should be routinely changed to avoid prolonged exposure to increased temperatures. Corals should not be stored overnight in transport containers and those corals removed from the project site should be reattached at the recipient site on the same day.

For those corals requiring removal/detachment (those attached to the Fort structure and those attached to boulders that are too large for transport), the following protocol has been developed as a guideline to decrease coral stress. It is recommended that two teams are utilized during the relocation process: one team responsible for removing corals and a second team mobilized and prepared for reattachment activities (reattachment to be completed same day). Corals should not be stored overnight in transport containers. The following protocol/guidelines should be followed during the removal process.

- Recommended Tools:
 - rubber gloves
 - putty knife
 - chipping hammer
 - other thin bladed tools with beveled edges
 - baskets or buckets
 - chisels with thin blades
 - underwater paper to record and track coral movements
- Clear all encrusting organisms from the edges of the corals.
- Prevent damage to the edges of corals.
- When possible, remove the coral colony in whole condition.
- When removal of the entire colony is not possible, a partial removal of the colony will be applied to maintain the phenotypic genetic composition of corals from the project site.
- Notes should be made regarding orientation of the coral in its natural setting to mimic that position at recipient site.
- Place corals upright in transport containers.
- Avoid touching coral tissue.

Once the specific reattachment locations within the recipient site have been identified, the following protocol/guidelines should be followed during the reattachment process:

- Similar species of corals should be clustered in close proximity in order to facilitate the monitoring program and for easier differentiation between transplanted corals and corals that currently exist at the recipient site.
- Prepare the reattachment surface with a wire brush, removing biota and any sediment exposing rock substrate. Attention should be made to avoid contacting existing corals with wire brush.
- Drive masonry nails into the substrate at the site where the cement will be placed. Larger corals will require additional nails.
- For reattachment, use Portland Type II cement with molding plaster added, as necessary, to accelerate hardening of cement.
- Place cement over the masonry nails.
- Place detached coral on cement.
- Permanent markers will be installed to assist with future identification requirements.
- Minimize exposure of coral skeleton by placing cement in voids or along dead coral edges.

Once all of the transplantation activities have been completed, a detailed effort should be undertaken to map the transplanted colonies. A map of all reattached corals will be developed and submitted as part of the baseline monitoring package. This map product must be geo-referenced using high accuracy GPS technology, show locations and depths of corals, and should be created immediately upon completion of the transplantation project, while coral transplants are still easily identifiable. A reference photograph of each relocated coral will be taken with a scaled reference item in the image, and all relocated corals will be identified by species. Transplanted corals will be identified using individually numbered identification tags containing a unique ID code. Geo-referencing may be accomplished either by 1) geo-referencing each individual coral location or 2) referencing a central marker or staked GPS position, relative to which all corals are mapped. Still photography will be used to document transplantation activities.

4.2 Seagrasses

The seagrass bed within the project area and vicinity was delineated during the October 2010 benthic survey. A seagrass bed is located south of the Fort, extending from just east of the rip-rap shoreline towards the inlet (Figure 8). This bed was present within the sandy substrate located south of the rubble/revetment areas found adjacent to the Fort. The bed was comprised of a multispecies assemblage including *Thalassia testudinum* (turtle grass), *Halodule beaudettei* (shoal grass), and *Halophila decipiens* (paddle grass).

The proposed installation of scour apron and the limited revetment will have no direct impacts on seagrasses. It is important to note that in Figure 8, which shows the seagrass quadrats and the edge of bed, one of the quadrats is located outside of the seagrass edge of bed. This graphic depiction presents a potential for direct impacts to occur to seagrass habitat. The location of the seagrass quadrat outside of the delineated bed is likely a result of the accuracy differences

between the Garmin handheld unit (Garmin GPSMAP 60Csx) used to map the quadrat locations and the increased accuracy of the Trimble Geo-XT handheld DGPS unit used to map the edge of the seagrass bed. To avoid and minimize impacts to seagrass beds, the USACE will ensure that the proposed revetment is not placed in seagrass habitat. For planning purposes and to develop the proposed mitigation plan, emphasis is being placed on the edge of bed line as the more accurate estimation of seagrass occurrence.

The exact construction methodologies that will be used for the project are currently under development. Thus, detailed information relating to temporary construction impacts on the delineated seagrass habitat is not available. The USACE has committed to continued coordination with regard to finalizing the construction methodology and the potential use of barges. The USACE has committed to install the revetment in-between the seagrass edge of bed and the wall of the Fort. On-site monitoring during construction and contractor oversight will be conducted to ensure there will be no permanent impacts to seagrasses from the proposed construction. Prior to construction, the contractor will submit a precise Seagrass Avoidance Plan. The seagrass avoidance plan may include such commitments as:

- Placement of surface buoys along the seagrass edge of bed with the intent of assisting the contractor during installation
- Conduct an updated seagrass edge of bed mapping effort
- Regrading of any depressions created from barge anchoring or spudding (with detailed regrading methodologies to be supplied by the contractor)
- Conduct seagrass surveys during construction to identify any issues that arise during the process
- Conduct post-construction survey to identify any impacts that occur during construction
- Establishment of a reference control site away from, but in close proximity to, the construction site, in order to compare and contrast changes in seagrass community structure in the project area

4.3 Water Quality

Sediment from uncontrolled water runoff from upland sources have a negative impact on corals by smothering coral colonies, as well as reducing light penetration (i.e. turbidity) required for coral growth. Heavy sedimentation reduces coral recruitment and calcification. Increased sedimentation is one of the many anthropogenic sources contributing to overall net loss of coral habitat throughout the Caribbean. In order to mitigate the impacts from turbidity and sedimentation, the following protocols will be adhered to prior to and during construction to avoid/minimize impacts to the surrounding coral and seagrass communities:

- In the vicinity of the upland construction staging area, sediment control devices or traps will be installed around the perimeter of all storm water drains. These methods are intended to reduce and eliminate direct discharge of sediments into the adjacent marine system. The sediment devices will be routinely changed to maintain functionality for the life of the project. All accumulated sediments will be properly removed and disposed of to avoid entry into the marine system.
- All revetment rock boulders will be washed off-site of any fine sediments prior to installation.

- Turbidity curtains will be deployed and properly maintained during construction. The contractor will commit to identifying the proper turbidity curtains for installation prior to construction, including the proper anchoring system. Both depth and wave energy should be considered in selecting the proper sediment entrapment system.
- Turbidity should be contained within the project area.
- If turbidity levels in excess of background conditions are identified, construction work should cease until a remedy can be implemented.
- Further coordination on the specific type and use of turbidity curtains will be conducted with the construction contractor. Prior to the commencement of construction, the contractor will submit for review and approval a detailed Water Quality Monitoring Plan. This plan will be based on specific site conditions and the USACE guidelines established in the Turbidity and Disposal Monitoring Specifications for this project. The Water Quality Monitoring Plan will also address the in-situ turbidity monitoring protocols to be implemented during construction that will establish sampling locations, frequency and remedies during construction if turbidity levels increase beyond agreed upon thresholds.

5.0 TRANSPLANTATION MONITORING

Monitoring of the transplanted corals over time is an essential component of the relocation effort, providing an assessment of the viability and success of the project. Monitoring should include underwater assessments of the transplanted corals conducted by experienced project biologists. To assess the success of the transplanted corals, a statistically significant number of reference control corals located in the vicinity of the transplanted colonies will be used for comparison. Data on the reference corals will be compared to the transplanted corals to detect differences in coral health and to track potential influential factors causing degradation to transplanted corals.

5.1 Transplantation Success Criteria

To determine an appropriate target for transplanted coral survivorship, peer-reviewed transplantation studies for coral transplantation projects (Kilbane et al., 2008; Thornton et. al, 2000) were reviewed. This review resulted in a suggested transplanted coral survivorship target of 80%.

5.2 Monitoring Plan

The transplanted corals will be monitored over time to assess the success of the transplanting effort. Once the corals have been relocated and attached at the recipient site, the locations of the transplanted colonies will be documented. Geo-referencing of the transplanted colony locations may be accomplished by either 1) mapping the location of each individual coral transplant using GPS or 2) mapping the location of each colony relative to a central marker/stake GPS position. In addition, each transplanted colony will be photographed for future reference using a scaled reference item within the image. For each coral transplant, the species, depth, and unique identification (ID) code for all relocated corals will be recorded.

A baseline (post-transplantation) monitoring report will be prepared that summarizes the transplantation effort and documents the baseline conditions for future monitoring events. The baseline report will include the following components:

- The total number of coral colonies transplanted
- An estimate of the area (cm²) of coral relocated
- A map of the location of each transplanted coral
- Information on each transplanted coral, including its coral ID code, depth of the transplant site, issues or concerns encountered during relocation/reattachment
- A photograph of each relocated coral colony. The height and angle of each photograph will be established. It is recommended that the photograph should be taken from directly above the center of the coral and at sufficient distance to capture the entire coral and utilizing as much of the field of view as possible. This may require the use of a close up/wide angle lens.

Subsequent monitoring events of the transplanted corals will occur at 6 months, 12 months, and 24 months post-transplantation. The transplanted corals will be revisited and assessed for the following information:

- Current condition of the structural attachment

- Growth/recession of coral tissue
- Qualitative description of coral health (e.g., notations regarding pigment loss/bleaching, disease, predation, bio-fouling by other organisms, growth of coral over the cement attachment, growth of tissue over substrate, re-growth of tissue over previous lesions).

If during the monitoring period it is determined that natural events such as, but not limited to, hurricanes, bleaching or elevated sea water surface temperatures could be occurring and affecting the transplanted coral colonies success, additional post-transplantation monitoring events could be performed. Recommendations from NMFS representative located in Puerto Rico, as well as the available information at the NOAA's Coral Reef Watch (CRW) Satellite Bleaching Alert (SBA) system (<http://coralreefwatch-satops.noaa.gov/SBA.html>) may be used to determine if additional monitoring will be required. However, the NMFS shall provide the USACE with written recommendations or an additional monitoring request in order for the USACE or the IPRC to authorize its monitoring contractor to proceed with any additional efforts. If it is determined that natural events impacts affected the transplanted colonies success, additional mitigation efforts will not be performed by either the USACE or the IPRC.

As part of the monitoring efforts a transect or quadrats will be established on the flat area seaward of the Fort where no work is proposed. These monitoring areas shall be located within the 2010 Benthic Resources Survey study limits and its final location will be agreed between the USACE and NMFS prior the post-transplantation monitoring. The information gathered will be used to determine if the conditions of the coral colonies present in this area have been impacted as a result of the construction project.

Following each monitoring effort, the information will be compiled and presented into reports summarizing the monitoring event. These reports will be provided to the NMFS and the PRDNER. In addition, if any significant natural changes or any impacts to the recipient site are observed during the monitoring efforts, NMFS and PRDNER staff will be immediately notified and changes will be recorded and documented. As a construction contractor has not been selected for the proposed project, the timing for project implementation and subsequent monitoring cannot be determined at this time. The proposed monitoring intervals (6, 12, and 24 months) will begin immediately once coral transplantation activities are complete.

5.3 Contingency Plan

The USACE is committed to accomplishing this mitigation plan that offsets the functions and values lost at the impact site. If the success criteria are not achieved within the specified time frame, a meeting will be arranged with NMFS, PRDNER, and ICPR staff to determine the necessary steps to achieve a successful mitigation project. If at the end of the monitoring period, the agencies and the project's local sponsor ICPR agree that the transplanted coral project is trending toward success, the USACE will continue monitoring until the success criteria are achieved. If the agencies determine that the mitigation is unlikely to achieve success, then the USACE in coordination with the resource agencies will propose alternate mitigation measures.

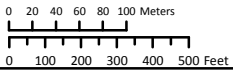
5.4 Educational Program

The USACE commits to collaborate and participate in meetings, conference calls and site visits, to discuss with representatives of the hotels in the vicinity of the Condado Lagoon (in particular the Caribe Hilton and Condado Plaza Hotels) the Fort San Geronimo Section 103 Project purpose, objectives and mitigation plan. In a joint effort with the NMFS, the USACE will provide the measures taken during the construction project to protect listed species that are likely to occur in the project area and the importance of the mitigation project. As part of the educational program, information could be provided to the hotels representatives on ways to improve their practices to protect listed species and their habitats.

LITERATURE CITED

- Aerostar Environmental Services, Inc. and PBS&J, an Atkins company. 2010. Marine benthic resource survey Fort San Geronimo San Juan, Puerto Rico. U.S. Army Corps of Engineers Jacksonville District, Jacksonville, FL. 26 pp.
- Kilbane, D., B. Graham, R. Mulcahy, A. Onder, and M. Pratt. 2008. Coral relocation for impact mitigation in Northern Qatar. Proceedings of the 11th International Coral Reef Symposium, Ft. Lauderdale, Florida. Pp. 1248-1252.
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- Thornton, S.L., R.E. Dodge, D.S. Gilliam, R. DeVictor, and P. Cooke. 2000. Success and growth of corals transplanted to cement armor mat tiles in southeast Florida: implications for reef restoration. Proceedings of the 9th International Coral Reef Symposium, Bali, Indonesia.
- U.S. Army Corps of Engineers. 2008. Environmental Assessment – Shore Protection Project Fort San Geronimo Del Boquerón San Juan, Puerto Rico. U.S. Army Corps of Engineers Jacksonville District, Planning Division, Environmental Branch, Jacksonville, FL. 149 pp.

Figures



Fort San Geronimo - Benthic Resource Survey



Fort San Geronimo
San Juan,
Puerto Rico

Project Location Map

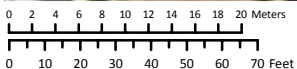


Prepared By: Ecological Sciences

Figure
1



an ATKINS company
Date: November 17, 2010



Fort San Geronimo - Benthic Resource Survey



Fort San Geronimo
San Juan,
Puerto Rico

Benthic Survey Area



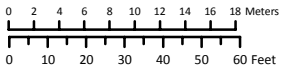
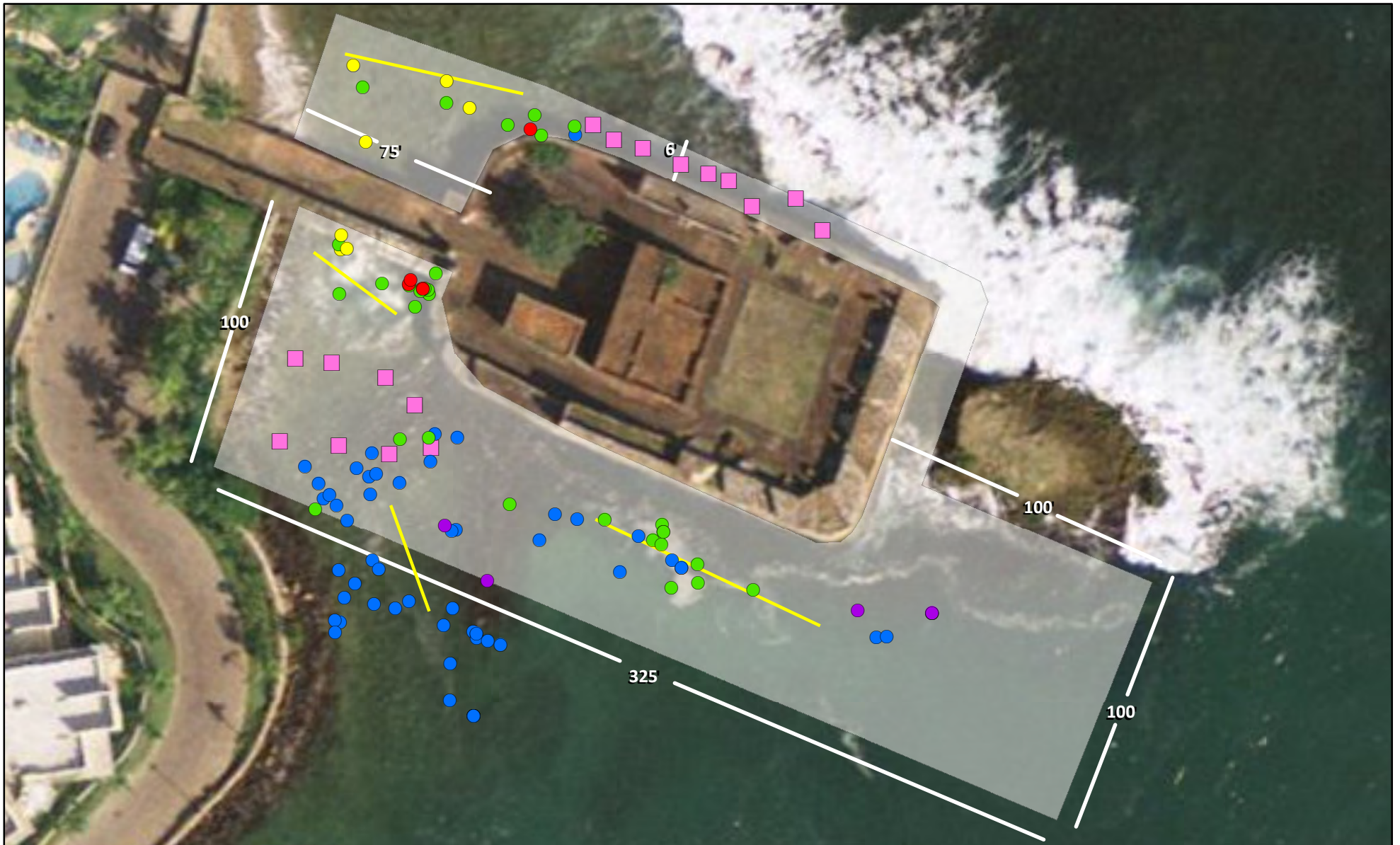
Approximate Survey Boundary



Survey area boundary is approximate.

Prepared By: Ecological Sciences

Figure
2



Fort San Geronimo - Benthic Resource Survey



Fort San Geronimo
San Juan,
Puerto Rico

Coral Community Assessment - Mapped Colonies, Quadrats, and Transects

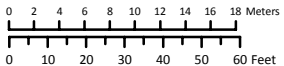
- | | | |
|------------------------------|-------------------------------|----------------------------|
| ● <i>Agaricia sp.</i> | ● <i>Gorgonia ventalina</i> | ■ Coral Quadrats Locations |
| ● <i>Diploria sp.</i> | ● <i>Porites sp.</i> | — Video Transects |
| ● <i>Siderastrea radians</i> | □ Approximate Survey Boundary | |



Survey area boundary is approximate.

Prepared By: Ecological Sciences

Figure 3





Fort San Geronimo - Benthic Resource Survey



Fort San Geronimo
San Juan,
Puerto Rico

Seagrass Community Assessment - Edge of SAV and Quadrats

-  Seagrass Extent
-  Seagrass Quadrat Locations

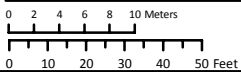
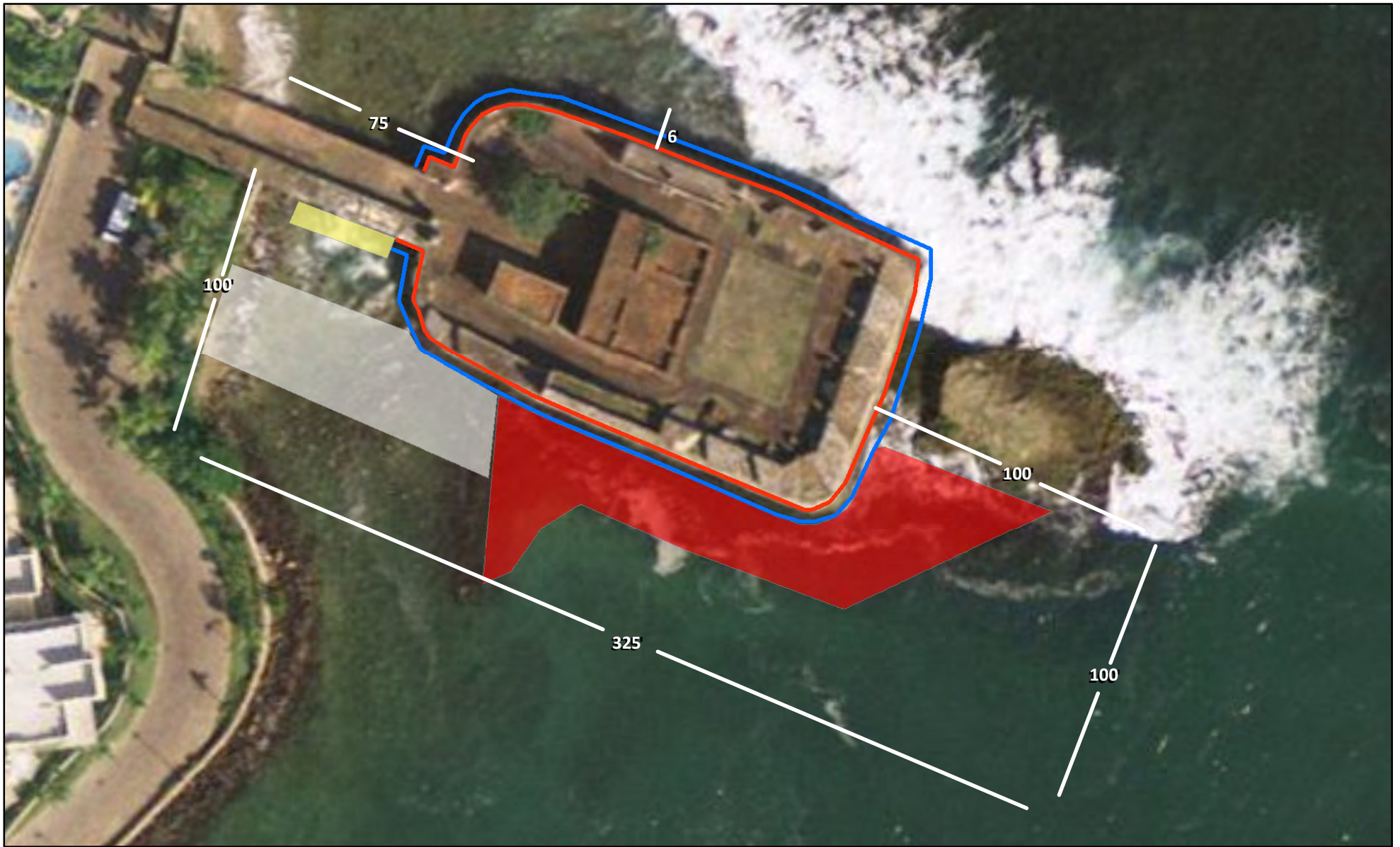
 Approximate Survey Boundary



Survey area boundary is approximate.

Prepared By: Ecological Sciences

Figure
4



Fort San Geronimo - Benthic Resource Survey



Fort San Geronimo
San Juan,
Puerto Rico

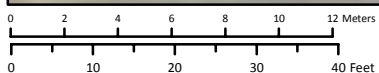
Project Construction Footprint

- Scour Fill
- Temporary Easement
- Limited Revetment
- 2' Concrete Apron
- 5' Form and Buffer



Prepared By: Ecological Sciences

Figure
5



Fort San Geronimo - Benthic Resource Survey



Fort San Geronimo
San Juan,
Puerto Rico

Coral Community Assessment - North of Fort

Mapped Coral Colonies

- *Agaricia sp.*
- *Diploria sp.*

- *Gorgonia ventalina*
- *Porites sp.*
- *Siderastrea radicans*

■ Coral Quadrats Locations

— Video Transects

Approximate Survey Boundary

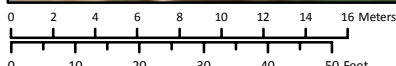
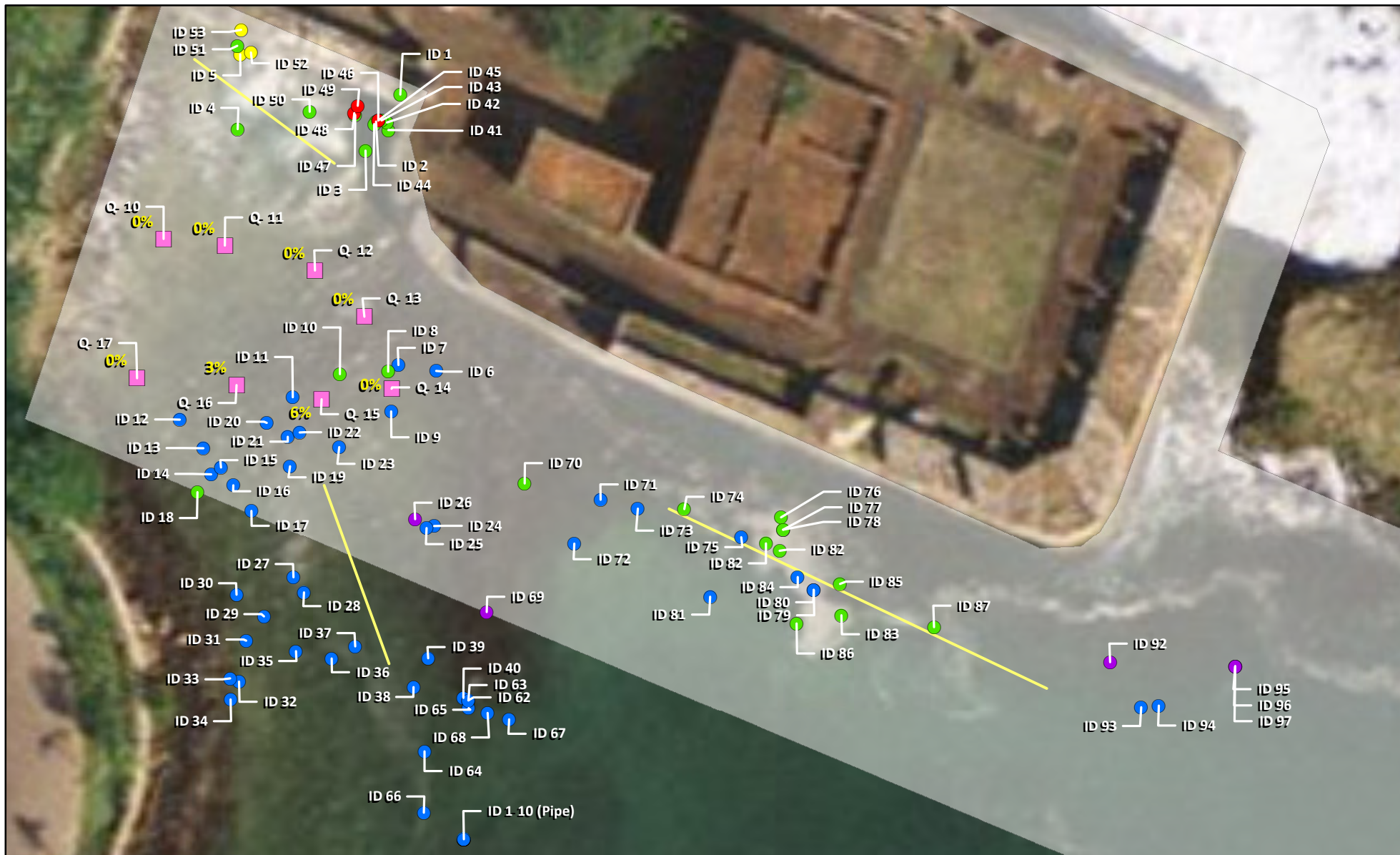


Figure 6

Total coral quadrat percent cover labeled in yellow.

Survey area boundary is approximate.

Prepared By: Ecological Sciences



Fort San Geronimo - Benthic Resource Survey



Fort San Geronimo
San Juan,
Puerto Rico

Coral Community Assessment - South of Fort

- Mapped Coral Colonies**
- *Agaricia sp.*
 - *Diploria sp.*
 - *Porites sp.*
 - *Siderastrea radians*
 - *Gorgonia ventalina*
 - Coral Quadrat Locations
 - Video Transects
 - Approximate Survey Boundary

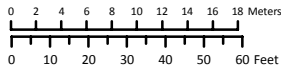


Total coral quadrat percent cover labeled in yellow.

Survey area boundary is approximate.

Prepared By: Ecological Sciences

Figure
7



Fort San Geronimo - Benthic Resource Survey



Fort San Geronimo
San Juan,
Puerto Rico

Seagrass Mapping: Quadrat Locations and Edge of SAV Bed

Seagrass Quadrat Locations

Braun-Blanquet Score

- 0=No cover
- 0.1= solitary short shoot

- 0.5= sparse or < 1% cover
- 3= 26%-50% cover
- 4= 51%-75% cover
- 5= 76%-100% cover

- Seagrass Extent
- Approximate Survey Boundary



Survey area boundary is approximate.

Prepared By: Ecological Sciences

Figure
8

Appendix A

Agency Communications

**Agency Communications
2010 – 2011
Draft Mitigation Plan**



REPLY TO
ATTENTION OF

Planning Division
Environmental Branch

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P.O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

DEC 20 2010


To The Addressees on the Enclosed List:

This letter is being sent in reference to the Fort San Geronimo Section 103 (storm damage reduction) Project. The U.S. Army Corps of Engineers (USACE) and the non-Federal sponsor, the Institute of Puerto Rican Culture (IPRC), propose to implement structural alternatives to protect the Fort's foundation from continued degradation due to wave-induced erosion. A draft Environmental Assessment (EA) that evaluates the proposed implementation of structural alternatives was circulated to Federal and Commonwealth of Puerto Rico agencies as well as to interested members of the public on July 2007. On the basis of evaluations presented and agency responses, a final EA was prepared and the District Engineer signed a Finding of No Significant Impact on September 22, 2008.

During the proposed project coordination, the USACE committed to mitigate for adverse effects to coral communities by, prior to commencement of construction activities, performing a detailed benthic survey and implementing a coral transplant and monitoring plan. In order to determine the presence, location, species composition, and density of marine resources around the vicinity of the Fort, a detailed marine benthic survey was conducted from October 25 to 27, 2010. Using the marine benthic survey data, a draft Mitigation Plan has been developed to avoid and minimize impacts to corals and seagrass habitat found on and around the Fort. It should be noted that none of the coral species found within the project area are listed or proposed to be listed as threatened or endangered under the Endangered Species Act. The Mitigation Plan includes the proposed coral colonies removal and attachment methodologies as well as the preferred recipient site.

Enclosed you will find the draft Mitigation Plan for the subject project. We would appreciate your comments no later than 30 days from the date of this letter. If you have any questions or need additional information, please contact Mr. Ivan Acosta, Chief of the Special Projects Section at (904) 232-1693 or by e-mail at Ivan.Acosta@usace.army.mil or contact Mr. Wilberto Cubero, Environmental Scientist at (904) 232-2050 or by e-mail at Wilberto.Cubero-delToro@usace.army.mil.

Sincerely,


Eric P. Summa
Chief, Environmental Branch

Enclosures

- 1) Mailing List
- 2) Draft Mitigation Plan
- 3) Final Environmental Baseline Survey Report

FORT SAN GERONIMO SECTION 103
STORM DAMAGE REDUCTION PROJECT
Draft Mitigation Plan
Mailing List

Ms. Mercedes Gómez Marrero
Executive Director
Institute of Puerto Rican Culture
Antiguo Asilo de Beneficencia
Frente al Cuartel de Ballajá
Viejo San Juan, Puerto Rico 00902

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Field Supervisor
Caribbean Field Office
U.S. Fish and Wildlife Service
Carr. 301, Km. 5.1, Bo. Corozo
Boquerón, Puerto Rico 00662

Dr. Lisamarie Carrubba
Endangered Species Branch
National Marine Fisheries Service
Boquerón Field Office
Carr. 301, Km. 5.1, Bo. Corozo
Boquerón, Puerto Rico 00662

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Assistant Regional Administrator
Habitat Conservation Division
National Marine Fisheries Service
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St. Petersburg, Florida 33701

Mr. David M. Bernhart
Assistant Regional Administrator
Protected Resources
National Marine Fisheries Service
Southeast Regional Office
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Secretary
Department of Natural & Environmental
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San Juan, Puerto Rico 00926

Ms. Aida Rosario
PR Coral Reef Task Force
Department of Natural & Environmental
Resources
1375 Ave. Ponce de Leon
San Juan, Puerto Rico 00926

Hon. Pedro Nieves Miranda
President
Environmental Quality Board
1375 Ave. Ponce de Leon
San Juan, Puerto Rico 00926

Carlos A. Rubio Cancela, Architect
State Historic Preservation Officer
Calle Norzagaray Final
Cuartel de Ballajá 3er Piso
San Juan, Puerto Rico 00906

Mr. Javier Laureano
Executive Director
San Juan Bay Estuary Program
Ponce de León 1225
Edificio VIG Tower, Oficina 902
San Juan, Puerto Rico 00908

Mr. Carl Soderberg
Director
Caribbean Environmental Protection
Division
Environmental Protection Agency
Centro Europa Building, Suite 417
1492 Ponce de Leon Avenue
San Juan, Puerto Rico 00907-4127

From: lisamarie_carrubba
To: Cubero-Deltoro, Wilberto SAJ
Cc: Acosta, Ivan SAJ; [Felix Lopez@fws.gov](mailto:Felix_Lopez@fws.gov); Jose A Rivera; [Jocelyn Karazsia](mailto:Jocelyn_Karazsia)
Subject: Draft Mitigation Plan, Fort San Geronimo, San Juan
Date: Friday, January 14, 2011 3:36:41 PM

Saludos, Wilberto (y feliz año nuevo!)

The National Marine Fisheries Service (NMFS) Protected Resources Division (PRD) has reviewed the draft mitigation plan prepared for the U.S. Army Corps of Engineers (COE) for the implementation of structural alternatives to protect the foundation of the San Geronimo Fort from continued degradation due to wave-induced erosion. The draft mitigation plan accompanied your letter dated December 20, 2010. The alternative selected for the stabilization of the base of the fort was chosen in consultation with NMFS and a Section 7 consultation with PRD was conducted by the COE pursuant to the requirements of the Endangered Species Act (ESA). As part of the coordination between NMFS and the COE, NMFS provided comments on the benthic survey protocol and met with the COE and contractors during the survey.

Based on our review of the mitigation plan, NMFS PRD has the following comments:

1. listed sea turtles, in particular green and hawksbill, are known to occur in the project area and utilize the seagrass beds and colonized hard grounds in the area as refuge and foraging habitat. Hawksbill sea turtles are also known to use the sand beach adjacent to the Condado Plaza Hotel as nesting habitat. Therefore, the mitigation plan should clarify that some of the areas that may be affected by the proposed stabilization of the fort provide habitat for listed sea turtles. In addition, the plan needs to clarify whether, as part of transplant activities, motorized vessels will be used. If so, then the plan needs to include the sea turtle avoidance measures that are part of NMFS guidelines (and that should also be included as part of the COE plan for construction vessels as well).
2. should have permanent markers at transplant locations in addition to mapping the location of transplanted colonies so that these colonies can be easily identified for future monitoring. In addition, the plan should specify that photos will be taken at the same height, angle, etc. relative to the colonies to be sure photos are comparable over time.
3. if seagrass is present in project footprint based on the most recent investigation, then impacts to seagrass may also require mitigation. Anchor points for construction vessels and platforms, as well as turbidity barriers if used, should be located outside the seagrass beds as much as possible. The mitigation plan states that regrading of anchor points would be done. NMFS recommends that, in addition to regrading, monitoring of seagrass beds in the project area be completed as part of this mitigation plan. The monitoring should determine whether and the extent of impacts to seagrass as a result of the proposed project, monitor whether beds recover naturally over time, and, if not, contain contingency measures, such as the transplant of plugs to impacted areas.
4. the plan should specify whether the corals that are on stones and boulders that are small enough to be moved will also be cemented in

place at the transplant site to ensure the stones do not roll around during storms and to provide a fixed location for future monitoring of the transplanted colony.

5. the use of turbidity barriers needs to be evaluated due to the sea conditions in the area to determine whether sea conditions will permit the installation and maintenance of turbidity curtains or whether their use in this area would actually result in more impacts to habitat due to breakage, anchor pull-outs, dragging, etc.

6. the plan states that, if turbidity levels in excess of background conditions are identified, work should cease until a remedy can be implemented. However, the background turbidity levels were not provided; the length of time levels could be elevated prior to work stoppage was not evaluated; the length of time work would be stopped was not specified; and the potential remedies were not specified.

7. in addition to the two-year monitoring plan and the caveat that monitoring will be extended should the success criteria not be met within the proposed monitoring period, NMFS recommends that targeted monitoring should also occur following events such as hurricanes, bleaching or extended periods of elevated sea surface temperatures, etc. Targeted monitoring should take place within a period of several months to assess the impact of significant events on transplanted colonies. Without this monitoring, when the investigators come back in six months or a year and the colonies are dead, it will be much more difficult to determine whether mortality was due to the large event. For the same reason, NMFS recommends that the monitoring of control colonies that are already located at the transplant site be incorporated in the plan in order to compare the health of transplanted colonies to these colonies.

8. the coral health assessment should include predation in addition to biofouling.

9. Monitoring should include area around fort where corals are present and construction won't take place to determine whether project results in additional impacts to these colonies and propose contingency measures if this is the case.

10. Because not all coral colonies to be impacted can be transplanted, should consider some additional out-of-kind mitigation addressing listed species and their habitat that occur in the project area. Possibilities include: 1) working with the Caribe Hilton and Condado Plaza Hotel to convert outside lights to turtle friendly lights; 2) working with these hotels to eliminate their practice of mechanically clearing the beaches with heavy equipment during sea turtle nesting season; 3) promoting an educational campaign in these hotels about listed species and their habitats in the area of the lagoon and practices tourists can follow to protect these animals and habitats.

In addition to these comments, based on our meeting at the site on October 27, 2010, NMFS has concerns regarding the sea conditions and the ability of the COE to work around various points of the fort to place the scour apron, including along the seaward face where the waves break, around the bridge where the currents move through the area very fast, and along the western face where waves break and currents flow quickly. NMFS recommends that the COE study whether the proposed access point is adequate, how the work on the seaward face of the fort will be accomplished in terms of moving equipment and materials, and whether the floating platform that is proposed as the work surface will withstand

the sea conditions in the area.

Thank you for the opportunity to provide comments on the draft mitigation plan. Please let me know if you have any questions regarding these comments.

Lee

Dr. Lisamarie Carrubba
NOAA Fisheries
Caribbean Field Office
P.O. Box 1310
Boqueron, PR 00622
787-851-3700
787-851-5588 (fax)



United States Department of the Interior



FISH AND WILDLIFE SERVICE

Boqueron Field Office
Carr. 301, KM 5.1, Bo. Corozo
P.O. Box 491
Boqueron, PR 00622

JAN 18 2011

Mr. Eric P. Summa
Chief, Environmental Branch
US Army Corps of Engineers
Jacksonville District
PO Box 4970
Jacksonville, Florida 32232-0019

Re: Fort San Geronimo, San Juan, Puerto Rico

Dear Mr. Summa:

This is in reply to your December 20, 2010, letter requesting our comments for the proposed mitigation plan for the Fort San Geronimo Project. Our comments are issued as technical assistance in accordance with the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.) and the Endangered Species Act (16 U.S.C. 1531 et seq. as amended). We have assigned FWS number 72127-017 to this action; please refer to it in future correspondence.

The Corps has selected a concrete apron with limited revetment alternative to protect this historic structure from wave erosion. The project will impact coral species that have colonized the structure, exiting rip-rap and rock substrate around the fort. The current mitigation plan calls for the relocation of selected coral colonies and coral encrusted rocks to a nearby site at the mouth of Condado Lagoon. Based on the information provided, we have the following comments and recommendations:

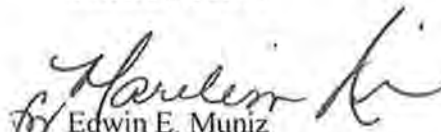
- 1) While the mitigation plan currently mentions that some rocks with attached corals will be moved to the mitigation site, it also states that some larger rocks will not. Unless there is some structural reason for not relocating a certain rock, size of the rocks should not be a limiting factor. Larger rocks may be more stable in the relocations site. Lift bags, other flotation devices, or even small cranes on a barge can be used to maneuver the rocks into a new location.
- 2) The relocation site may be more exposed to wave action than the current Fort San Geronimo site. There is no mention of the need or methods to stabilize the transplanted rocks. The relocation of individual corals does not specify where

they will be reattached; it is not clear if existing substrate in the relocation area will be used or if relocated rocks will provide the substrate.

- 3) Impacts to seagrass beds by the proposed access road and apron construction may not be avoidable or temporary as stated in the Draft Mitigation Plan. While the mitigation plan focuses on the project's impacts to corals, possible impacts to adjacent seagrass beds is being left for a later date. According to the enclosed Mitigation Plan, the contractor will develop a Seagrass Avoidance Plan. We believe the Corps should develop seagrass protection measures and a seagrass relocation plan in the event of unavoidable impacts to seagrass beds. This would avoid any confusion by the contractor at a later date.

Thank you for the opportunity to comment on this action, if you have any questions please contact Felix Lopez of my staff at 787 851-7297 x 210.

Sincerely yours,


Edwin E. Muniz
Field Supervisor

fhl
cc:
COE, Planning, San Juan
DNER, San Juan
EPA, New York
EPA, San Juan
NMFS, Boqueron

Agency Communications
2007 – 2008
Draft Environmental Assessment



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

Southeast Regional Office
263 13th Avenue South
St. Petersburg, FL 33701-5505
(727) 824-5312, FAX (727) 824-5309
<http://sero.nmfs.noaa.gov>

SEP 10 2008

F/SER31:LC

Rebecca S. Griffith, Ph. D.
Chief, Planning Division
Jacksonville District Corps of Engineers
Department of the Army
P.O. Box 4970
Jacksonville, FL 32232-0019

Re: Fort San Geronimo Shoreline Protection Project

Dear Dr. Griffith:

This responds to your July 7, 2008, letter regarding the shoreline protection project for Fort San Geronimo proposed by the U.S. Army Corps of Engineers (COE) and the local project sponsor, the Institute of Puerto Rican Culture. The project is located on cemented sand dunes at the inlet to Condado Lagoon, San Juan, Puerto Rico. By letter dated July 10, 2007, COE requested comments from the National Marine Fisheries Service (NMFS) regarding the Draft Environmental Assessment (EA) prepared for the project. COE also initiated section 7 consultation with NMFS pursuant to the requirements of the Endangered Species Act (ESA) through the EA. NMFS provided a response by letter dated September 14, 2007, indicating that we could not concur with the COE's effects determinations and requested more information. NMFS also recommended Alternative 3 as the preferred alternative as it provides a reasonable compromise between minimizing impacts to marine resources and providing a high level of protection to the portions of the fort most affected by wave-induced erosion. Your July 7, 2008, letter concludes that COE has addressed NMFS' concerns to the extent practicable during this stage of project design, including the selection of Alternative 3 as the preferred alternative, and again requests NMFS' concurrence with your determinations that the project may affect but is not likely to adversely affect listed sea turtle and coral species. Based on our review of the information in your letter, in addition to the adoption of Alternative 3 as the preferred alternative, COE has addressed NMFS' concerns related to access to the construction area, location of staging areas, use of control measures to control erosion and prevent sediment transport to waters of Condado Lagoon, impacts to hawksbill turtle foraging habitat, and the use of barges during construction.



Proposed Action

The COE will construct a temporary access to the fort construction site, in an area devoid of seagrass beds and with minimal coral colonization, that will be removed once construction of the shore protection revetment apron around portions of the fort is complete. This access will be installed and removed while surrounded by silt curtains to minimize turbidity caused by suspension of sediments and subsequent transport of resuspended sediments to other areas of the lagoon and inlet. Rocks used to construct the temporary access will be washed prior to being placed in waters of the Condado Lagoon to further reduce the potential for sediments to be introduced to waters of the lagoon. COE will locate the main staging area on uplands adjacent to the fort. Should a staging area be required closer to the construction area, COE will construct a temporary staging area on a concrete slab that was once a boat house adjacent to the fort in an area devoid of seagrass beds, corals, and other sessile benthic organisms that might serve as foraging habitat for green and hawksbill sea turtles. As for the construction of the temporary access to the fort, the staging area would be installed and removed while surrounded by silt curtains, and rocks used as fill to construct the temporary staging area would be washed prior to placement in waters of the lagoon. COE is evaluating the use of sectional barges should construction of the revetment prove impossible from the existing apron around the fort. The information provided indicates that the use of sectional barges would reduce the footprint of temporary fill needed to provide access to the construction area and for staging. The sectional barges have a minimal draft and would be transported on land then assembled on site eliminating the need for a vessel to navigate into the lagoon. The revetment apron to be constructed as part of Alternative 3 will be constructed in areas with no seagrass colonization and minimal coral and other sessile benthic organism colonization. Once the final project design and specifications are complete, COE will conduct a detailed benthic study of the construction and temporary access areas and develop a transplant plan in coordination with NMFS for any corals located within the construction footprint. COE will also coordinate construction scheduling with NMFS to ensure that impacts to nesting sea turtles and hatchlings are minimized.

Species and Proposed Critical Habitat Present

Listed species under the purview of NMFS that occur in the project area include: hawksbill sea turtle (*Eretmochelys imbricata*), leatherback sea turtle (*Dermochelys coriacea*), green sea turtle (*Chelonia mydas*), elkhorn coral (*Acropora palmata*), and staghorn coral (*A. cervicornis*). Hawksbill sea turtles nest on the beach at the mouth of Condado Lagoon to the south of the inlet. Hawksbill sea turtles are known to use the colonized hardgrounds in the project area as refuge and foraging habitat. Green sea turtles are known to use the seagrass beds in the project area as foraging habitat and leatherbacks are known to transit in waters outside the inlet toward nesting beaches in Isla Verde. Benthic surveys conducted as part of cable laying projects in the area, as well as information on benthic habitat impacted by the 1994 grounding of the barge Morris J. Berman in front of Escambron Beach to the northwest, have documented the presence of acroporid corals in nearshore waters near the lagoon inlet.

Critical habitat designation has been proposed for listed coral species. The primary constituent element (PCE) of critical habitat for elkhorn and staghorn corals is substrate of suitable quality and availability in water depths from the mean high water line to 30 m to support successful larval settlement, recruitment, and reattachment of fragments. Substrate of suitable quality and

availability means consolidated hardbottom or dead coral skeletons free from fleshy macroalgae and sediment cover. While the project area falls within the area proposed for designation of critical habitat for listed coral species, benthic habitat on rocks around the fort and in the inlet to the lagoon is dominated by encrusting coral species and fleshy macroalgae and many areas contain a layer of sediment, based on information in the Coordination Act Report prepared by the U.S. Fish and Wildlife Service. Other areas are characterized by sandy bottom with seagrass beds and numerous blowouts from storm surges. Therefore, NMFS has determined that the project area does not contain the PCE for listed coral species' designated critical habitat.

Effects Analysis

NMFS concurs with the COE's determination that the proposed action may affect but is not likely to adversely affect hawksbill and green sea turtles. Hawksbill and green sea turtles could be directly affected by the construction of the shoreline protection if they were to be struck by rocks or other construction materials during installation of the temporary access and staging area or during deployment of the sectional barge. However, we believe these effects will be insignificant because sea turtles are highly mobile and will likely temporarily move out of the project area during construction due to increases in ambient noise levels resulting from construction activities. Similarly, some hawksbill sea turtle foraging habitat may be lost as part of the construction of the revetment apron as some areas of colonized rocks will be covered with cement. However, we believe this impact will be negligible as colonization by sessile benthic organisms such as sponges within the construction area is minimal, based on the information in the Coordination Act Report prepared by the U.S. Fish and Wildlife Service. In addition, COE will develop the final construction schedule and transplant plan for sessile benthic organisms within the construction footprint in coordination with NMFS.

NMFS believes the project will have no effect on leatherback sea turtles. No construction will occur in the immediate area of the inlet or outside the lagoon and a sectional barge will be used in the construction area, which will not require vessel transit in nearshore or offshore waters outside the lagoon where leatherbacks transit en route to nesting beaches in Isla Verde. Leatherback sea turtles have never been reported nesting on the beach inside the inlet of the lagoon; and the size and form of the beach would not provide adequate nesting habitat for leatherbacks, which require large expanses of sand.

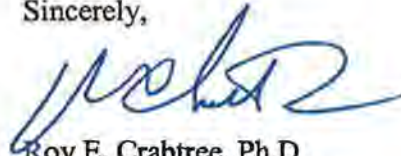
NMFS believes the project will have no effect on listed coral species. Neither elkhorn nor staghorn corals have ever been documented within the lagoon or the inlet. No construction will occur outside the inlet, no vessel transits to the lagoon will be required as part of the project, and silt curtains will be placed around construction areas, including the temporary access and staging area, during project construction to minimize the potential for sediment transport to waters outside the immediate construction area.

This concludes the COE's consultation responsibilities under Section 7 of the ESA for the proposed shoreline protection project. Be advised that a new consultation must be initiated if a take occurs or new information reveals effects of the action not previously considered, or the identified action is subsequently modified in a manner that causes an effect to listed species or critical habitat in a manner or to an extent not previously considered, or if a new species is listed

or critical habitat designated that may be affected by the identified action. Although the proposed action is not likely to affect hawksbill and green sea turtles as currently envisioned, NMFS reminds the COE of its commitment to coordinate with us once the project enters the design and specifications phase, including for the development of the construction schedule and sessile benthic invertebrate transplant plan. 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 future ESA consultations.

Thank you for your efforts to ensure the conservation of protected species and their habitat. If you have any questions regarding our position on the proposed project or the Section 7 consultation process, please contact Dr. Lisamarie Carrubba at (787) 851-3700, or by e-mail at lisamarie.carrubba@noaa.gov.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Roy E. Crabtree', is written over the typed name.

Roy E. Crabtree, Ph.D.
Regional Administrator

Enclosure

File: 1514-22.F.1.PR
Ref: I/SER/2008/04401



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Boqueron Field Office
P.O. Box 491
Boqueron, Puerto Rico 00622



August 9, 2007

Mr. Stuart J. Appelbaum
Chief, Planning Division
Jacksonville District Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

Attn: Mr. Nelson R. Colón
Planning Division
Environmental Branch

Re: Fort San Gerónimo Shore
Protection Project, EA

Dear Mr. Appelbaum:

We are hereby providing comments on the Draft Environmental Assessment (EA) prepared for the Fort San Gerónimo del Boquerón Shore Protection Project, in San Juan, Puerto Rico. Our comments are provided pursuant to the Fish and Wildlife Coordination Act (47 Stat. 401, as amended; 16 U.S.C. 661 *et seq.*) and the Endangered Species Act (Act) (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*).

The EA includes four primary structural alternatives, developed by the Corps, to protect Fort San Gerónimo from continued degradation due to wave-induced erosion. These alternatives, 1 to 5, range from least impacts (1) to most impacts to natural resources (5). Alternative 5 is a combination of alternatives 1, 2, and 4 and maximizes the level of protection to the fort's structure. After reviewing the EA and based on Service biologists observations conducted during the preparation of the Coordination Act Report (June 2005) included in the EA, we recommend Alternative 3 as the preferred alternative.

Alternative 1 proposes the construction of a concrete scour apron around the perimeter of the fort to isolate the foundation from direct contact with seawater. Although this alternative is the less impacting to natural resources, we believe that additional protection to the fort's southern area is needed. Alternative 3 proposes the construction of a concrete apron around the perimeter of the fort and the placement of rubble revetment limited to the areas along the south wall which has experienced undercutting, and would be more vulnerable to future damages. According to the alternative description, the revetment would lie entirely on the natural rock shelf that supports the fort and no filter cloth or foundation layers will be required. To construct the apron and revetment, a

Mr. Appelbaum

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temporary access would be built from the shore to access the southwestern corner of the fort's foundation. Observations made during our site visits indicate that concrete remains of a previously existing structure built adjacent to the fort still lie submerged by the area in which the access is being proposed. We recommend the Corps that, to minimize impacts on benthic communities, align the proposed access maximizing the use of the area already impacted by concrete rubble.

It was noticed by a Service biologist that areas of the emergent rock ridge to the northeast of the fort has been also affected by continued wave action. In addition, the base of the bridge to the south of the fort has been undermined by the wave action (see photos 22 and 23, Appendix 1) of the CAR. We recommend the Corps consider depositing additional revetment in these areas provided that these works could be performed from the barge or the temporary access proposed for the construction of Alternative 3 and no additional access would be needed.

The EA mentions various measures indicating that several provisions have been taken to minimize project impacts on natural resources. In addition to the selection of Alternative 3 as the preferred alternative, the Corps is proposing to limit the footprint of the scour apron and revetment to the natural rock shelf that supports the fort and no filter cloth or foundation layers will be constructed. The access ramp is proposed to be built from the closest point of the existing access road to the fort's southeast corner and will be removed after project completion, among others. However, the document does not specify impact minimization measures that would be implemented during the project's construction phase to minimize impacts by turbidity on adjacent seagrass beds and marine communities. Silt barriers and turbidity curtains should be installed and adequately maintained during project's construction to minimize such impacts. Any proposed coral transplant and relocation of invertebrates should be also coordinated with the National Marine Fishery Service.

Finally, we recommend that Alternative 5 be discarded. Although the combination of the scour apron with full revetment and breakwater would provide the highest level of protection to the structure, it would be the most impacting to benthic marine communities. This alternative would directly and indirectly impact the very shallow lagoon that lies between the north fort wall, beach rock, and seaward colonized hardgrounds, which harbor colonies of various coral species and a diverse variety of marine organisms mentioned in the CAR. As stated in the EA, the natural outcrop provides protection by reducing wave speed and force, and allows sufficient overwash and circulation to maintain diversity in the lagoon, reducing the need for breakwater construction.

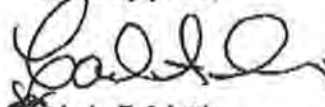
Mr. Appelbaum

3

Regarding possible effects on federally-listed threatened and endangered species, Fort San Gerónimo lies within the range of the green sea turtle (*Chelonia mydas*-threatened), hawksbill sea turtle (*Eretmochelys imbricata*-endangered), leatherback sea turtle (*Dermochelys coriacea*-endangered), Antillean manatee (*Trichechus manatus manatus*) and the brown pelican (*Pelecanus occidentalis*- endangered). After reviewing the proposed alternative we have found that this project, as currently proposed, is not likely to adversely affect these species and/or their habitat. Nevertheless, if the project is modified or if information on impacts on endangered species becomes available, this office should be contacted concerning the need for the initiation of consultation under Section 7 of the Act.

Thank you for the opportunity to comment on this project. If you have any question regarding the comments above, please contact Ana Román from our staff at (787) 851-7297, extension 222.

Sincerely yours,



Edwin E. Muñoz
Field Supervisor
Caribbean Field Office

amr

cc:

DNER, San Juan
COE, Planning, San Juan
PRPB, CZM, San Juan
SJBE, San Juan



DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P.O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

REPLY TO
ATTENTION OF

Planning Division
Environmental Branch

JUL 07 2008

Mr. Edwin Muñiz, Field Supervisor
Caribbean Field Office
U.S. Fish and Wildlife Service
Post Office Box 491
Boquerón, Puerto Rico 00622

Dear Mr. Muñiz:

This is in reference to your comments on the Draft Environmental Assessment (EA) for the Fort San Geronimo Shore Protection Project in San Juan, Puerto Rico as proposed by the U.S. Army Corps of Engineers (Corps), Jacksonville District, and the local sponsor, the Institute of Puerto Rican Culture (IPRC). As stated in your letter dated August 9, 2007, your comments were provided pursuant to the Fish and Wildlife Coordination Act and the Endangered Species Act.

In reference to your comment regarding measures to minimize impacts by turbidity on adjacent seagrass beds and other marine communities, the proposed project shall implement the best management practices to minimize turbidity impacts to the extent possible including, but not limited to, installation of silt curtains and washing of rock prior to discharging into waters of the United States. In addition, the conditions of the water quality certificate as issued by the Puerto Rico Environmental Quality Board specify allowable turbidity levels during construction. These conditions will be included in the project's construction specifications.


Regarding coral and invertebrates transplant, upon completion of benthic survey on the site a coral (and other sessile invertebrates) transplant plan will be coordinated with the National Marine Fisheries Service.

Following your recommendation, the Corps has decided to discard the breakwater and scour apron with full revetment alternative (Alternative 5). The rationale for elimination of this alternative is based on the fact that the breakwater would entail the largest impact footprint upon the seafloor (approximately 12,600 sq. ft.), in the area with the highest density and diversity of marine biota in the waters surrounding the fort. As stated in the EA, the natural beach rock (eolianite) outcrop provides effective protection to the fort's north wall by reducing wave speed and force, at the same time allowing sufficient circulation to maintain the sessile organism diversity in the shallow lagoon thus reducing the need for breakwater construction. Therefore we concur with your recommendation that the environmental impacts of this alternative outweigh the protection benefits it would provide.

Regarding possible effects on federally-listed threatened or endangered species, in your letter you indicate that the project, as currently proposed, is not likely to adversely affect the brown pelican and sea turtle species or their habitat. Should the Corps need to modify the project, such modifications will be coordinated with your office pursuant to compliance with Section 7 of the Endangered Species Act.

Thank you for your comments and we look forward to continued cooperation with your office for the successful completion of the Fort San Geronimo project. If you have any questions or need additional information please contact Mr. Nelson Colón from our staff at 904-232-2442 or by e-mail at Nelson.R.Colon@usace.army.mil.

Sincerely,


Rebecca S. Griffith, Ph.D, PMP
Chief, Planning Division



August 17, 2007

Mr. Nelson R. Colón
Planning Division, Environmental Branch
Jacksonville District Corps of Engineers
P.O. Box 4970
Jacksonville, FL 32232-0019

**SHPO 05-07-07-03 DRAFT ENVIRONMENTAL ASSESSMENT FOR
SHORE PROTECTION PROJECT, FORT SAN GERONIMO DEL
BOQUERON, SAN JUAN, PUERTO RICO**

Dear mister Colón:

We have reviewed the draft Environmental Assessment prepared for the Fort San Gerónimo del Boquerón Shore Protection Project. At this moment we cannot agree with your finding of effect based on the limited information currently available to us. In order for our staff to adequately review the proposed alternatives and their possible immediate and longer term effects on this historic site we will need additional information.

It is our understanding that a "Feasibility Phase Study" referenced in an agreement (dated March 25, 2005) between the Department of the Army and the Institute of Puerto Rican Culture is underway or concluded and that a "Detailed Project Report" on the erosion problems surrounding the fort is to be prepared. What is the status of these actions?

In addition, as stated in your letter, the Institute of Puerto Rican Culture will rehabilitate the Fort's interior and structure above the water line after completion of the federal project. This rehabilitation is a reasonably foreseeable effect that is caused by the undertaking that is to occur in the near future as a direct result of the federal action under consideration. As such, we request a copy of the rehabilitation plans for the above-waterline portion of the fort in order to assess if they meet federal standards for rehabilitation.

Also, San Gerónimo and its surroundings have witnessed several historic battles. Therefore, any work within the surrounding waters needs to consider the possibility of affecting remnants of these engagements. An underwater archaeological survey of the areas that may be affected by the underwater improvements under consideration should be carried out.

Furthermore, we have the following specific observations:

Chapter 1, Section 1.3 PROJECT NEED OR OPPORTUNITY

The first sentence of this section reads as follows: *Fort San Gerónimo was built in the second part of the 16th century, at which point it became the principal component of the section of San Juan.* It is unclear what the second part of this sentence means.

Chapter 2 ALTERNATIVES

We request additional information on the four primary structural alternatives under consideration.

Chapter 3, Section 3.14 HISTORIC PROPERTIES

In addition to being listed individually in the National Register of Historic Places (NRHP) in 1983, San Gerónimo was also listed in the NRHP in 1997 as part of the *Linea Avanzada* or Advanced Defense Line discontinuous historic district.

Chapter 4 ENVIRONMENTAL EFFECTS

Sections 4.1 GENERAL ENVIRONMENTAL EFFECTS and 4.7 HISTORIC PROPERTIES

Based on the limited amount of information currently available to us, we do not believe that the potential effects of the shore protection project on historic properties can be adequately foreseen at this time.

Section 4.20.4 COMPLIANCE WITH THE NATIONAL HISTORIC PRESERVATION ACT

As part of the ongoing consultation pursuant to Section 106 of the National Historic Preservation Act and its implementing regulation, we look forward to receiving the information requested in our letter of June 6, 2007 (copy enclosed).

Nelson R. Colón
August 17, 2007
Page 3

If you have any questions concerning our comments, please contact Miguel Bonini at 787-721-3737 or mbonini@prshpo.gobierno.pr or me personally at abrivera@prshpo.gobierno.pr.

Sincerely,

A handwritten signature in black ink, appearing to be 'Aida Belén Rivera Ruiz', written over a circular stamp or mark.

Aida Belén Rivera Ruiz
State Historic Preservation Officer

ABR/KG/MB

Note: On page 3 of the Historic Significance attachment, the photograph shown is actually that of fort San Antonio, located a few hundred meters to the south of San Gerónimo.

Enclosure

- C. Ms. Marta T. Beltrán, Esq., La Fortaleza
- Ms. Ana Carrión, La Fortaleza
- Ms. Yomarie García, La Fortaleza



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P.O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

Planning Division
Environmental Branch

Ms. Aida Belén Rivera Ruiz
State Historic Preservation Officer
Post Office Box 9066581
San Juan, Puerto Rico 00906-6581

Dear Ms. Rivera:

The U.S. Army Corps of Engineers (Corps), Jacksonville District, received comments from your office on a draft Environmental Assessment (EA) for the Fort San Gerónimo del Boquerón shore protection project in a letter dated August 17, 2007. Your letter references your file number SHPO 05-07-07-03. We are also in receipt of your letter dated June 6, 2007, in reply to our determination of effect.

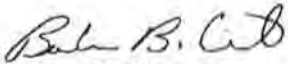
Your letter requests information on the status of the Feasibility Phase Study and the Detailed Project Report (DPR). The study is still underway and the DPR has not been finalized. The EA will be a part of the DPR. One of the issues that are pending to complete the EA is a conclusion to our Section 106 consultation.

In reply to our determination of effect and your comments on the EA, you state that you consider the rehabilitation of the Fort by the Institute of Puerto Rican Culture (IPRC) a reasonably foreseeable effect that is caused by our undertaking. We have been assured by the IPRC that the rehabilitation of the Fort is not contingent upon whether the undertaking proceeds with Federal dollars. Plans and specifications for the rehabilitation have been prepared and the rehabilitation project is ready to be advertised, as told to us by the IPRC. A copy of the plans and specifications has been delivered to your office, as per your request.

Given that the rehabilitation project is not contingent upon our shore protection project, we can not agree that the rehabilitation is a reasonably foreseeable effect of our undertaking. We therefore once again seek your concurrence with our determination that neither proposed alternative will create an effect to this historic property, other than a visual effect, and that the visual effect to the Fort will not be adverse.

Your specific observations from Chapters 1, 2, and 3 have been incorporated into the EA. Thank you for your thoughtful review of the EA. If you have questions or require additional information, please contact Mr. David McCullough by phone at 904-232-3685 or by e-mail at david.l.mccullough@saj02.usace.army.mil.

Sincerely,


Barbara B. Cintron
Acting Chief, Environmental Branch



Acost
UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

Southeast Regional Office
263 13th Avenue South
St. Petersburg, FL 33701
(727) 824-5312, FAX (727) 824-5309
<http://sero.nmfs.noaa.gov>

SEP 14 2007

F/SER31:LC

Stuart Appelbaum
Chief, Planning Division
Department of the Army
Jacksonville District Corps of Engineers
P.O. Box 4970
Jacksonville, FL 32232-0019

Dear Mr. Appelbaum:

This responds to your letter dated July 10, 2007, and received in our office on August 21, 2007, regarding the Draft Environmental Assessment (DEA) for the proposed Fort San Gerónimo del Boquerón Shore Protection Project. The U.S. Army Corps of Engineers (COE) proposes the shore protection project under the authority of Section 103 of the Rivers and Harbors Act Continuing Authority Program for shore protection. The fort sits on cemented sand dunes at the inlet known as El Boquerón, which opens to Condado Lagoon in San Juan, Puerto Rico. The fort was originally built in the sixteenth century and has suffered wave damage to the walls and foundation along the north, east and south but particularly along the south and east sides of the structure. Through the DEA (Section 4.20.2, pg. 25), the COE is initiating Section 7 consultation pursuant to the requirements of the Endangered Species Act (ESA) of 1973 with the National Marine Fisheries Service (NMFS). The COE has determined that the project will not result in direct impacts to any listed species under our purview and is therefore not likely to adversely affect these species.

Listed species under the purview of NMFS that occur in the project area include hawksbill sea turtle (*Eretmochelys imbricata*), leatherback sea turtle (*Dermochelys coriacea*), green sea turtle (*Chelonia mydas*), elkhorn coral (*Acropora palmata*), and staghorn coral (*A. cervicornis*). The sandy beach north of Dos Hermanos Bridge in Condado Lagoon is nesting habitat for leatherback and hawksbill sea turtles. The sponge colonies on rock reefs adjacent to the fort provide foraging habitat for hawksbill sea turtles. The seagrass beds in Condado Lagoon provide foraging habitat for green sea turtles. The rock reefs at the entrance to the lagoon and along the coast in the project area provide habitat for elkhorn and staghorn corals.

Based on our review of the DEA, the COE is considering four alternatives for the shore protection project. Alternative 1 consists of the construction of a concrete scour apron measuring 5 feet high and 3 feet wide of a quick-setting, low mobility grout around the entire perimeter of the fort. The construction of this apron would also require the construction of a temporary access built from shore to the southwestern corner of the fort's foundation measuring 25 feet wide and 85 feet long. Alternative 2 consists of the construction of the concrete scour apron as in Alternative 1 with the addition of rubble revetment. Armor stone with a median size of 2 tons would be laid directly on the natural rock shelf around the entire fort and would impact approximately 0.27 acre of marine bottom. The construction access would be the same as for Alternative 1. Alternative 3 consists of the construction of the concrete scour apron and a



limited rock revetment. This alternative is a variation of Alternative 2. The revetment would be constructed only around areas that have experienced the most wave damage along the southern 30 feet of east wall, the southeast corner of the fort, and approximately 120 feet of the south wall. Although not provided in the DEA, NMFS assumes the construction access for this alternative is the same as for Alternatives 1 and 2. Alternative 4 consists of the construction of a rubble breakwater along the northern (seaward) side of the fort. The breakwater would measure 350 feet along and would consist of 5 ton armor stone placed directly on the natural rock bottom. The breakwater would impact 0.17 acre of bottom. The access to construct the breakwater would be along the southern fringe of rocky outcrops north of fort where a small lagoon and rock reef containing extensive coral colonies are located. Alternative 5 is a combination of Alternatives 1, 2 and 4. This alternative would result in permanent impacts to 0.45 acre of marine bottom and 0.16 acre of temporary impacts for the construction access. Of these, 0.14 acre is corals that would be affected by the construction of this alternative. No details are provided in the DEA regarding the location and size of staging areas for construction materials for each alternative but these could result in additional impacts to marine resources. In addition, the DEA does not contain information regarding sediment and erosion control measures that will be implemented during the construction of each alternative and during the removal of temporary fill for construction access. Mitigation in the form of transplanting of coral colonies is mentioned in the document as one of the measures to minimize project impacts to marine habitats. However, a detailed mitigation plan was not provided in the DEA, although it is unlikely that the plan can be developed until the COE has selected a preferred alternative. The DEA notes that the use of barges may be part of the construction of some of the alternatives. Given the physical characteristics of the project area in terms of wave energy and size of the inlet to the lagoon, it is not clear to NMFS how barges would be transported to the project area and whether the barges would have a shallow enough draft to avoid impacting the marine bottom. In addition, the DEA notes that, if barges are used, they could be anchored in the lagoon. Details of the location and number of anchor sites, as well as whether anchor pins or other moorings would be installed to minimize impacts to seagrass beds and corals in the project area were not provided. Finally, the DEA does not contain information regarding the methods of construction to be used for each alternative.

In summary, NMFS is unable to concur with the COE's determination that the project may affect but is not likely to adversely affect listed species and their habitat under our purview at this time. The DEA did not contain enough information for NMFS to determine the potential project impacts to listed species and their habitat. In addition, although the DEA states that the COE is recommending Alternative 3, which is the alternative that provides a compromise between minimizing impacts to marine resources and providing a high level of protection to the portions of the fort most likely to continue eroding due to wave action, no preferred alternative has been selected. Therefore, NMFS suggests the selection of Alternative 3 as the preferred alternative and requests that the COE provide us with the following information for this alternative:


- Details of the construction method, including the location of temporary staging areas and measures to be employed to control accidental escapes of the grout used in the construction of the scour apron to water and marine bottom in Condado Lagoon;
- Sediment and erosion control measures to be employed during all construction activities, including the placement of the temporary access ramp and the removal of this ramp once construction is completed;
- Estimated length of time for constructing the scour apron and limited rock revetment and removing the temporary fill, as well as time of year construction operations are planned to minimize impacts to nesting sea turtles and hatchlings in the project area;

- Details regarding the use of barges during construction, including the draft of the vessels, the methods to be used to transport the vessels to the project area, and anchor locations and types of anchor systems to be employed while vessels are in the project area; and
- Details regarding the amount, type, and location of corals and other sessile benthic organisms within the footprint of the proposed apron and revetment and the mitigation plan to be implemented during construction of the shore protection project to minimize impacts to these resources, which provide foraging habitat for hawksbill sea turtles.

Once we receive this information, including details of the best management practices that will be implemented as part of the construction of Alternative 3 to minimize impacts to listed species and their habitat, we anticipate rapid closure of the ESA Section 7 consultation for this project. In addition to Section 7 consultation, an essential fish habitat (EFH) consultation with NMFS may be necessary for this project pursuant to the requirements of the Magnuson-Stevens Fishery Conservation and Management Act. Please contact Mr. David Dale of the Habitat Conservation Division at 727-824-5317 or via e-mail at David.Dale@noaa.gov.

Thank you for your efforts to ensure the conservation of protected species and their habitat. If you have any questions regarding our position on the proposed Fort Gerónimo shore protection project or the Section 7 consultation process, please contact Dr. Lisamarie Carrubba at (787) 851-3700, or by e-mail at lisamarie.carrubba@noaa.gov.

Sincerely,



David M. Bernhart
Assistant Regional Administrator
for Protected Resources

cc: F/SER4
FWS - PR

File: 1514-22.F.1.PR
Ref: T/SER/2007/05930



DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P.O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

REPLY TO
ATTENTION OF

Planning Division
Environmental Branch

JUL 07 2008

Mr. David M. Bernhart
Assistant Regional Administrator
For Protected Resources
NOAA Marine Fisheries Service
Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701

Dear Mr. Bernhart:

This is in reference to the shoreline protection project for Fort San Geronimo in San Juan, Puerto Rico as proposed by the U.S. Army Corps of Engineers (Corps) and the local project sponsor, the Institute of Puerto Rican Culture. By letter dated July 10, 2007, the Corps circulated a Draft Environmental Assessment (EA), copy of which was mailed to your agency in which we described the proposed implementation of structural alternatives to prevent the erosion affecting the foundation of Fort San Gerónimo. By letter dated September 14, 2007, you provided your comments and recommendations pursuant to compliance with the consultative requirements of Section 7 of the Endangered Species Act.

The Corps would hereby like to address your comments. The preferred alternative is Alternative 3, comprised of the concrete scour apron and limited rock revetment. Proposed construction access for this alternative would be the same as for alternatives 1 and 2, as indicated in your letter. Regarding staging areas for construction materials, the Corps is evaluating and consulting with adjacent land owners to enter into real estate agreements for site access and upland staging areas. If necessary, a secondary staging area has been identified on the former location of a boat house, as can be seen in Photo 8, View of San Geronimo Fort in 1954, in page 12 of Appendix A of the EA – Draft Coordination Act Report (CAR). A submerged concrete slab remains at that location and it could be used for staging of materials during construction, thus minimizing impacts to benthic communities. Also, sediment transport controls would be implemented to ensure any staged materials do not drift to the lagoon bottom.

The Corps will implement best management practices for minimization of turbidity caused by suspension of sediments from the construction process including, but not limited to, installation of silt curtains and washing of rock prior to discharging into waters of the United States. In addition, the conditions of the water quality certificate as issued by the Puerto Rico Environmental Quality Board (EQB) specify allowable turbidity levels during construction. These conditions will be included in the project's construction specifications. Other detailed construction methods and scheduling information requested in your letter will be developed

when the project enters the design and specifications phase, when it will be available for your review. Similarly, a site benthic survey will be performed upon project authorization and funding in order to prepare a detailed coral (and other sessile invertebrates) transplant plan that will be coordinated with your office. Once the construction methods and scheduling information has been finalized or should any changes to the proposed project develop during the design phase, the Corps will notify you and reinitiate consultation, if needed.

As mentioned in your letter, the Corps is evaluating the use of sectional barges as an alternative construction method. The barges under evaluation would be similar to the Flexifloat product from Robishaw Engineering, as seen in their website at www.flexifloat.com. By using this type of equipment the Corps seeks to minimize the footprint of temporary fill and, at the same time, provide extended construction reach. These modular type barges would be brought to the site by land as separate pontoons, placed in the water by crane and joined to create a stable platform for a crane or excavator. The barge, if used, will be anchored by means of spuds thus avoiding the use of anchors and chains that could abrade the lagoon floor. No deep-draft vessel would be required to sail into the Condado Lagoon to move or anchor the barges and the modular spud system would have minimal footprint upon the seafloor.

Based on the survey performed by the U.S. Fish and Wildlife Service (FWS) biologists for preparation of the CAR, hard coral cover becomes very sparse (<5%) south of the fort. Also, neither the FWS biologists nor the Corps personnel observed *Acropora spp.* corals within the footprint of the proposed project's preferred alternative. The project footprint does not extend to the location of the seagrass beds within the Condado Lagoon nor to the sandy beach north of the lagoon. In addition, based on recommendations by the FWS and Dr. Carrubba from your staff, the Corps has decided to discard the breakwater and scour apron with full revetment alternative (Alternative 5). The rationale for elimination of this alternative is based on the fact that the breakwater would entail the largest impact footprint upon the seafloor (approximately 12,600 sq. ft.), in the area with the highest density and diversity of marine biota in the waters surrounding the fort. As stated in the EA, the natural beach rock (eolianite) outcrop provides effective protection to the fort's north wall by reducing wave speed and force, at the same time allowing sufficient circulation to maintain the sessile organism diversity in the shallow lagoon thus reducing the need for breakwater construction. Therefore, the environmental impacts of this alternative outweigh the protection benefits it would provide.

By discarding Alternative 5, as stated above, impacts upon sponge colonies and rock reefs that provide foraging habitat for hawksbill turtles would be eliminated, as well as impacts to habitat suitable for establishment of elkhorn and staghorn corals (*Acropora spp.*). Based on the information stated herein, the Corps determines that the project as proposed, may affect but is not likely to adversely affect the federally-listed threatened or endangered species under the NOAA Marine Fisheries Service purview.

Thank you for your comments and recommendations. We look forward to continue working in cooperation with your agency to implement environmentally-sound protection measures at Fort San Geronimo. If you have any questions or need additional information, please contact Mr. Nelson Colón at 904-232-2442 or by e-mail at Nelson.R.Colon@usace.army.mil.

Sincerely,

A handwritten signature in black ink that reads "Rebecca S. Griffith". The signature is written in a cursive, flowing style.

Rebecca S. Griffith, Ph.D, PMP
Chief, Planning Division



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

Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701-5511
(727) 824-5317; FAX (727) 824-5300
<http://sero.nmfs.noaa.gov/>

April 18, 2008

F/SER4:DD

Mr. Nelson Colón
U.S. Army Corps of Engineers
Jacksonville District Planning Division
701 San Marco Boulevard
Jacksonville, FL 32207-0019

Dear Mr. Colón:

NOAA's National Marine Fisheries Service (NMFS), Southeast Region, Habitat Conservation Division has reviewed the July 2007 Draft Environmental Assessment (DEA) for the Shore Protection Project at Fort San Geronimo Del Boqueron, San Juan, Puerto Rico. The U.S. Army Corps of Engineers (COE) and the Institute of Puerto Rican Culture, the local sponsor, are investigating various shore protection measures to protect the foundation of Fort San Geronimo. The Fort is located on cemented sand dunes at an inlet to Condado Lagoon in San Juan, Puerto Rico. By letter dated September 17, 2007, the Protected Resources Division provided comments pursuant to the requirements of the Endangered Species Act. The following comments are provided in accordance with the essential fish habitat (EFH) provisions of the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA).

The shore protection methods presented in the DEA consist of a concrete apron at the base of the existing structure, a rubble revetment, and a rubble breakwater with alternatives derived by evaluating these protective measures individually and in various combinations. Several of the alternatives would require the construction of access ramps that would be removed at the completion of the project. The DEA also includes a draft Fish and Wildlife Coordination Act Report prepared by the U.S. Fish and Wildlife Service (USFWS) and combined these documents adequately describe the affected environment, including living marine resources, that occur in the project area. Generally the area consists of unvegetated or sparsely vegetated bottom, rock and sand bottom, hard and soft corals, and algae colonized bedrock. These habitats are classified as EFH by the Caribbean Fishery Management Council pursuant to the requirements of the MSFCMA. These habitats provide essential nursery, spawning, forage and refuge functions for various life stages of federally managed species including reef fish, spiny lobster and queen conch.

The DEA describes the consequences of each alternative and estimates impacts to fish and



wildlife resources, including EFH. The proposed concrete scour apron would result in the least amount of habitat alteration (approximately 3200 square feet) but it alone is not expected to provide an adequate level of long-term protection and would likely be constructed in conjunction with a revetment or breakwater. The highest level of protection to the fort's structure would be provided by a combination of the scour apron with a full revetment and breakwater resulting in an impact area of 0.45 acre with an additional 0.16 acre of temporary impacts for construction access. The preferred alternative identified in the DEA includes the scour apron with a limited revetment along the south wall in an area of an area of lower biological diversity. This alternative would require construction of a temporary access ramp.

The COE has identified various mitigative measures including a coral transplant plan to relocate coral colonies that would be impacted in the project footprint as well as various best management practices (e.g., pre-washing the armor stone) that would minimize adverse impacts to the surrounding environment including adjacent areas of EFH. Additionally, the COE anticipates rapid algal re-colonization of the revetment. At this time the NMFS can not determine the affects the proposed revetment may have on NMFS trust resources. The DEA indicates the median armor stone size will be approximately 2 tons but other details are not available at this stage of planning. For example, the configuration of the revetment armor stones is not provided. Shaped and/or fitted stones would greatly reduce interstitial spaces which provide gaps for refugia and greatly increase surface area for colonization and grazing.

As noted above, information regarding the construction plans for the preferred alternative, as well as the identified mitigative measures, is general in nature and lacking sufficient detail for comprehensive analysis. However, based on our review of the EFH assessment and other information provided, the NMFS believes that measures to conserve EFH and associated fishery resources are appropriate and necessary. Accordingly, consistent with the requirements of §305(b)(4)(A) of the MSFCMA, we offer the following:

EFH Conservation Recommendations

1. A comprehensive mitigation plan shall be included to compensate for unavoidable adverse impacts to aquatic resources. The plan shall address both temporary and permanent impacts related to the construction of the scour apron, revetment, access ramps, and staging areas. The plan shall also detail methods for identifying, protecting, and transplanting coral resources.
2. A best management practices plan shall include erosion and sediment control measures to be employed during project construction as well as during the removal of access and staging areas.

Please be advised that Section 305(b)(4)(B) of the Magnuson Stevens Act and NMFS' implementing regulation at 50 CFR Section 600.920(j) require your office to provide a written response to this letter within 30 days of its receipt. Your response must include a description of measures proposed by your agency to avoid, mitigate, or offset the adverse impacts of the activity. If your response is inconsistent with our EFH conservation recommendations, you must provide a substantive discussion justifying the reasons for not implementing those

recommendations. If it is not possible to provide a substantive response within 30 days, you should provide an interim response to the NMFS, to be followed by the detailed response at least 10 days prior to final approval of the action.

Thank you for the opportunity to provide comments on this public notice. Questions regarding the proposed project or marine fishery issues should be addressed to Mr. David Dale at letterhead address above or David.Dale@noaa.gov.

Sincerely,



/ for

Miles M. Croom
Assistant Regional Administrator
Habitat Conservation Division

cc: (via electronic mail)
F/SER3 - Carrubba
F/SER4



DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P.O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

REPLY TO
ATTENTION OF

Planning Division
Environmental Branch

JUL 07 2008

Mr. Miles M. Croom
Assistant Regional Administrator
Habitat Conservation Division
NOAA Marine Fisheries Service
Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701

Dear Mr. Croom:

This is in reference to the shoreline protection project for Fort San Geronimo in San Juan, Puerto Rico as proposed by the U.S. Army Corps of Engineers (Corps) and the local project sponsor, the Institute of Puerto Rican Culture. By letter dated July 10, 2007, the Corps circulated a Draft Environmental Assessment (EA), copy of which was mailed to your agency in which we described the proposed implementation of structural alternatives to prevent the erosion affecting the foundation of Fort San Gerónimo. By letter dated April 18, 2008, you provided your comments and recommendations pursuant to compliance with the consultative requirements for Essential Fish Habitat provisions of the Magnuson Steven Fishery Conservation and Management Act (MSFCMA).

The Corps would hereby like an acknowledgement receipt of your comments and conservation recommendations and regarding these recommendations we want to offer the following:

Conservation Recommendation 1: *A comprehensive mitigation plan shall be included to compensate for unavoidable adverse impacts to aquatic resources. The plan shall address both temporary and permanent impacts related to the construction of the scour apron, revetment, access ramps, and staging areas. The plan shall also detail methods for identifying, protecting, and transplanting coral resources.*

Upon completion of a site benthic survey a detailed coral (and other sessile invertebrates) transplant plan will be coordinated with your office. This study will be performed upon project authorization and funding. Other detailed construction information will be developed when the project enters the design phase, when it will be available for your review.

Conservation Recommendation 2: *A best management practices plan shall include erosion and sediment control measures to be employed during project construction as well as during removal of access and staging areas.*

The Corps will implement best management practices for minimization of turbidity caused by suspension of sediments from the construction process including, but not limited to, installation of silt curtains and washing of rock prior to discharging into waters of the United States. In addition, the conditions of the water quality certificate as issued by the Puerto Rico Environmental Quality Board specify allowable turbidity levels during construction. These conditions will be included in the project's construction specifications.

This letter constitutes our response pursuant to Section 305(b)(4)(B) of the MSFCMA and NMFS implementing regulation at 50 CFR Section 600.920(j). However, if any changes to the proposed project develop during the design phase, the Corps will notify you and reinstate consultation, if needed.

Thank you for your comments and recommendations. We look forward to continue working in cooperation with your agency to implement environmentally-sound protection measures at Fort San Geronimo. If you have any questions or need additional information, please contact Mr. Nelson Colón at 904-232-2442 or by e-mail at Nelson.R.Colon@usace.army.mil.

Sincerely,



Rebecca S. Griffith, Ph.D, PMP
Chief, Planning Division



COMMONWEALTH OF PUERTO RICO
OFFICE OF THE GOVERNOR
PLANNING BOARD

Alcanta

MINILLAS GOVERNMENT CENTER
DE DIEGO AVE., STOP 22, SANTURCE
PO Box 41119, SAN JUAN, PUERTO RICO 000940-1119

July 31, 2007

Mr. Stuart J. Applebaum
Chief
Planning Division
Department of the Army
Jacksonville District Corps of Engineers
PO Box 4970
Jacksonville, Florida 32232-0019

**Draft Environmental Assessment
Shore Protection Project
Fort San Gerónimo del Boquerón
San Juan, Puerto Rico**

Dear Mr. Applebaum:

We have received the Draft Environmental Document at reference. After reviewing it we would like to provide the following comments and recommendations:

- The Puerto Rico Planning Board is the agency with the responsibility of reviewing Federal Consistency Determinations according to Puerto Rico Coastal Zone Management Program (PRCZMP). The project at reference will be considered as a Federal Agency Activity according to Subpart C of Coastal Zone Management Act, Federal Consistency Regulations at 15 CFR Part 930.
- The PRCZMP establishes the following policies related to the proposed project:
 - 30.0 To protect natural, environmental and cultural resources from destruction or irreparable damage resulting from misuse, or lack of foresight to address the adverse impact of other activities.
 - 30.03 Avoid activities that may cause deterioration or destruction of natural systems that are critical for the preservation of the environment, such as mangroves, wetlands, forests, reefs, sinkholes, dunes, and the ecological niches of endangered species.

30.08 Avoid demolition, mutilation, destruction and deterioration of natural, environmental, and cultural resources, archaeological sites and historical sites and zones.

30.09 Reduce the impact of natural disasters and other activities on natural, environmental and cultural resources by preparing and implementing mitigation plans.

- The Fort of San Gerónimo del Boquerón is a unique and highly valuable historic structure that was designated by the Puerto Rico Planning Board as a Historic Site on February 3, 2000 through Resolution Number 2000-RMSJ-00-JP-SH. The proposed project is necessary to prevent damage and deterioration of this important cultural asset. Notwithstanding, the proposed alternatives shall be adequately analyzed in order to select the one that achieves most adequate protection to the structure, minimum possible impacts to natural resources present at the project area and adequate public access for safe enjoyment of this important historic structure.
- We recommend to consider the following aspects as part of the cost-benefit analysis for the proposed alternatives:
 - 1- It is important to perform a benthic study that allows the U.S. Army Corps of Engineers (USACE) to precisely and consider the magnitude of direct and indirect impact of the proposed alternatives to marine resources present at the project area. You may take into consideration that direct impact to marine resources will increase the cost of the project and delay the beginning of the operational phase.
 - 2- Consider long range requirements for maintenance of the proposed alternatives. Some structures, materials, construction methods, etc. have higher initial cost but require less maintenance and lower inversion in long term.
 - 3- The protection structure shall be designed considering worst atmospheric conditions.

- In terms of compliance with the PRCZMP and Federal Consistency Procedure, the following recommendations are provided:

- 1- Compliance with Article 4B(3) of the P.R. Environmental Policy Law (Law Number 416 of September 22, 2004) and coordination with the Puerto Rican Culture Institute and State Historic Preservation Office are the most important requisites to make this project consistent with the PRCZMP. If the project will require an environmental document to comply with the National Environmental Policy Act (NEPA), it is important to establish early coordination and foster technical orientation from the P.R. Environmental Quality Board (EQB) to include all required information and use the same document to comply with P.R. Environmental Policy Law at the same time. This will avoid duplicity of efforts and delays. In order to obtain orientation and coordinate this aspect, you may contact:

Mr. Teófilo De Jesús
Manager
Scientific Assessment Office
P.R. Environmental Quality Board
PO Box 11488
Santurce, Puerto Rico 00910

Phone Number: (787) 767-8181 ext. 3630 or 3636
(787) 767-8119

E-mail address: teofilodejesus@jca.gobierno.pr

- 2- The required Federal Consistency Determination may be submitted using the form JP-833, provided as enclosure. Seven Copies of the completed form or Federal Consistency Determination letter shall be submitted with required information about the project, at the Secretariat Office of the Puerto Rico Planning Board:

Mrs. Carmen Torres Meléndez
Secretary
Puerto Rico Planning Board
PO Box 41119
San Juan, Puerto Rico 00940-1119

July 31, 2007

Page 4

- 3- In addition to descriptive information it is important to include copy of endorsements from the Puerto Rican Culture Institute, the State Historic Preservation Office, the Environmental Quality Board, the Department of Natural and Environmental Resources and any other available documents.

We are in the best disposition to collaborate with the USACE in this important project. For any required information or orientation related to the Federal Consistency procedure, do not hesitate to contact Ms. Rose A. Ortiz at (787) 723-6200 ext. 2020 or (787) 726-0289, e-mail address: ortiz_r@jp.gobierno.pr

Thank you for the opportunity to comment.

Cordially



Angel D. Rodriguez
President

- c Mr. Ernesto Díaz, DNER
Ms. Enid Torregrosa de La Rosa, SHPO
Dr. Jose Luis Vega, PRCI
Mr. Teófilo De Jesús, EQB

NAR/MML/RAO/mir



ESTADO LIBRE ASOCIADO DE PUERTO RICO
Oficina del Gobernador
Junta de Calidad Ambiental
35 Años de Gestión Ambiental

Lcdo. Carlos W. López Freytes
Director Ejecutivo

27 de septiembre de 2007

DADA: 1994-07

SR IVAN ACOSTA
PLANNING DIVISION
ENVIRONMENTAL BRANCH
CORPS OF ENGINEERS
PO BOX 4970
JACKSONVILLE FLORIDA 32232-0019

Estimado señor Acosta:

DN 07-0945 (ARMY)
Shore Protection Project
Fort San Gerónimo del Boquerón
San Juan, Puerto Rico

La Junta de Calidad Ambiental ha analizado el documento ambiental sometido para el proyecto mencionado en referencia. La acción propuesta consiste en implementar alternativas estructurales para prevenir que la erosión provocada por el embate de las olas del mar continúe afectando los cimientos de la estructura del Fuerte de San Gerónimo, el cual está ubicado en la Bahía de San Juan, al noroeste de la Laguna del Condado en el municipio de San Juan.

Esta Junta concluye que al presentar este documento su instrumentalidad ha cumplido con la fase de evaluar el posible impacto ambiental de la acción propuesta, de acuerdo con el Artículo 4-B(3) de la Ley sobre Política Pública Ambiental, Ley Núm. 416 del 22 de septiembre de 2004.

No obstante para una mejor realización del proyecto y tomando en consideración que este documento ambiental es un instrumento de planificación y análisis de los posibles impactos ambientales que pueda generar la acción propuesta, esta Junta emite las siguientes recomendaciones:

1. Previo a las actividades de restauración de la estructura o realizar algún movimiento de tierra, se debe obtener de esta Junta el Permiso General Consolidado que establece el Reglamento para el Trámite de los Permisos Generales de esta Junta, que incluye lo siguiente:
 - a. Permiso de Fuente de Emisión para controlar adecuadamente el polvo fugitivo generado durante las actividades del proyecto y que se realicen en un área mayor de 900 metros².
 - b. Permiso de Actividad Generadora de Desperdicios Sólidos No Peligrosos.
 - c. Permiso para el Control de la Erosión y Prevención de la Sedimentación, si el volumen del movimiento de tierra es mayor de 40 metros³ o se realiza en un área mayor de 900 metros².
2. Deberán tomar las medidas necesarias para evitar que residuos de sustancias orgánicas e inorgánicas tales como aceites, combustibles u otras sustancias químicas generadas durante la restauración del fuerte, puedan ser arrastradas por la escorrentía y ganen acceso a la bahía o al sistema pluvial.
3. Si durante el movimiento de tierra se encuentran depósitos arqueológicos, los mismos deben ser informados inmediatamente al Instituto de Cultura Puertorriqueña y a la Oficina Estatal de Preservación Histórica.
4. El almacenaje, manejo y disposición de los desperdicios sólidos a generarse durante la fase de reconstrucción de la estructura, debe realizarse en conformidad con la reglamentación vigente.
5. Mantener las vías públicas y los alrededores del proyecto libres de acumulación de escombros y desechos. Los mismos deberán manejarse y disponerse de acuerdo a la reglamentación vigente.
6. Las descargas de escorrentía de las aguas pluviales durante la reconstrucción de la estructura pueden impactar el área de la bahía, por lo que deberán consultar con la Agencia Federal de Protección Ambiental para determinar si dicha descarga requiere un Permiso Federal de Descarga "NPDES".
7. De ser requerido por el Cuerpo de Ingenieros del Ejército de los Estados Unidos, deberán obtener del Área de Calidad de Agua de esta Junta un Certificado de Calidad de Agua.

8. Durante la acción propuesta deben cumplir con el Reglamento para el Control de la Contaminación por Ruido, según el nivel de sonido máximo permitido.
9. Deberán cumplir con las recomendaciones y requisitos emitidos por las demás agencias consultadas.

Esta Junta no tiene objeción a la acción propuesta, ya que entendemos que la misma no ha de causar efectos detrimentales al ambiente, siempre y cuando el proponente cumpla con lo establecido en el documento sometido, con las recomendaciones señaladas y con la reglamentación ambiental vigente.

Agradecemos su cooperación por mantener y conservar la calidad de nuestro ambiente.

Cordialmente,



Lcdo. Carlos W. López Freytes
Director Ejecutivo
Junta de Calidad Ambiental

ODM/



Commonwealth of Puerto Rico

Department of Natural and Environmental Resources

PO Box 366147
San Juan, PR
00936-6147
Tel. (787) 999-2200
Fax: (787) 999-2203

OCT 4 - 2007

MR NELSON R COLÓN
DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS
OF ENGINEERS
PLANNING DIVISION
ENVIRONMENTAL BRANCH
P O BOX 4970
JACKSONVILLE FL 32232-0019

Dear Mr. Colon:

RE: Draft Environmental Assessment Shore Protection Project Fort San Gerónimo del Boquerón San Juan, Puerto Rico

M

We have evaluated the documents submitted in relation to the above-mentioned matter. As a result, Ms. Aida Rosario, Director of the Department of Natural and Environmental Resources' Fisheries Research Laboratory and contact person in Puerto Rico for the U.S. Coral Reef Task Force, submitted the comments (Attachment 1) included in this letter. In addition to these comments, we have the following concerns and questions, which must be extensively addressed and included in the referred document.

1. There is no mention or discussion of sedimentation control measures (for example, sediment control curtains, among others) needed to prevent impacts on marine systems adjacent to the project site.
2. There is no mention or discussion of how the coastal protection measures for the Fortín San Gerónimo will be implemented (for example machinery, barge, or other means).
3. We must consider the possibility that oil residues buried in the sandy seafloor of this sector (from the T/B Morris J. Berman barge oil spill on the north coast of Puerto Rico) may be exposed and/or be suspended again when the proposed works are carried out.

Page 2

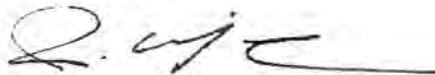
Comments to "Draft Environmental Assessment, Shore Protection Project Fort San Gerónimo"

4. Discuss the possibility and/or viability to create an artificial reef as a measure to reduce wave impact on this structure while at the same time creating the appropriate substrate for the colonization and transplanted of the corals that may be affected with the proposed coastal protection works.

The concept of using artificial reefs as a mitigation measure for the damage caused by the Morris J. Berman barge grounding in the north coast was one of the measures highly considered by our agency.

We hope our comments and questions may be of much help to you in the final preparation of the proposed project. If you have any questions with respect to these, please contact Mr. José L. Padilla, Director of the Maritime Zone Public Domain Division at (787) 999-2200, ext. 2832 or 2830.

Cordially,



Javier Vélez Arocho
Secretary

JVA/ARB/JLP/JR/nm

Commonwealth of Puerto Rico

Department of Natural and Environmental Resources



PO Box 366147
San Juan, PR 00936
Tel. (787) 999-2200
Fax: (787) 999-2303

August 7, 2007

Mr. Nelson R. Colón
Jacksonville District Corps
of Engineers
Planning Division
Environmental Branch
PO Box 4970, Jacksonville
FL, 32232-0019

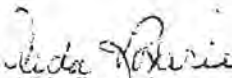
**RE: Environmental Assessment for the Fort San Gerónimo del Boquerón
shore protection project, San Juan, Puerto Rico**

Dear Mr. Colón:

As Point of Contact for Puerto Rico of the US Coral Reef Task Force I appreciate the opportunity presented to comment the reference Environmental Assessment for the Fort San Gerónimo del Boquerón shore protection project, San Juan, Puerto Rico. Nonetheless, since I am employee of the Puerto Rico Department of Natural and Environmental Resources (DNER) my comments were included in the final position of the Department.

You would receive these comments in a future date sent by the appropriate official in charge of issuing such comments. I expect that the comment provide by DNER will help in the process of the propose project.

Sincerely yours,


Aida Rosario
PR CRTF Point of Contact

AR

Environmental Assessment – Army Corps of Engineer Project - “FORT OF SAN GERONIMO DEL BOQUERON SHORE PROTECTION PROJECT, SAN JUAN, PUERTO RICO”.

The Fort of San Gerónimo del Boquerón is a historical landmark that could be use as another recreational and touristic destination as are the many others forts of the old San Juan. The Army Corps of Engineer proposed alternatives to prevent the erosion of the fort and surrounding habitat grounds are a reasonable set. The documentation of the affected environment is adequate and substantiated by the FWS Act Report (2005).

The propose preferred alternative (2.1.3 – Concrete Apron and Limited Revetment) by the Corps will provide adequate protection from erosion and will have a lower impact than the alternatives 2.1.2. and 2.1.5. The rationale presented by the Corps in adopting this as the preferred alternative is adequate and is consistent with the recommendations made by FWS. Although the FWS was not able to analyze the impacts of the alternatives presented in this document, since the Act Report (2005) was created without specific information on the alternatives. The FWS provide valuable supplementary information on the project. They suggest that the propose project should concentrate on reinforcing the undercut area of the beach rock and as close to the seaward ledge of the rock as possible. It was pointed out that care should be taken to avoid the elevation of the outer beach rock of the fort.

The characterization of the fish and wildlife resources include a number of species of fish and invertebrates. Among the invertebrates there is a number of sessile species on which the project will have greatest impact. These species include corals (*Diplaria* spp., *Porites* spp.), zooanthids (*Palythoa caribaeorum*), foraminiferans (*Homotrema rubrum*) and red algae (*Galaxaura subverticillata*). Other invertebrates with little mobility will also be highly impacted such as the rock boring sea urchin (*Echinometra lucunter*), long-spined sea urchin (*Diadema antillarum*) and the West Indian topshell (*Cittarium pica*). Of these species the whelk is of recreational and commercial value. The status of West Indian topshell populations around the Puerto Rico coast was evaluated by Jimenez (2005). The findings included a size-specific zonation where large individuals are found in the creeds on the submerged rocky shore and the smaller use the pseudo-exposed rocky shore (getting wet with the wave movement). These smaller individuals represents the juvenile of the species. Thus if the population found in the beach rock exposed and washed by the wave action, might represent juveniles individuals. Other findings regarding the West Indian topshell refers to the fishing pressure exerted over the resource. Those individuals found on low wave energy areas are overfished which also explains the lack of large-adult specimens.

The long-spined sea urchin (*Diadema antillarum*) populations were practically wipeout between 1982 and 1983 by a disease spread throughout the Caribbean (Lessios et al. 1984, Waddell et al. 2005). The mass mortality of *Diadema* contributed to the phase-shift from coral to algae dominated reefs in many locations including Puerto Rico. The recovery of the populations have been very slow. As mentioned above this species of great importance to maintain healthy corals, preventing being overgrown by algae.

Corals provide essential habitat for many species of other invertebrates as well as for fish. The north coast of Puerto Rico is characterized as a hard bottom colonized by corals, rather than by coral reefs. The bottom area surrounding the fort represent the typical characteristics of the north coast. *Diploria clivosa* is a fairly common species around the coasts of Puerto Rico as a coral reef builder species. They are resilient to high wave energy. They might be resilient to transplant to similar habitat conditions in which they are at present time. *Porites* spp. are very common around PR and easily transplanted or reproduced by fragmentation. A note of concern regarding the present health of the corals found in the area pertains to the most severe bleaching event in recent time that took place in September 2005. This event cause mass bleaching on coral reefs around the coasts of Puerto Rico. This resulted in mortalities rate of over 50% of corals and in some places up to 90%. The Act Report submitted by FWS is prior to this event and therefore did not reported any bleaching effects. The effects of the bleaching were still evident during 2006, as water temperature were over average and causing the failure in reproduction on many coral species during that year. Another factor confounding the health of the corals present in the area is the high number of construction undertaken in the confine access area to the fort.

The 2005 Caribbean bleaching event not only affected the corals but also other invertebrates such as zoanthids (*Palythoa* sp), specifically in our coasts. Thus is very important to assess the health of these species in the area and transplant those that might have survived bleaching. Those that survive are considered by coral experts of great importance for the future of corals and need special attention. DNER performs monitoring of coral reefs within the designate natural reserves around PR, but little information is available on coral communities specially in the North coast. Therefore is very important that those communities that have been identified be protect to the extent applicable.

Although no acroporids were found in the area if any were to be found when the project start it would apply a Section 7 consultation.

At least two threatened and endangered species, the brown pelican and the leatherback turtle could be impacted by the proposed activities. Provisions should be taken to avoid the interaction with this resources. If interactions are anticipated Section 7 consultation should be initiated with FWS and with NMFS for the possible impacts on the water for sea turtles.

The proposed mitigation by the Corps for adverse impact to corals should be the implementation of a coral transplant plan previous to the construction activities. This plan shall include accurate coral species densities, as well as alternative recipient site for transplanted colonies. Spherical and semi-spherical coral colonies should be transplanted whole, as well as encrusting species attached to moveable rocks or outcrops that could be separate in their entirety. Representation of genotype of all individual colonies should be guarantee. The Corps proposal of cutting core cylinders from encrusting coral species that could not be detached from the substrate. Those cores should be transplanted to the recipient site. The transplanted corals should be mapped in a GIS format to enable future monitoring of the transplant success.

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Lessios, H.A., D.R. Robertson and J.D. Cubit. 1984. Spread of *Diadema* mass mortality throughout the Caribbean. Science 226: 335-337.

Jimenez, N.M. 2005. Caribbean/NMFS Cooperative SEAMAP Program Wreck Assessment Project. Report to NMFS/SEAMAP. 1-10 p.

Waddell, J.E. (ed.), 2005. The State of Coral Reef Ecosystems of the United States and Pacific Freely Associated States: 2005. NOAA Technical Memorandum NOS NCCOS 11. OAA/NCCOS Center for Coastal Monitoring and Assessment's Biogeography Team. Silver Spring, MD. 522 pp.

Appendix B

Impact Coral Photo Log



ID 01



ID 02



ID 03



ID 04



ID 05



ID 06



ID 07



ID 08



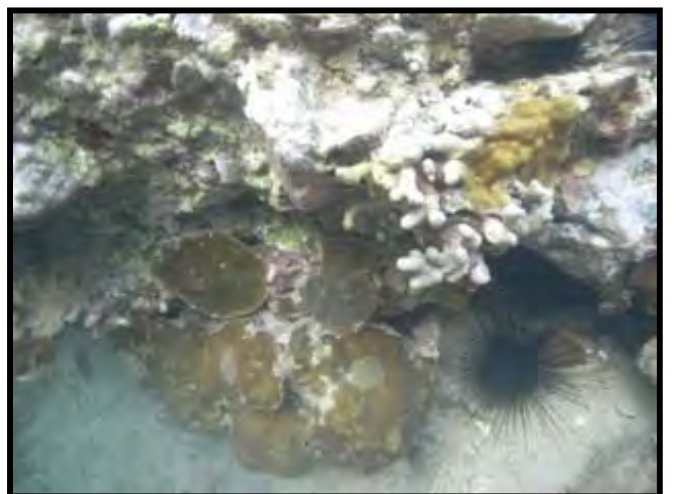
ID 09



ID 10



ID 11



ID 12



ID 13



ID 14



ID 15



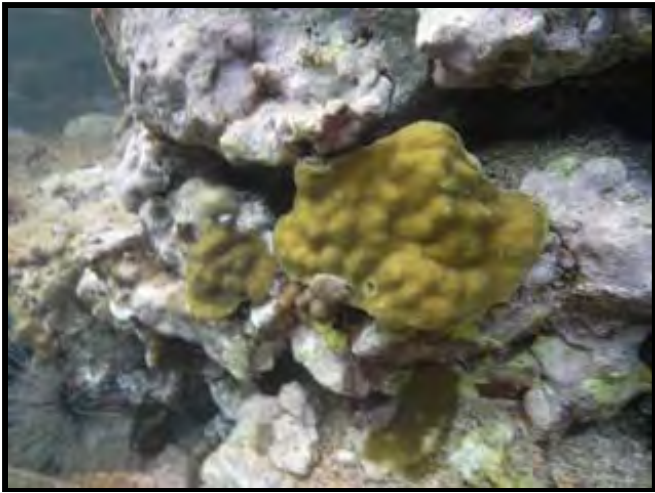
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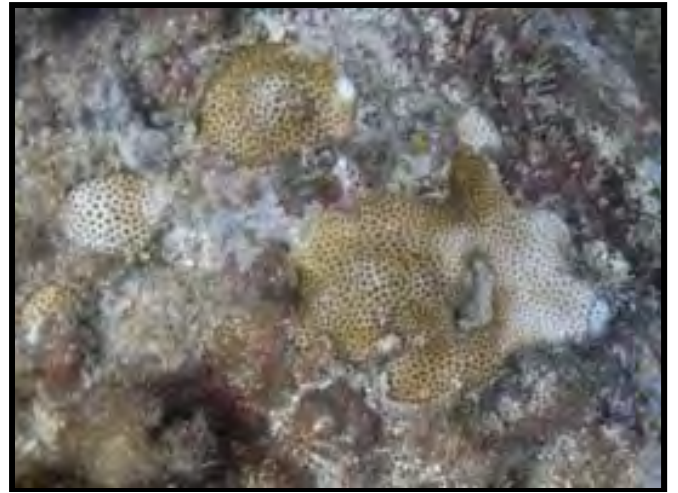
ID 17/18



ID 19



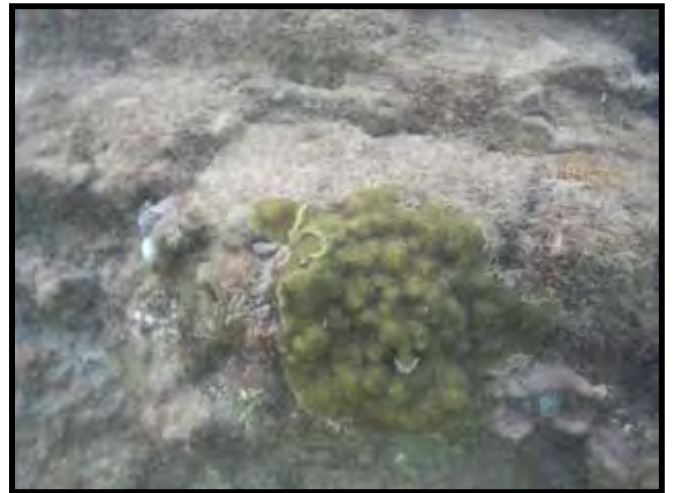
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ID 21



ID 22



ID 23



ID 24



ID 25



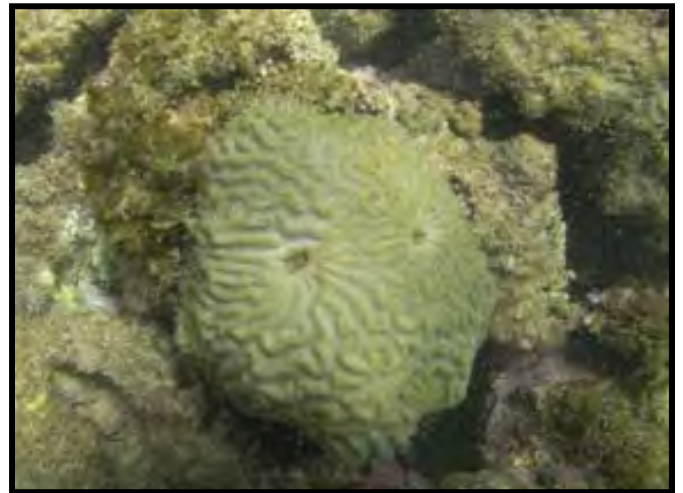
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ID 27



ID 28



ID 29



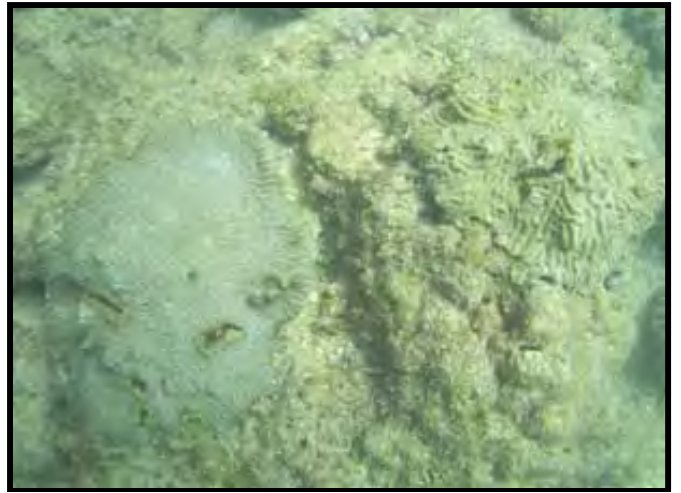
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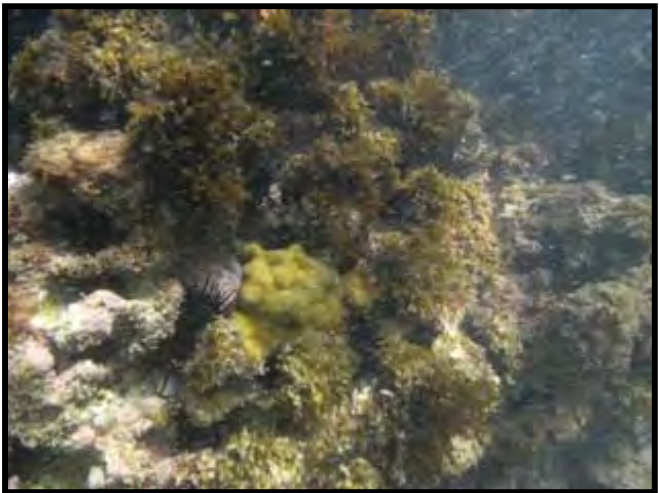
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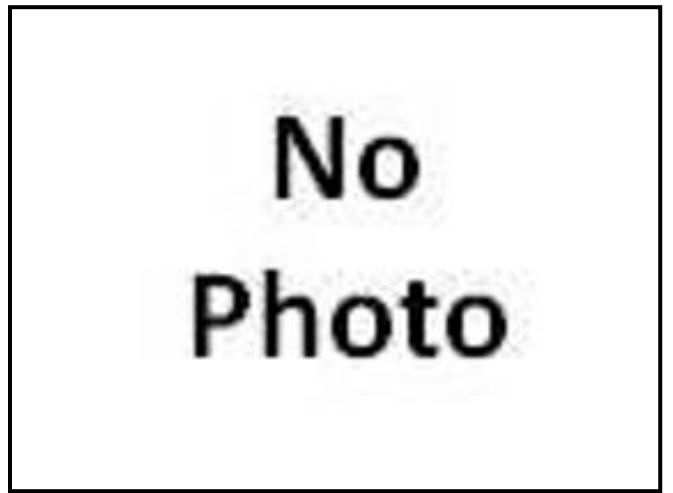
ID 32



ID 33/34



ID 35



ID 36



ID 37



ID 38



ID 39



ID 40



ID 41



ID 42



ID 43