EXECUTIVE SUMMARY

The Corps of Engineers (Corps) has proposed the renourishment of 2,800 feet of public beach in the vicinity of 63rd Street, Miami Beach, Florida. Two offshore borrow sites have been identified as the sand source for the renourishment. Miami-Dade County is the local sponsor for the Federal project.

Offshore hard bottom/live rock habitat in the project vicinity is found to be significant, as defined by the Fish and Wildlife Service's (Service) Mitigation Policy. Anticipated direct impacts to the offshore hardbottom habitat are restricted to the hardbottom communities within the slurry pipeline corridor. The proposed alignment was identified through habitat surveys to be the least damaging alignment. Actual pipe placement will be micro-sited by Miami-Dade County biologists. Mitigation for unavoidable impacts is targeting inkind habitat through artificial reef modules at a 1 to1 square meter footprint ratio. The Service supports this mitigation as proposed. Suspended sediments generated from the hopper dredge operations, pump station operations, and shore deposition of the sand slurry may affect biological resources. The Corps has proposed extensive turbidity and sedimentation monitoring programs. The Service believes these monitoring programs will protect natural resources in the project area.

The Corps has determined that the Biological Opinion (BO) dated October 24, 1996, for Region III of the Coast of Florida Erosion and Storm Effects Study includes the project area considered for the proposed renourishment and that the "Reasonable and Prudent Measures" and "Terms and Conditions" apply to the proposed renourishment. The Corps plans to incorporate these requirements into the project plans and specifications and any contracts as appropriate. The Service agrees with the determination that the project limits are within the area defined in the Coast of Florida BO, however, Service guidance on section 7 consultations on sea turtles has been revised and has resulted in project specific changes in the "Reasonable and Prudent Measures" and "Terms and Conditions" of the Coast of Florida BO. The revised Coast of Florida BO addresses potential project effects on threatened and endangered sea turtles.

The Draft Fish and Wildlife Coordination Report was prepared in October 2000. Request for review and comment were submitted to National Marine Fisheries Service (NMFS), Habitat Conservation Division; Florida Department of Environmental Protection, Office of Beaches and Coastal Systems; Florida Fish and Wildlife Conservation Commission, Office of Environmental Services; and Miami-Dade County Environmental Resources Management, Restoration and Enhancement Section. Comments were received from the NMFS, Habitat Conservation Division on November 21, 2000. Comments received from the NMFS concur with the Service's positions that (1) further studies should be conducted to determine the impacts that dredging may have on marine invertebrate fauna within the areas used as borrow sites, (2) impacts to biological resources adjacent to the borrow areas from sedimentation should be minimal, (3) hard bottom/coral reef communities are not expected to be impacted by the proposed disposal of unsuitable beach material in the rock disposal areas, and (4) the reef mitigation should be of sufficient quantity to address the temporal loss of impacted resources. For this project, the actual

additional surface area provided by the reef modules, over and above the base footprint 1:1 mitigation, may provide the additional compensation which would be required through temporal loss calculations. We recommend that the Corps evaluate this scenario, and provide additional mitigation if evidenced by an uncompensated temporal loss. The NMFS also recommended that turbidity and sediment monitoring plans include all phases of the project, including offshore sediment transfer, sieving operations at the pump station, slurry transfer through the pipeline, and sediment placement on the beach. The Service also supports this recommendation.

No other comments were received by the Service, and the Final Coordination Act Report has been modified to reflect NMFS's turbidity and sediment monitoring recommendations.

I. INTRODUCTION

Nourishment of the Atlantic shoreline of Miami-Dade County was authorized by the Flood Control Act of 1968, and referred to as the Beach Erosion Control and Hurricane Protection Project (BEC&HP). The original BEC&HP encompassed approximately 10.5 miles of shoreline extending from Government Cut north to the northern boundary of Haulover Beach Park. The Supplemental Appropriations Act of 1985, and the Water Resources Development Act of 1986 (Public Law 99-662), provided authority for extending the northern limit of the authorized BEC&HP to include the construction of a protective beach along an additional 2.5 miles of shoreline north of Haulover Beach (Sunny Isles) and for periodic renourishment of all the BEC&HP beaches. This authority also provided for the extension of the period of Federal participation in the cost of nourishing the modified BEC&HP from 10 years to 50 years, which is the life of the BEC&HP.

The beaches in the City of Miami Beach, Florida were initially nourished in 1978, renourished in 1980, 1987, 1994, 1997, and scheduled for renourishment again in 2002. The existing beach at 63rd Street is experiencing an accelerated erosion rate and may not provide hurricane and flood protection of westward structures until the scheduled renourishment period. As an interim measure, the U.S. Army Corps of Engineers (Corps) is proposing renourishment 2,800 feet of shoreline in the vicinity of 63rd Street, Miami Beach, Florida. The proposed interim action is planned for 2001. The Corps posted Public Notice of the proposed action in June 2000.

The purpose of this Fish and Wildlife Coordination Act Report (FWCA) is to assess the impacts to existing fish and wildlife resources in and adjacent to the Corps proposed beach renourishment. The U.S. Fish and Wildlife Service (Service) has evaluated the study area and commented on project impacts, including recommendations for conservation measures.

II. DESCRIPTION OF STUDY AREA

Miami-Dade County is a heavily populated county on Florida's Atlantic coast and receives a tremendous volume of tourists, particularly during the winter months. Those beaches which can be accessed by the general public are heavily used year round. Those beaches which are associated with condominiums, apartments, and hotels have more restricted access for the general public, but receive use from the many visitors who frequent these facilities as well as those members of the general public who walk or jog along the beachfront.

The beaches in Miami Beach have public access and receive heavy use by swimmers and sunbathers. Adjacent to these beaches are many condominiums and hotels used by long term and short term visitors and residents of the area. Other water related activities within the project area include onshore and offshore fishing, snorkeling, SCUBA diving, wind surfing, and recreational boating. Most of the boating activity in the area originates from either Bakers Haulover Inlet or Government Cut. Both offshore fishing and diving occur on the natural and artificial reefs located within and adjacent to the project area.

III. PROJECT DESCRIPTION

The proposed action is the placement of about 200,000 cubic yards of material along the beach in the vicinity of 63rd Street, Miami Beach, Florida (Figure 1). The beach fill would cover approximately 2,800 feet of shoreline from DEP monument R-44 to R-46A. The beach will have a berm width of 205 feet from the Erosion Control Line (ECL) at an elevation of +9 feet mean low water (MLW), with a construction tolerance of +/- 0.5 feet. The front slope of the fill will be 1 vertical on 15 horizontal. A 50-foot wide access corridor is proposed for placement of the pipeline to pump sand to the beach. The corridor is located 1,200 feet north of the beach fill area (Figure 2). The proposed borrow areas are located south of Government Cut, approximately 2.5 miles east of Key Biscayne, in 30 to 40 feet of water (Figure 3). The proposed borrow areas and the pipeline corridor were investigated as part of a previous Miami-Dade County nourishment project (U.S. Army Corps of Engineers 1997).

IV. FISH AND WILDLIFE RESOURCES

Fish and wildlife resources that could be affected by this project include the upper beach zone, which serves as nesting habitat for four species of sea turtles; nearshore rock outcrops, which could be destroyed by nourishment material covering the rock outcrops; and offshore coraline reefs, which are adjacent to the proposed borrow areas and may be impacted by turbidity plumes generated from the dredging operation, scraping actions from the pipeline placement crossing the hardbottom reefs, and direct impacts from the dredge suction heads accidentally hitting the reefs.

A. Community Descriptions

Beach zone

Florida has approximately 744 miles of beaches, mainly along the shorelines of barrier islands. Wind and waves are constantly changing the shape of barrier islands and their beaches. On the east coast of Florida, general patterns of sand transport or littoral drift have been well documented. During winter, net littoral drift is to the south; whereas, during summer, the net transport of sand may retreat slightly to the north if southeasterly winds prevail. Inlets inhibit littoral drift. As a result, beaches on the up-drift or north side of these inlets accumulate sand, while those on the down-drift side are deprived of this sand.

Florida's beaches function as nesting habitat for four species of federally listed sea turtles: the threatened loggerhead turtle (*Caretta caretta*) as well as the endangered green turtle (*Chelonia mydas*), leatherback turtle (*Dermochelys coriacea*) and hawksbill turtle (*Eretmochelys imbricata*). Approximately 40 percent of all loggerhead nesting occurs in the southeastern United States, primarily in Florida. Nesting beaches in Miami-Dade County experience

considerable anthropogenic impacts from public use of the beaches. As a result, Miami-Dade County has initiated a program that relocates nests to more isolated beaches.

The beaches of Miami-Dade County are typical of other Atlantic Coast beaches in Florida that are subject to the full force of ocean waves. Sandy bottom beaches are populated with small, short-lived infauna with high species density and substantial reproductive potential and recruitment. Common species include haustoriid amphipods, decapod crustaceans, bivalves, and spionid worms. These beaches usually have low species diversity, but populations of individual species are often very large. Species such as ghost crabs (*Ocypode quadrata*), mole crabs (*Emerita talipoda*), and polychaetes are highly specialized to survive in this high-energy environment.

Thirteen species of birds nest on Florida's beaches, generally between April and August. All nest on the ground, with the nest consisting of a scrap in the sand. Nesting shore bird populations in Florida have declined due to loss of beach habitat to real estate development. On the remaining natural beaches, human visitors disrupt nesting birds. However, some species have proved adaptable to new nesting sites, with some species, such as the least tern (*Sterna antillarum*), having found alternative nesting sites to include rooftops (Myers and Ewel 1990).

Reefs

Florida is endowed with several reef types: subtropical coral reefs, live bottom communities, nearshore sabellariid worm (*Phragmatopoma lapidosa*) reefs, vermetid reefs, and deep-water *Oculina varicosa* reefs.

Coral reefs are best developed in the United States in south Florida. Most of the Florida Keys' coral reefs are well known due to the clarity of the water and the popularity of SCUBA diving. Farther north, through Miami-Dade and Broward Counties on the east coast and Collier County on the west coast, water clarity and temperature declines, as do reef-building corals. Continuing north, hard corals are fewer, and "live rock" communities are more prevalent. Live rock communities within the project area are populated by sponges, small (ahermatypic) hard corals, tunicates, bryozoans, algae, and sabellariid worms. Live rock communities typically, are also more common in or near the high energy surf zone.

Sabellariid worms can dominate the reef community and form a unique live rock reef type known as "worm rock." These are most often formed in high-energy surf zones particularly between Martin and Brevard counties on the east coast. Such reefs are composed of sand particles loosely cemented together by a mucus secreted by the worms when building their casing. *Oculina* reefs occur in depths greater than 100 feet and are found from St. Lucie County to Jacksonville. Intertidal vermetid reefs off the Ten Thousand Islands are a remnant of structures formed by the reef-building gastropod, *Petaloconchus* spp.

The reefs of the project area can be classified as live bottom or live rock communities with scattered hard coral. The South Atlantic Fishery Management Council has developed a Fishery Management Plan (FMP) for Coral, Coral Reef, and Live/Hard Bottom Habitats of the South Atlantic Region. Furthermore, damaging, harming, and killing of live rock is prohibited by the current FMP and all harvesting of live rock has been prohibited since January 1, 1996.

The extent of reefs is well known in Miami-Dade, Broward, and Palm Beach counties because the sea floor out to the 60-foot depth contour has recently been mapped with side-scan sonar by the Corps (Continental Shelf Associates, 1993). Other mapped areas include Venice Beach in Sarasota County, Hutchinson Island in Martin County, and Vero Beach in Indian River County. Nevertheless, with deeper reef areas taken into account, the Service estimates that less than one percent of areas statewide, which may contain live rock communities, have been mapped. Reefs in Miami-Dade County and specifically those reefs east of the proposed beach renourishment and on both sides of the proposed borrow area are typical of the classical reef profile described for southeast Florida. The inner reef is in approximately 15 to 25 feet of water, the middle patch reef is in about 30 to 50 feet of water, and the outer reef is in approximately 60 to 100 feet of water. The composition of the hardground biological assemblages along Florida's east coast has been detailed by many authors (Goldberg 1970, 1973; Marszalek and Taylor 1977; Continental Shelf Associates, Inc. 1984, 1985, 1987, 1993). Although the reefs in the project area and those north of Government Cut support a large variety of hard coral species, these corals are no longer actively producing the reef features seen there. The reef features seen north of Government Cut have been termed "gorgoniod reefs" (Goldberg, 1970; Raymond and Antonius, 1977). Blair and Flynn (1989) described the reefs and hardbottom communities off Miami-Dade County and compared them to the offshore reef communities from Broward and Palm Beach Counties. They documented a decrease in the hard coral species density moving northward from Miami-Dade County to Palm Beach County.

Offshore Borrow Zones:

Two sand substrate borrow areas have been identified by the Corps for this project. The two areas are south of Government Cut, located in approximately 35 to 45 feet of water, and approximately 2 miles east of Key Biscayne. The two zones are situated between two hardground/reef communities (Figure 3). The two sites have been designated SGC - 2 and SGC extension. To protect the adjacent hardbottom reefs, the Corps is proposing a 400-foot buffer from any hardbottom area. Silt content in the SGC-2 borrow area ranges from 1.3 to 10.3 percent, with an average of 4.5 percent. The composite mean grain size is 0.56 mm. In the SGC extension borrow area, the silt ranges from 0.8 to 9.2 percent, with an average of 3.7 percent. The composite mean grain size is 0.62 mm. In both the SGC-2 and SGC extension, rock fragments from 1 inch to 3 feet in diameter may make up to 5 percent. The use of these borrow areas will require that all rock fragments larger than 1 inch be separated from the sand and disposed in an approved rock disposal area. The Corps proposes the use of a hopper dredge for sand removal, with the dredged material transferred to a pumping station offshore of the nourishment beach.

The sand substrate typically supports a community composed of squid, amphipods, annelids, bivalves, gastropods, crustaceans, and scallops. These areas also support a variety of algae species and provide foraging for reef fish species that seek refuge in the adjacent hardbottom reefs.

B. Important Species and Taxa

Epibiota

Reef fauna may be divided into sessile and motile components. The sessile component contains the primary producers, some grazers or first order consumers, planktivores, and filter feeders. Hard corals occupy niches as both producer and consumer. Zooxanthellic algae within coral polyps photosynthesize while the polyps themselves capture planktonic organisms for consumption. As with the hard corals, carbon fixed far offsite is also concentrated on the reefs by tunicates, sabellariid worms, and sponges. These attached filter-feeding organisms contribute to the organic base by trapping nutrient-rich plankton as it is swept past the reef by wave- and wind-generated currents. Tunicates, sponges, and sabellariid worms add structure to the reef, providing shelter from predation for the numerous fishes of the reef.

Fishes and motile invertebrates

Fish and motile invertebrates are attracted to the reef by its structure. The numerous crevices, holes, undercut ledges, and epibiotic structure provide these organisms with a refuge from larger predatory fish. The reef also provides a barrier to currents and substrate for attaching demersal eggs. In addition to these features, the sessile organisms of the reef provide a large diverse food base on which some fish species feed directly. Others benefit from this indirectly by feeding on invertebrates and other smaller fish which are nurtured by sessile plant material.

The "food fish" species observed on Miami-Dade County reefs include hogfish *(Lachnolaimus maximus)*, porkfish (*Anisotremus virginicus*), gray snapper (*Lutjanus griseus*), spadefish (*Chaetodipterus faber*), gag grouper (*Mycteroperca microlepis*), and gray triggerfish (*Balistes carpiscus*). Species such as the gray snapper use shallow nearshore reefs as a staging area before recruitment into the offshore commercial and recreational fishery (Stark and Schroeder 1970). All reef fish species are ecologically or scientifically important and some value to recreational divers. Many species are collected for aquariums, such as angelfish (Pomacanthidae), butterflyfish (Chaetodontidae), wrasses (Labridae), damselfish (Pomacentridae) and doctorfish (Acanthuridae).

The spiny lobster (*Panulirus argus*) is the most popular fishery of the nearshore reefs. After spending its early post-larval life stages in estuarine habitats, young lobsters move to the nearshore reefs, where they may spend a good part of their adult lives. Many of these adults move further offshore seasonally (Lyons *et al.* 1981).

Other motile invertebrates include sea urchins, conch, octopus, polychaetes, and decapod crustaceans, which include penaeid shrimp (*Penaeus* spp.), portunid crab (*Portumus* spp.), stone crab (*Menippe mercenaria*), and spiny lobster. Crustaceans consume sessile and epiphytic algae and are, in turn, consumed by higher predators such as grunts (Pomadasydae) and snappers (Lutjanidae) (Odum 1969). Gastropods graze on algae, thereby passing nutrients and energy produced on the reef up the food chain. Predators of gastropods include other invertebrates, such as the spiny lobster.

Sea turtles

Miami-Dade County supports a small percentage (0.6 percent) of Florida's total sea turtle nesting (Meylan *et al.* 1995). Four species are known to nest in Miami-Dade County. The loggerhead sea turtle constitutes by far the largest percentage (approximately 95%) of Miami-Dade County's total nesting activity, with an average of 400 loggerhead nests constructed each year. Small numbers of green, hawksbill, and leatherback turtles nests are also present. The Service believes the recommendations in the Biological Opinion for the Coast of Florida Study, Region III, as revised by the Service on September 19, 2000, are valid for this project. A summary of the Reasonable and Prudent Measures of the October 24, 1996 Biological Opinion are: (1) substantial monitoring of compaction will be conducted and appropriate corrective actions will be taken, if needed; (2) relocation of nests will be required during periods of nesting activity; and (3) escarpments will be leveled, if they occur.

V. DISCUSSION

Anticipated impacts from the beach nourishment include potential impacts to the upper beach zone, surf zone, nearshore high energy reefs, offshore hardbottom reefs, and sand borrow areas. Impacts include burial from actual fill placement, burial and suffocation from turbidity generated from surf zone washing of the fill material, burial and suffocation from turbidity generated from sieving and slurrying of the dredged material from the hopper dredge to the pump station, scarring damage to the hardbottom reefs from the slurry pipeline, and suction dredge impacts to the non-motile species in the borrow areas. Secondary impacts, although not anticipated, can also occur to the hardbottom reefs, adjacent to the borrow zones, from accidental scarring of the reefs from dredging operations through misalignment of the dredge suction heads.

Upper Beach Zone

The upper beach zone supports ghost crabs, which are common and are at risk of burial. Limited information describes the crabs ability to "burrow up" to the surface if buried. If populations drop after nourishment takes place, it could be attributed to the emigration of crabs responding to a decreased food supply in the disturbed intertidal (surf) zone rather than from burial mortality (Nelson 1985). The upper beach zone also provides nesting habitat for federally listed sea turtles. Potential impacts to these species include loss of nest, reduced nesting activity, and reduced hatchling survival from sand placement, sand compaction, escarpment formation, and

sand color and texture changes. The Biological Opinion dated October 24, 1996, for Region III of the Coast of Florida Erosion and Storm Effects Study includes the project area considered for the proposed renourishment. The "Reasonable and Prudent Measures" and "Terms and Conditions" listed in the revised Biological Opinion for Miami-Dade County are applicable to the project and the Corps plans to incorporate these requirement into the project plans, specifications, and any contracts, as appropriate.

Surf Zone

The surf zone of the beach supports a diversity of amphipods, polychaetes, gastropods, bivalves, and surf zone fishes. The sand flea or mole crab is one of the more common inhabitants. Many of the surf zone species, because of their weak swimming capabilities, burrowing and/or cryptic nature, will be negatively impacted by the beach nourishment from the deposition of sand . New recruitment must come from juveniles or adults which migrate to the area. Increased sediment load may affect the respiration of some species, which could cause suffocation and the loss of these individuals. Information on surf zone fishes is limited, but generally states that most fish will flee to avoid the disturbed area and will return within a few months. Outside of lagoons, nearshore hardbottom areas are the primary natural structures in shallow waters of mainland Florida's east coast and are estimated to have nursery value for 34 species of fishes. (Lindeman and Snyder 1998). Nelson (1985) suggests that loss of habitat may be more harmful to fish than suspended sediment loading, which could clog their gills. Most surf zone fish may tolerate an elevated level of turbidity, but burrowing fish are at greater risk from burial.

In general, sandy beaches are populated by small, short-lived organisms with great reproductive potential. As a result, these communities tend to recover quickly from environmental disturbances. The effects of this beach nourishment project on the beach zone fauna will depend primarily on the quality of the nourishment material. Since the sand proposed to be used for this project is likely to contain below 5 percent (on average) silt and clay, significant recovery of the beach fauna should occur within one year.

Nearshore High Energy Reefs

Based on reef maps included in the Coast of Florida Study (Continental Shelf Associates 1993), the Corps does not expect impacts to nearshore high energy reefs. According to the report, the nearest reefs are approximately 800 feet east and offshore of the beach. Miami-Dade County conducted visual nearshore surveys of the beaches in the project area (Miami-Dade County 1999) and confirmed the absence of nearshore reef. The survey results (Figure 2) show nearshore high energy reefs approximately two thousand feet north of the project area. Impacts to nearshore high energy reefs, when present, could include direct burial through sand placement and excessive turbidity from washing of the dredged sand. While the fishes, which inhabit these reefs, will avoid adverse effects by leaving the area, the epifauna, which grows on the rocky substrate, would be lost. The affected habitat would include nearly all of the epibenthic organisms (e.g., sponges, bryozoans, and stony corals) within the renourishment area. When

present, this habitat is unique in that it is located in a shallow dynamic area. Located in the surf zone, wave action seasonally and intermittently scours the rock, making it available for the re-settlement of pioneering sessile organisms. The presence of an abundance of these organisms in early life stages provides unique forage opportunities for fishes, including jeuvenile commercially valuable species, and invertebrates. This habitat should be recognized as a valuable fishery resource. The South Atlantic Fishery Management Council's Fishery Management Plan calls for avoiding impacts to this important resource.

We are not aware of any research addressing possible cumulative secondary impacts to these reefs from the repeated transfer of offshore silt from beach renourishment to the nearshore water column and benthic environment. We believe that research in this context is needed in light of potential cumulative impacts. Though no nearshore hardbottom is present at this project, it is found in varying concentrations nearby and intermittently all along the east coast of south Florida.

Offshore Reefs

The Coast of Florida Study (Continental Shelf Associates 1993) and visual surveys conducted by Miami-Dade County (1999) show extensive hard bottom coraline reefs immediately east of the renourishment beach and on both sides of the two borrow areas. Potential impacts to these reefs may include burial and suffocation from turbidity generated from sieving and slurrying of the dredge material from the hopper dredge to the pump station, scarring damage to the hard bottom reefs from the slurry pipeline, and although not anticipated, accidental scarring of the reefs from dredging operations through misalignment of the dredge suction heads.

The dredging of placement material and associated disturbance of benthic sediments will most likely create a turbidity plume. Estimates (M. Dupes, Corps, pers. comm., 1995) referenced in the Corps' 1987 DEIS for the Sunny Isles Beach Renourishment, indicate a possible plume size of one-half mile in length. Little information is available for nourishment impacts in the offshore reef zone. Studies indicate the main concern in this zone is that of clogging the gills of resident fish by suspended solids, which may lead to suffocation (Nelson 1985) and the coating of the sessile reef dwelling species. Most mobile pelagic species of fish will leave the work area and return after the work is done. The hard bottom coraline community as a group is the most sensitive community to potential impacts from turbidity generated by the dredging operations and may suffer the greatest impacts from suspended sediments settling onto the reef. Past occurrences of sedimentation damage to reef communities have been documented for renourishment at Sunny Isles in 1988 and at Bal Harbour in 1990. Sediment impacts to the reef during the 1990 incident were though to be caused by the dredge spending a significant amount of time dredging in one confined area between reefs located immediately north and south of the area dredged. Blair and Flynn (1988) and Blair *et al.* (1990) discuss factors believed to have contributed to the impacts documented and have recommended modifications to project specifications to reduce or eliminate impacts. This project will include stipulations addressing dredge positioning and movement to prevent excessive sedimentation.

As part of the current project, the Corps is proposing the incorporation of an extensive turbidity monitoring program into the design and construction specifications for the project. The turbidity monitoring program was developed by Miami-Dade County for the Sunny Isles Renourishment Project (Miami-Dade County 2000). The monitoring program will include a series of monitoring stations on the adjacent hardbottom reefs and the beach fill sites. The monitoring program will require surveys to be conducted throughout the construction phase of the project to ensure levels of turbidity are maintained below State water quality standards. In addition, visual inspections of the hardbottoms adjacent to the borrow area will also be performed. The hardbottoms in proximity to the dredging area will be surveyed at least twice a week to look for any indicators of turbidity or sediment impacts. Findings of such indicators will trigger actions from equipment operational changes to halting the dredge operations until a determination can be made as to the cause and rectification of the factors creating the stress or imminent impact. With the inclusion of this extensive monitoring program in the Corps' project design documents, the Service believes that suspended sediments will have minimal impact to natural resources in the project area.

Hardbottom impacts can also include reef scarring from the placement of the slurry pipe line and accidental misalignment of the dredge suction heads during dredging operations. As a means of preventing misalignment of the dredge suction heads, as well as providing a sedimentation buffer, the Corps is proposing a minimum of a 400-foot separation between hard bottom communities and the project borrow areas. Proper controls and procedures will be used to avoid mechanical damage from the equipment. Project and construction specifications, which will prevent such damage and proposed by the Corps, include the use of recording and displaying real-time precision electronic location equipment during dredging operations. The equipment will provide exact position of the dredge to the operator and allow continuous monitoring of the dredge location during operations. With the use of the proposed electronic monitoring and position location equipment, the Service does not expect significant impacts to occur from the mechanical operation of the dredge.

The slurry pipeline corridor for this project will also serve as the corridor for the upcoming Alternate Test Beach renourishment project, which includes this 63rd street area. Miami-Dade County conducted an extensive survey of the reef zones to identify the least damaging alignment for the slurry pipeline that would provide suitable access to the nourishment beach. The corridor that was identified produced the least amount of scarring to the offshore reefs (Miami-Dade County 2000). This recently completed alignment survey provided the proposed location of the 63rd Street slurry pipeline. The alignment assumes a pipeline footprint width of 0.25 meters (m) along the entire path over the reef. The estimated amount of reef damage is 311 m^2. The potential pipeline contact path is projected to include 532 hard corals, 2,637 soft corals, and 2,329 sponges. However, as past projects have shown, the pipeline will not be in contact with the reef along the entire path. Variability of bottom relief and permit required pipeline "collars" (tractor tires will be used in this project) serve to support the pipeline for considerable distances, thus dramatically reducing the area of physical contact between the pipe and the reef. Actual impacts from several recent projects have been shown to be between 18% and 83% of full

pathway projection. Therefore, mitigation will be calculated post-construction and consist of artificial reef modules designed with concrete and limerock. The modules will be placed nearby at a 1:1 area of impact to base area of module ratio. With a 5 ft. by 9 ft. base area, one module per 5 m^2 of hardbottom impacts will be required, as outlined in the state Department of Environmental Protection permit. Due to the approximate 6:1 surface area to base area of these modules being substantially greater than impact surface area, we expect the actual mitigation habitat substrate ratio to be more akin to 2:1. The Service supports this mitigation proposal. We recommend that the Corps research a temporal factor, incorporating a functional equivalency assessment, for insertion in mitigation calculations, for a true ratio validation here and in future projects. The Service recommends Habitat Equivalency Analysis: An Overview (NOAA, Damage Assessment and Restoration Program, 1995) as one reference. Another reference, based on this concept, is the Temporal Lag Table found in Section 5c of the Corps sponsored Joint State/Federal Mitigation Bank Review Team Process For Florida (October 1998). The temporal factor should account for the time lag in establishing a functional, viable hardbottom community that is comparable to the community impacted by the pipeline scarring.

Borrow Zone

Two borrow zones are proposed for the 63rd Street renourishment. Project impacts include the loss of the benthic fauna characteristic of these sand flats and various species of seasonally abundant algae. Dredging would result in the loss of these organisms. Additionally, several studies by various authors on dredged borrow sites and turbidity indicate that the short-term impacts to aquatic resources are limited to the immediate and temporary defaunation of the benthic community (USACE 1997). Long-term effects observed in the study areas were a reduction in species diversity, density, and community stability. The studies also indicate that the reestablishment of the benthic community correlates directly to the recovery of the physical and chemical characteristics of site sediment. In a study of a borrow area located offshore of Delray Beach, Florida, Bowen and Marsh (1988) concluded that recovery of the infaunal community occurred within 1 year. Cutler and Mahadevan (1982) found no significant differences in biotic communities between borrow sites and surrounding areas off Panama City, Florida, some 3 to 4 years after a beach renourishment project. More recent studies by Wilber and Stern (1992) of borrow sites in southeast Florida concluded that the borrow site did not recover after 3 years following dredging. The Service is not aware of recent detailed studies of the borrow site recovery process in the Broward and Miami-Dade county areas of the Florida coastline. Recent discussions with National Marine Fisheries personnel (M. Johnson, 2000, pers. comm) also confirm that limited information is available on the flora, fauna, physical, and chemical recovery of borrow sites. The Service believes that more detailed evaluations of the biological, physical, and chemical recovery of these marine environments are needed.

Threatened and Endangered Species

Consultation under section 7 of the Endangered Species Act of 1973, as amended, has been completed for threatened and endangered sea turtles. The Service concluded that the proposed

action is not likely to jeopardize the continued existence of these species. A copy of the Service's original Biological Opinion dated October 24, 1996, for Region III of the Coast of Florida Erosion and Storm Effects Study, and as revised by letter dated October 4, 2000, are included as appendices to this report.

VI. RECOMMENDATIONS

In developing the Service's Mitigation Policy (Federal Register 46 (15), Pg. 7656), the definition of mitigation contained in the Council on Environmental Quality's National Environmental Policy Act regulations (40 CFR 1508.20[a-e]) was used. As such, mitigation can include:

1. avoiding the impact all together by not taking a certain action or parts of an action;

2. minimizing impacts by limiting the degree of magnitude of the action and its implementation;

3. rectifying the impacts by repairing, rehabilitating, or restoring the affected environment;

4. reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and

5. compensating for the impact by replacing or providing substitute resources or environments.

This definition recognizes mitigation as a stepwise process that incorporates both careful project planning and compensation for unavoidable losses and represents the desirable sequence of steps in the mitigation planning process. Initially, project planning should attempt to ensure that adverse effects to fish and wildlife resources are avoided or minimized as much as possible. In many cases, however, the prospect of unavoidable adverse effects will remain in spite of the best planning efforts. In those instances, compensation for unavoidable adverse effects is the last step to be considered and should be used only after the other steps have been exhausted.

The Service's Mitigation Policy focuses on the mitigation of fish and wildlife habitat values, and it recognizes that not all habitats are equal. Thus, four resource categories, denoting habitat type of varying importance from a fish and wildlife resource perspective, are used to ensure that the mitigation planning goal will be consistent with the importance of the fish and wildlife resources involved. These categories are based on the habitat's value for the fish and wildlife species in the project area (evaluation species) and the habitat's scarcity on a national, regional or local basis. Resource Category 1 is of the highest value and Resource Category 4, the lowest. Mitigation goals are established for habitats in each resource category.

The mitigation goal for Resource Category 1 habitats is no loss of habitat value since these unique areas cannot be replaced. The goal for Resource Category 2 habitats is no net loss of in-kind habitat value. Thus, a habitat in this category can be replaced only by the same type of habitat (i.e., in-kind mitigation). The mitigation goal for Resource Category 3 habitats is no net loss of overall habitat value. In-kind replacement of these habitats is preferred, but limited substitution of different types of habitat (out-of-kind mitigation) perceived to be of equal or greater value to replace the lost habitat value may be acceptable. The mitigation goal for Resource Category 4 habitats (considered to be of marginal value) is to avoid or minimize losses, and compensation is generally not required.

Priority habitats in the project area include offshore hardbottom reefs within the pipeline corridor and hardbottom reefs which are present in the vicinity of the borrow areas. These habitats are generally considered by the Service to be in Resource Category 2, and no net loss of in-kind habitat value is recommended. However, we consider any significant colonies of hard (stony) coral in this area to be Resource Category 1. Research suggests that two species of brain and star coral grow at a rate of approximately 0.5 centimeters per year (Dodge 1987). Based on this information, we estimate it would take these corals, and likely other hard coral species, at least 100 years to reach 1 meter in diameter.

The Corps through coordination with the Service is proposing specific measures in the specifications of the project that, if implemented, should reduce adverse environmental effects of the proposed project. These measures are:

1. The 400-foot restrictive buffer zone will be maintained as proposed around hardbottom reefs to protect the reefs from accidental damage from misalignment of the dredge suction heads and reduce sediment settlement on the reefs from the actions of the dredge operations. The Corps has proposed this dredge restriction as part of the proposed action. Mitigation should be required for any unforeseen cutterhead damage or significant sedimentation damage to benthic habitat and organisms, especially hard corals.

2. The Service has expressed concerns with the ability of the dredge operators to accurately place the dredge and dredge suction heads in the borrow areas. As part of the proposed action, the Corps is including in the construction specifications specific requirements that the dredge contractor will have precision electronic location equipment that will provide the exact position of the dredge and will allow continuous monitoring of the dredge location during operations.

3. The Service has expressed concerns with the potential effects from turbidity on nearby hardbottom reefs, as generated by the hopper dredge during dredging operations, by sediment transfer and sieving at the pumping station, and by sediment placement on the beach. The Corps has proposed a turbidity monitoring program and sedimentation monitoring (Miami-Dade County 2000) that will measure the levels of each generated by the material transfer and will provide corrective protocols to protect area reefs. The

NMFS also recommended that turbidity and sediment monitoring plans include all phases of the project, including offshore sediment transfer, sieving operations at the pump station, slurry transfer through the pipeline, and sediment placement on the beach.

4. The Service has expressed concerns with the potential effects from the slurry pipeline placement across portions of the offshore reefs between the pumping station and the nourishment beach. The Corps has identified a preferred pipeline route though a study prepared by Miami-Dade County (2000) that minimizes reef contact and includes mitigation for post-construction verified impacts. Mitigation will include the nearby placement of concrete/limerock reef modules at the ratio of one module per $5m^2$. Miami-Dade County divers will micro-site actual pipeline placement. Hard corals should be avoided or relocated, especially those requiring 50 to 100 years to reach diameters of 0.5 to 1 meter. Tractor tires will be used as elevation collars. It is also our understanding that buoy cables, such as those responsible for reef damage in a previous area project, will be removed after pipeline placement in order to avoid this problem.

In addition, the Service offers the following recommendations:

1. The Service recommends that the Corps account for temporal lag in the mitigation quantification that accounts for time between damage occurred and the development of suitable "in-kind" habitat, which functions at the same resource level as the resource lost to the environment. We recommend that the Corps research temporal factors, incorporating a functional equivalency assessment, for insertion in mitigation calculations, for a true ratio validation here and in future projects. The Service recommends Habitat Equivalency Analysis: An Overview (NOAA, Damage Assessment and Restoration Program, 1995) as one reference. Another reference, based on this concept, is the Temporal Lag Table found in Section 5c of the Corps sponsored Joint State/Federal Mitigation Bank Review Team Process For Florida (October 1998).

2. The Service believes that research is needed in addressing possible cumulative secondary environmental impacts from the repeated transfer of offshore silt from to the nearshore benthic system along the coast of south Florida, for the evaluation of future projects.

3. The Service believes that more detailed evaluations of the biological, physical, and chemical recovery of sand borrow areas in general are needed for evaluation of future projects.

Refer to the Terms and Conditions of the Biological Opinion for Region III of the Coast of Florida Erosion and Storm Effects Study, and the letter of revision dated October 4, 2000 (appendices) for the protection of threatened and endangered sea turtles.

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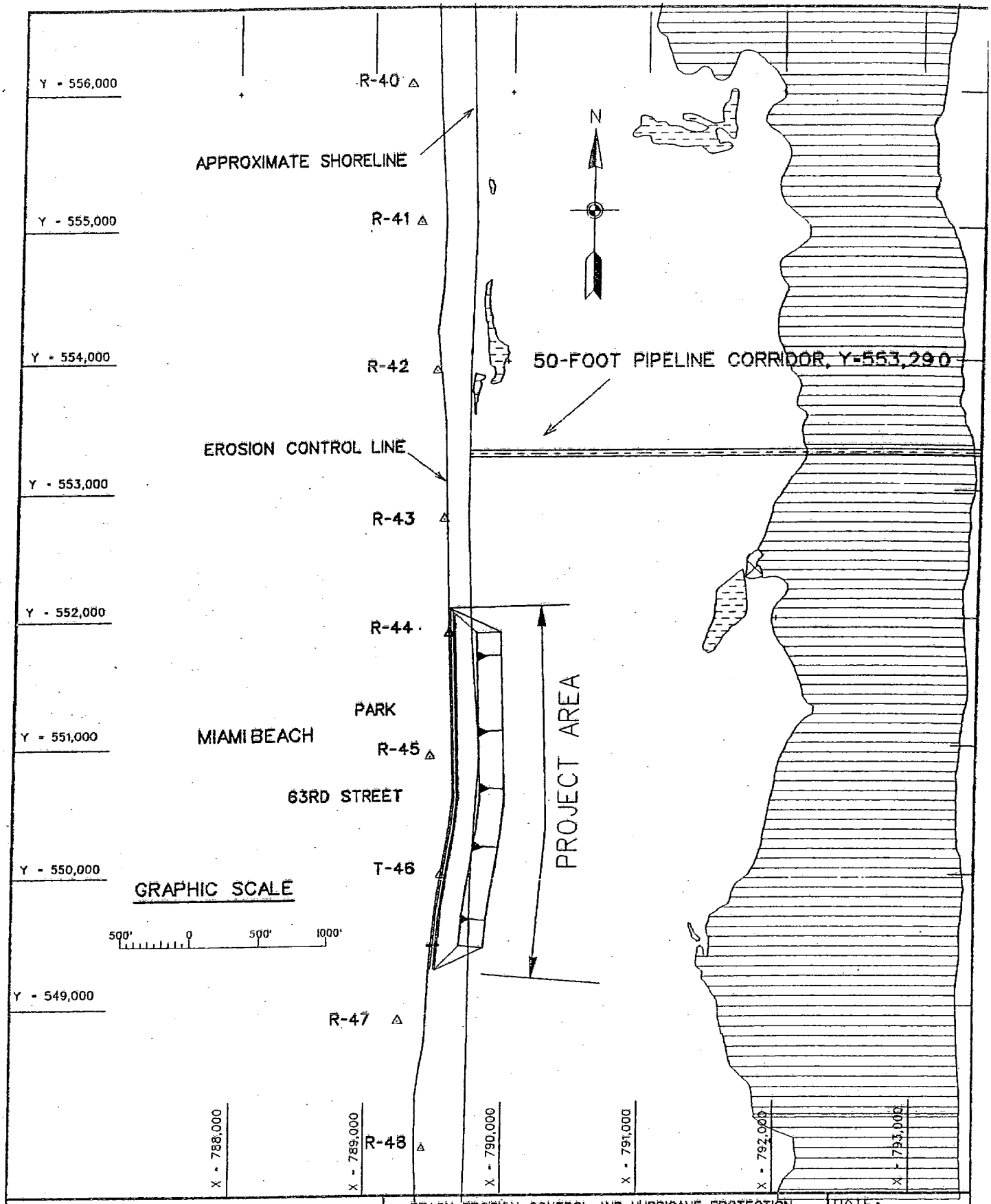


PLAN VIEW OF BEACH FILL AREA

Figure 1

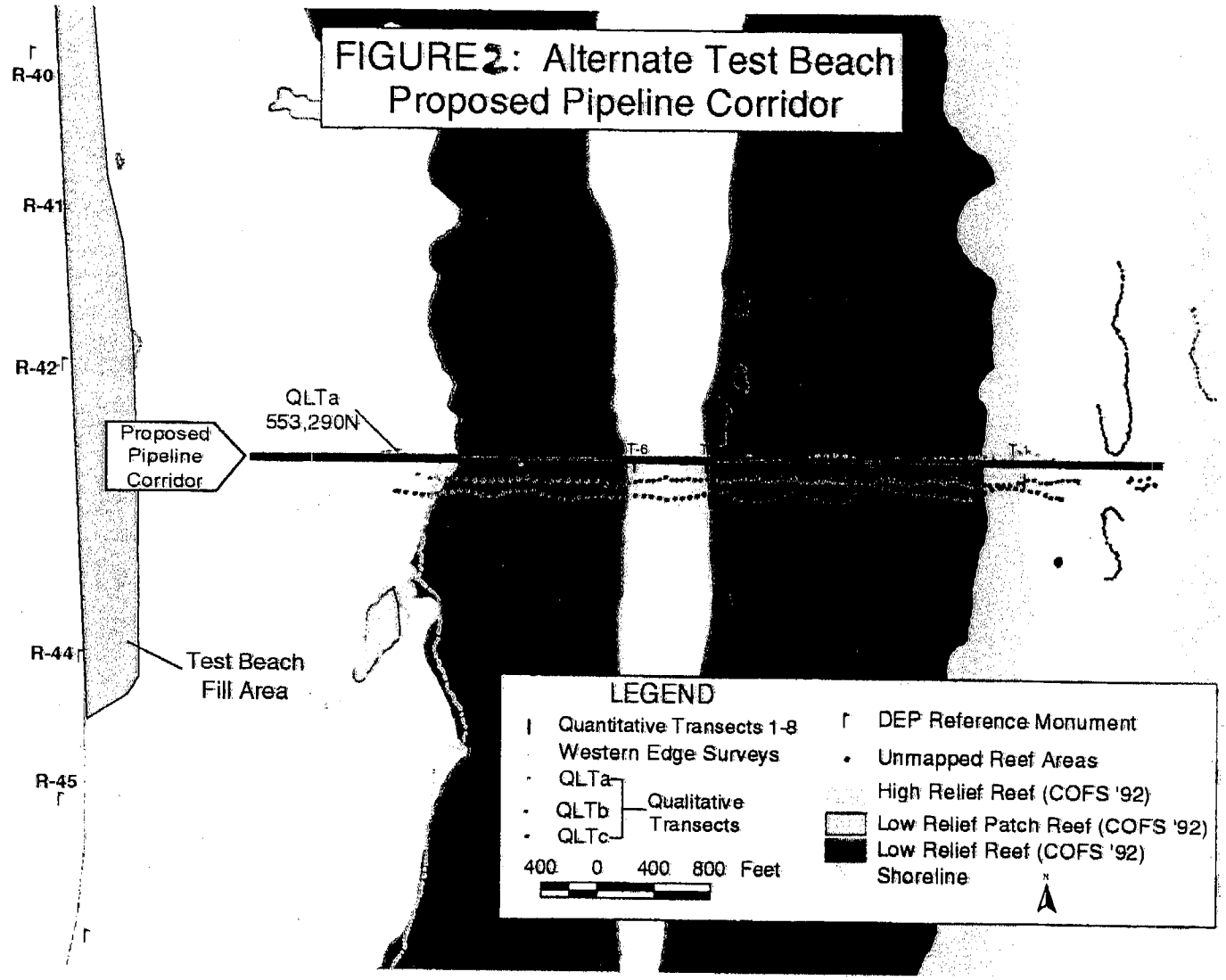
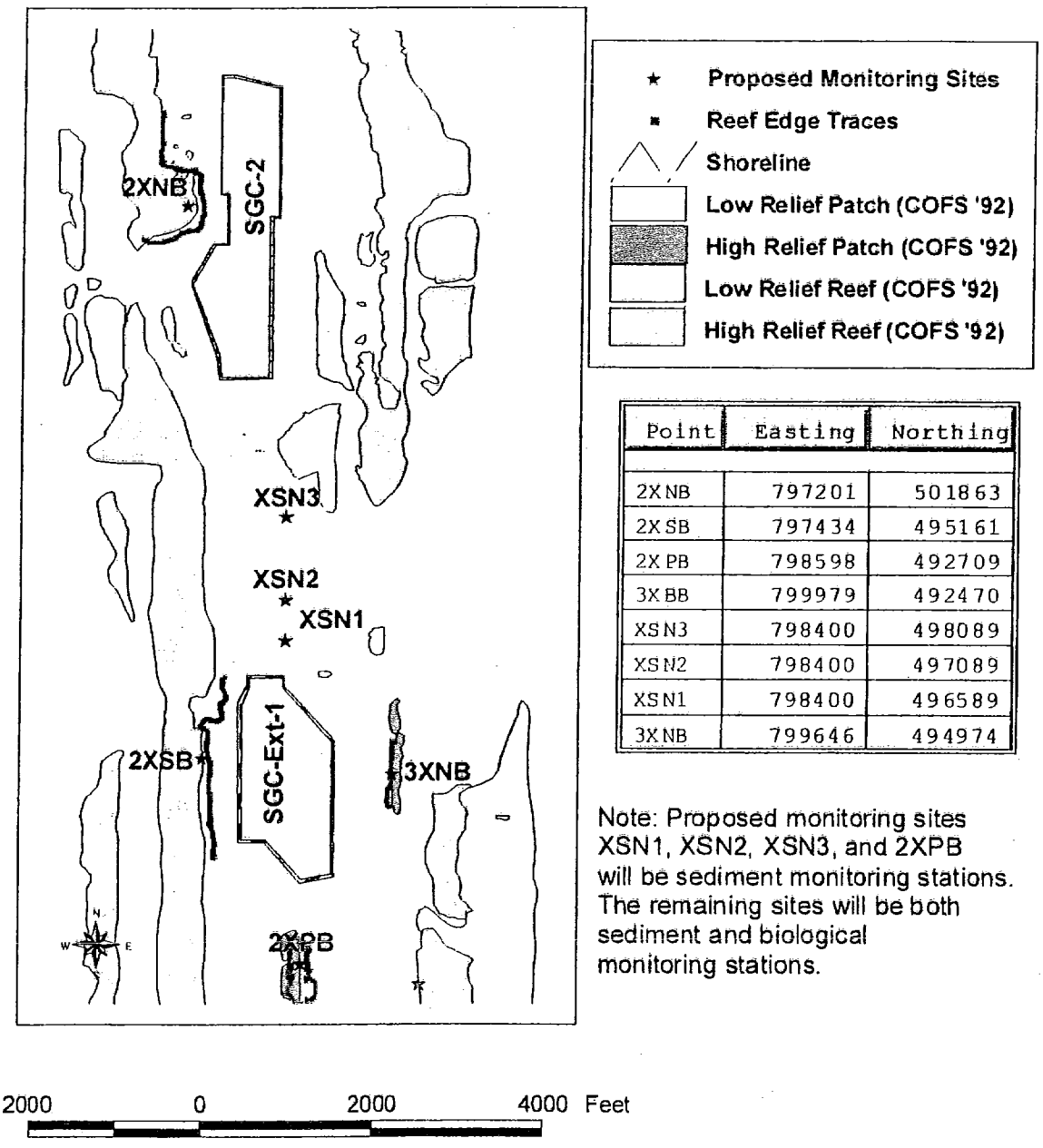


FIGURE 2: Alternate Test Beach
Proposed Pipeline Corridor
R-40
R-41
R-42
R-44
R-45
QLTa
553,290N
Proposed
Pipeline
Corridor
Test Beach
Fill Area
T-6
LEGEND
Quantitative Transects 1-8
Western Edge Surveys
QLTa
QLTb
QLTc
Qualitative
Transects
400 0 400 800 Feet
DEP Reference Monument
Unmapped Reef Areas
High Relief Reef (COFS '92)
Low Relief Patch Reef (COFS '92)
Low Relief Reef (COFS '92)
Shoreline
N



Point	Easting	Northing
2XNB	797201	501863
2XSB	797434	495161
2XPB	798598	492709
3XBB	799979	492470
XSN3	798400	498089
XSN2	798400	497089
XSN1	798400	496589
3XNB	799646	494974

Note: Proposed monitoring sites XSN1, XSN2, XSN3, and 2XPB will be sediment monitoring stations. The remaining sites will be both sediment and biological monitoring stations.

Figure 3. Location of the Borrow Area relative to the offshore hard-ground areas and approximate center points for the Benthic Community and Sediment Accumulation Monitoring Stations.

APPENDICES

Appendix

Appendix 1	Coast of Florida Biological Opinion
Appendix 2	Service Concurrence Letter - 63rd Street Renourishment

United States Department of the Interior

FISH AND WILDLIFE SERVICE
P.O. Box 2676
Vero Beach, Florida 32961-2676
October 24, 1996

IN REPLY REFER TO:

Colonel Terry Rice
District Engineer
U.S. Army Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

Attn: Planning Division

FWS Log No.: 4-1-96-F-268
Project: Coast of Florida Study, Region III

Dear Colonel Rice:

The U.S. Fish and Wildlife Service (FWS) has reviewed the draft Feasibility Report for the Coast of Florida Erosion and Storm Effects Study, Region III submitted by the U.S. Army Corps of Engineers (COE). This letter represents the FWS' biological opinion on the effects of the planned actions within this report in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (ESA). Effects of the planned actions on other resources such as nearshore reefs remain to be addressed in accordance with section 2(b) of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. *et seq.*).

This biological opinion programmatically addresses beach nourishment and renourishment in Region III. According to the COE's Biological Assessment (BA), separate biological opinions will be prepared for individual projects at a more advanced planning stage. This biological opinion is based on information provided from the following sources: the Feasibility Report, which includes a draft Environmental Impact Statement (DEIS), the BA for the Coast of Florida Study, Region III, from the Florida Department of Environmental Protection (FDEP), from Palm Beach, Broward, and Dade Counties, field investigations, previous biological opinions prepared for similar actions in the action area as well as other published and unpublished sources of information. A complete administrative record of this consultation is on file in the FWS' South Florida Ecosystem Office in Vero Beach, Florida.

CONSULTATION HISTORY

On October 5, 1995, the COE provided the FWS with a BA and a letter requesting formal consultation on threatened and endangered sea turtles as a result of the proposed actions associated with the Coast of Florida Study, Region III.

In a letter dated February 14, 1996, the FWS requested from the COE an estimate of the number of proposed projects which could be constructed within a single year. In this letter, the FWS notified the COE that formal consultation could not be initiated without this information.

In a letter dated March 28, 1996, the COE provided the FWS with the information requested above.

On July 9, 1996, the FWS notified the COE that the information provided is sufficient, formal consultation is initiated, and a biological opinion would be provided by August 23, 1996.

In August 1996, a revised DEIS for the Coast of Florida Study was received by the FWS.