July 2004

Draft Environmental Assessment

SECTION 227 NATIONAL SHORELINE EROSION CONTROL DEVELOPMENT AND DEMONSTRATION PROGRAM

63rd STREET " HOTSPOT" SUBMERGED ARTIFICIAL REEF TRAINING (SMART) STRUCTURE MIAMI-DADE COUNTY, FLORIDA

U.S. Army Corps of Engineers
JACKSONVILLE DISTRICT

DRAFT FINDING OF NO SIGNIFICANT IMPACT

PROPOSED SUBMERGED ARTIFICIAL REEF TRAINING (SMART) STRUCTURE SECTION 227 NATIONAL SHORELINE EROSION CONTROL DEVELOPMENT AND DEMONSTRATION PROGRAM FOR THE 63RD STREET "HOTSPOT" MIAMI BEACH MIAMI-DADE COUNTY, FLORIDA

I have reviewed Environmental Assessment (EA) for the proposed action. This Finding incorporates by reference all discussions and conclusions contained in the EA enclosed hereto. Based on information analyzed in the EA, reflecting pertinent information obtained from agencies having jurisdiction by law and/or special expertise, I conclude that the proposed action would not significantly impact the quality of the human environment and does not require an Environmental Impact Statement. Reasons for this conclusion are in summary:

a. The proposed action would retain the shoreline of an erosional "Hotspot" at Miami Beach, Florida, thus preventing or reducing loss of public beachfront to continuing erosional forces and preventing or reducing periodic damages and potential risk to life, health and property in the developed lands adjacent to the beach. The need for periodic renourishments, and their affects to natural resources, would also be lessened

b. The Draft Fish and Wildlife Coordination Act Report of (July 2004) indicates no objection by the Department of the Interior and full compliance with the Endangered Species Act, the Coastal Barrier Resources Act and Fish and Wildlife Coordination Act.

c. Measures to prevent or minimize impacts to sea turtles in accordance with the Biological Opinions from the U.S. Fish and Wildlife Service and the National Marine Fisheries Service would be implemented during and after project construction. To protect the manatees, water-based activities would follow standard manatee protection measures (Appendix G). There would be no adverse impacts to other federally listed endangered or threatened species.

d. Pending the State's concurrence with the Federal Coastal Zone Consistency Determination (Appendix B of the EA), the action is consistent with the State's Coastal zone Management program.

e. Based on historic property field investigations and consultation with the State Historic Preservation Officer, no significant historical properties have been identified within the proposed project area.

f. Water Quality Certification, pursuant to Section 401 of the Clean Water Act, was issued by the Florida Department of Environmental Protection on (To Be Determined).

g. Measures to eliminate, reduce, or avoid potential impacts to fish and wildlife resources include the following: (1) Turbidity monitoring would be preformed at the SMART structure site during installation of the project, within the vicinity of NE 63rd Street "Hotspot" location, to ensure turbidity levels do not exceed the State water quality standards, (2) To avoid vessel impact damage to hardbottom habitat associated with vessel transit across those areas, precision electronic positioning equipment would be used to ensure the vessels have adequate water depth to avoid impacts, (3) Visual inspection of hardground habitat in proximity of the SMART structure project area would be routinely conducted to check for any indicators of turbidity, sedimentation or mechanical impacts, (4) Any unavoidable impacts to the nearshore hardbottom habitat from the project would be appropriately mitigated as described in the Environmental Assessment Monitoring Plan (Appendix F), (5) The SMART structure segment design has been adjusted to provide 'sea turtle access lanes', every 10th segment, as per USFWS request on June 16, 2004, (6) Under the authority of Section 227 of the Water Resources Development Act of 1996, The National Shoreline Erosion Control Development and Demonstration Program provides for adjustment or removal of the SMART structure if project goals and objectives are not met. This is a basic element of the SMART structure design.

h. USFWS concerns about sea turtles, littoral drift and manatees are addressed within the Environmental Assessment.

Robert M. Carpenter Colonel, U.S. Army District Engineers	Date

DRAFT
ENVIRONMENTAL ASSESSMENT
ON THE
PROPOSED SUBMERGED ARTIFICIAL REEF TRAINING (SMART) STRUCTURE
SECTION 227 NATIONAL SHORELINE EROSION CONTROL
DEVELOPMENT AND DEMONSTRATION PROGRAM
FOR THE 63RD STREET "HOTSPOT" MIAMI BEACH
MIAMI-DADE COUNTY, FLORIDA

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1 PROJECT PURPOSE AND NEED

1.1 PROJECT AUTHORITY.

1.1.1 INITIAL AUTHORIZATION.

The proposed project was authorized under Section 227 of the Water Resources Development Act (WRDA) of 1996, the National Shoreline Erosion Control Development and Demonstration Program of the U.S. Army Corps of Engineers. The Secretary of the Army shall establish and conduct a national shoreline erosion control development and demonstration program for a period of 6 years beginning on the date that funds are made available to carry out this section.

A separate project, immediately adjacent to the proposed SubMerged Artificial Reef Training (SMART) structure is the (Test Beach) Renourishment At Miami Beach in the Vicinity of 63rd Street, Miami-Dade County Beach Erosion Control and Hurricane Protection Project, Miami-Dade County, Miami, which was authorized by the Flood Control Act of 1968. In addition, Section 69 of the 1974 Water Resources Act (P.L. 93-251 dated 7 march 1974) included the initial construction by non-federal interests of the 0.85-mile segment along Bal Harbour Village, immediately south of Bakers Haulover Inlet. The authorized project, as described in House Document 335/90/2, provided for the construction of a protective/recreational beach and a protective dune for 9.3 miles of shoreline between Government Cut and Baker's Haulover Inlet (encompassing Miami Beach, Surfside and Bal Harbour) and for the construction of a protective/recreational beach along the 1.2 miles of shoreline at Haulover Beach Park.

1.1.2 SUPPLEMENTAL APPROPRIATION.

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 project to include the construction of a protective beach along the 2.5 mile reach of shoreline north of Haulover Beach Park (Sunny Isles) and for periodic nourishment of the new beach. This authority also provided for the extension of the period of Federal participation in the cost of nourishing the authorized 1968 BEC & HP Project for Dade County, which covered 10.5 miles of shoreline extending from Government Cut north to the northern boundary of Haulover Beach Park, from 10 years to the 50-year life of the project.

1.2 PROJECT LOCATION.

The project is located on the southeast Florida coast within Miami-Dade County. The proposed work would be constructed from NE 63rd Street, near State of Florida DNR Monument R-46, northward, approximately 1,800-foot, to NE 65th Street, within the community of Miami Beach (see Figure 1, Location Map).

1.3 PROJECT NEED OR OPPORTUNITY.

The proposed underwater breakwater ('SubMerged Artificial Reef Training Structure – SMART) is necessary to help prevent storm damage in the 'Hotspot area' of the Miami-Dade County Beach Erosion Control and Hurricane Protection (BEC&HP) Project. The intent of SMART is to reduce wave energy in the area of the 'Hotspot erosion area' of Miami Beach (see US Army Corps of Engineers Final Environmental Assessment, Renourishment at Miami Beach in the Vicinity of 63rd Street, BEC&HP, November 2000). The Section 227 Program provides an opportunity in cooperation with other Federal and non-Federal agencies, to address coastal erosion challenges.

Offshore borrow sources of beach quality sediment along the Miami-Dade County shoreline have been almost completely depleted, requiring innovative solutions to help prevent beach erosion and conserve beach quality sediment. No dredging is proposed.

1.4 AGENCY GOAL OR OBJECTIVE.

1.4.1 OBJECTIVE

The objective of this Section 227 National Shoreline Erosion Control Development and Demonstration

Program is for the research and development of innovative structures or non-structural methods for shoreline erosion control and includes the demonstration of prototype-scale "innovative" or "non-traditional" methods for the design and building of research structures to abate erosion and retain placed fill material along shorelines. The objective of the 63rd Street "Hotspot: Miami Beach, Florida, Section 227 project is to retain sand at the southern terminus of this fill project without causing impacts to adjacent shorelines, when exposed to the combination of storm surge and design wave events with a 10-year return interval. A second objective is for the structure to remain stable and not incur any damage if exposed to the combination of storm surge and design events with a 50-year return interval. The SMART structure gains merit when the increase in marine habitat is considered.

1.4.2 PROPOSED ACTION
The proposed Section 227 "SMART" project would be located parallel to Miami Beach from NE 63rd Street, north approximately 1,800-foot to NE 65th Street. The SMART structure would be installed at an average depth of 7-foot below Mean Low Water (MLW). The SMART structure crest would be covered by one-foot of water at MLW. SMART would be located approximately 400-foot offshore of the mean shoreline (see Figure 2 – Preferred Alternative).

The SMART structure would be constructed of 42.8-foot long segments approximately 6-foot wide (see Figure 3 – SMART Structure Typical Cross Section). The SMART structure segments would be placed parallel the shoreline, to form an overall, crescent-shaped, continuous structure that would be approximately 2,272-foot long located between DEP monument R-46A and R-44. Northern and southern structure terminus would be angled and narrowed (see Figure 2).

The SMART structure segments would be composed of Goliath reef balls and smaller bay balls anchored to 6-foot by 6-foot concrete slabs attached to ARMORTEC Armorflex Concrete Block Mats (ABM) connected with cables in PVC pipe. Each free-standing reef ball would be anchored to solid ground to ensure stability. The SMART structure reef balls/ABM segments would be placed next to each other to better fit with the somewhat variable benthic landscape and better absorb and diffuse wave energy. Every 10th SMART segment would be comprised of smaller reef balls (approximately 3-foot high) to provide 'sea turtle access lanes' as per USFWS June 16, 2004 request.

The reef modules (balls) would be bell-shaped, constructed of concrete, approximately 5.90-foot tall, 5.90-foot wide and weigh 9,800 pounds each for stability. The reef modules would be hollow with randomly perforated complex (piling, coral transplant and ventilation) holes. A solid 'Bay Ball' would be attached to the concrete mat to anchor the oceanside segment of the mat and prevent scouring. The SMART design provides a significant mass with a low center of gravity that is cost-effective to install from the sea via barge and crane. No upland construction lands would be needed accept at a local port for the loading of materials. No dredging is proposed.

1.5 RELATED ENVIRONMENTAL DOCUMENTS.
The following is a list of related documents:

a. Dade County Beaches, Florida, Beach Erosion Control and Hurricane Surge Protection, General Design Memorandum, Phase I. U.S. Army Corps of Engineers, Jacksonville District, 1974.

b. Final Environmental Impact Statement, Beach Erosion Control and Hurricane Surge Protection Project, Dade County, Florida. U.S. Army Corps of Engineers, Jacksonville District, April 1975.

c. Beach Erosion Control and Hurricane Protection Study for Dade County, Florida, North of Haulover Beach Park, Survey Report and EIS Supplement. U.S. Army Corps of Engineers, Jacksonville District, June 1984.

d. Final Environmental Assessment, Second Periodic Nourishment, Sunny Isles and Miami Beach Segments, Beach Erosion Control and Hurricane Protection Project, Dade County, Florida. U.S. Army Corps of Engineers, Jacksonville District, May 1995.

e. Coast of Florida Erosion and Storm Effects Study, Region III, Feasibility Report with Final Environmental Impact Statement. U.S. Army Corps of Engineers, Jacksonville District, October 1996.

f. Final Environmental Assessment, Beach Erosion Control and Hurricane Protection Project Dade County, Florida, Second Periodic Nourishment, Surfside and South Miami Beach Segments. U.S. Army Corps of Engineers, Jacksonville District, April 1997.

g. Final Environmental Impact Statement, Beach Erosion Control and Hurricane Protection Project Dade County, Florida, Modifications at Sunny Isles. U.S. Army Corps of Engineers, Jacksonville District, July 1998.

h. Final Environmental Assessment, Beach Erosion Control and Hurricane Protection Project Dade County, Florida, Second Periodic Renourishment, at Bal Harbour. U.S. Army Corps of Engineers, Jacksonville District, May 1998.

i. Final Environmental Assessment, Renourishment, at Miami Beach in the Vicinity of 63rd Street, Beach Erosion Control and Hurricane Protection Project, Dade County, Florida. U.S. Army Corps of Engineers, Jacksonville District, November 2000.

1.6 DECISIONS TO BE MADE.
The decisions to be made include how to retain sand at the southern terminus of the 63rd Street "Hotspot" Test Beach Fill project without causing impacts to adjacent shorelines. The no action plan and the

SMART proposal are the alternatives being considered. This Environmental Assessment (EA) would evaluate the use of the SMART technology to retain sand at the southern terminus of the Dade County (BEC&HP) Project. The No Action Plan would allow continued shoreline erosion and loss of turtle nesting habitat.

1.7 SCOPING AND ISSUES.

Copies of the Notice of Intent (NOI), the list of addressees used for distribution, and letters of response have been completed to prepare a Draft Environmental Impact Statement and appeared in the Federal Register on May 15, 2003. Copies of the NOI were distributed to the appropriate Federal, State and local agencies, appropriate city and county officials, and other parties known to be interested in the project included in Appendix C Pertinent Correspondence. Due to the NOI responses received an Environmental Assessment (EA) with Finding of No Significant Impact (FONSI) would be prepared. Scoping of resources agencies has continued with meetings in Tallahassee, Bal Harbor, Miami Beach and Sunny Isles.

1.7.1 ISSUES EVALUATED IN DETAIL.

The following issues were identified during scoping and by the preparers of this Environmental Assessment to be relevant to the proposed action and appropriate for detailed evaluation:

a. Downdrift littoral effects, turbidity and sedimentation impacts to offshore hardground/reef communities.
b. Potential effects to sea turtle access and nesting.
c. Potential effects on the beach benthic infaunal community.
d. Water quality.
e. Endangered Species.
f. Essential Fish Habitat (EFH).
g. Impacts on historic properties (i.e. historic shipwrecks).
h. Recreation/Public Safety.
i. Structure stability
j. Mitigation

1.7.2 IMPACT MEASUREMENT.

The following provides the means and rationale for measurement and comparison of impacts of the proposed action and alternatives.

1.7.2.1 Hardground and Reef Impacts.

Based on extensive experience with projects within the Miami-Dade County and other Florida beaches, impacts to hardground and reefs can be predicted based on proximity, currents, nature of borrow material, buffer zones and other factors. Our desire in selecting a shoreline stabilization alternative is to avoid or minimize impacts to these resources to the maximum extent practicable in consideration of other project requirements. Light Detection and Ranging (LIDAR) information overlaid on Laser Airborne Depth Sounder (LADS) data for the project area provided by Miami-Dade County Department of Environmental Resources Management (DERM) has located sandy bottom devoid of any sessile or epibenthic organisms. Hardgrounds have been located approximately 1,600 to 2,400-foot offshore of the proposed project area (see Figure 4 – LADS/LIDAR of Project Area). Sufficient water depths exist within the project area so loaded barge and tug transit will not impact hardgrounds near the project area (see Figure 5 – NOAA Chart).

1.7.2.2 Sea Turtles.

Sea Turtle nesting is closely monitored along Miami-Dade County's public beaches. Detected nests are relocated to a safe hatchery due to high public use of the beach. Impacts of compaction and scarps are fairly well established. In addition, continued beach erosion would reduce available nesting habitat. Corrective and mitigative protocols have been established. It is our goal to avoid or minimize impacts to sea turtles, their habitat or access to and from the beach, to comply with the requirements of the Endangered Species Act. The proposed SMART structure is designed to protect the shoreline. No net loss of beach is expected. Some beach gain may result. A foot of freeboard over the SMART structure will be available at MLW for sea turtle access to and from the beach. "Sea turtle access lanes" (rows of approximately 3-foot tall reef balls every 10th SMART segment) would be placed to provide additional sea turtle access as requested by USFWS June 16, 2004.

1.7.2.3 Other Impacts.

Bases for impact measurement and comparison are stated more specifically in Section 4.0 on ENVIRONMENTAL EFFECTS and other sections of this document and its appendices.

1.7.3 ISSUES ELIMINATED FROM DETAIL ANALYSIS.

No issues were specifically identified for elimination.

1.8 PERMITS, LICENSES, AND ENTITLEMENTS.

The proposed SMART design to retain sand at the southern terminus of the fill project without causing impacts to adjacent shorelines is subject to the Coastal Zone Management Act. Consultation with the State Historic Preservation Officer (SHPO) is also required. Since there would be fill material placed into waters of the United States, the proposed Action is subject to Section 404 of the Clean Water Act (see Appendix A). In addition the proposed action is subject to Section 401 of the Act for certification of water quality by the state. The U.S. Army Corps of Engineers (Corps), Jacksonville District, has submitted an application for a Section 401 Water Quality Certificate (WQC) from Florida Department of Environmental Protection (FDEP).

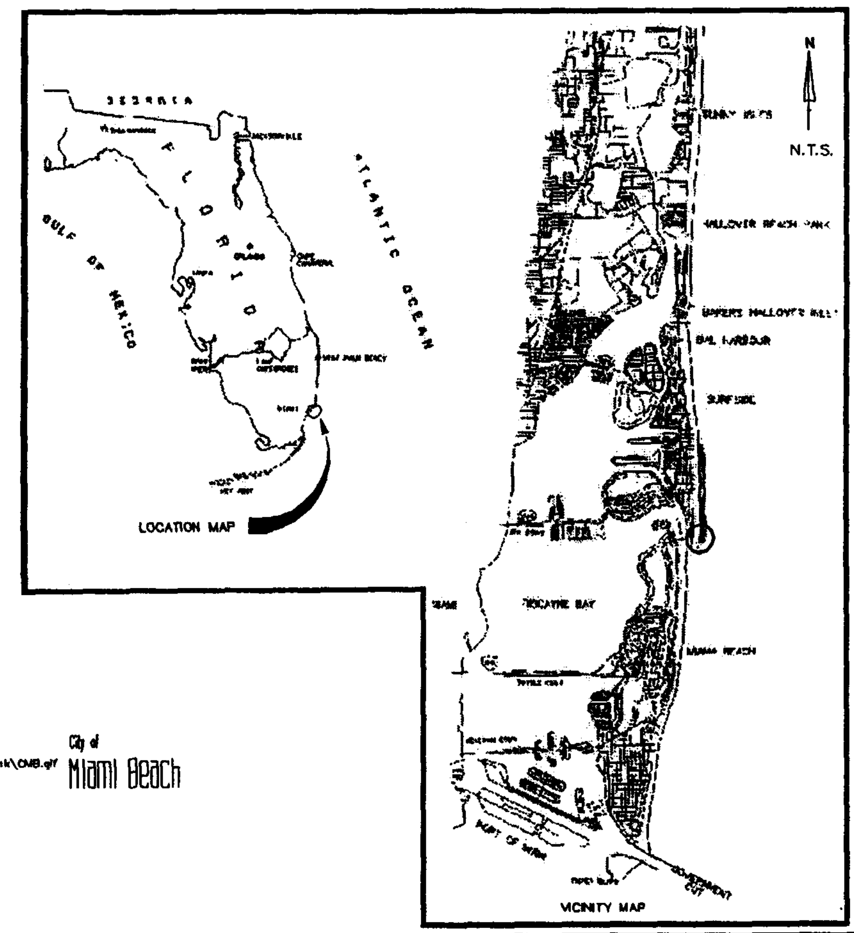
If conducted during the sea turtle nesting and hatching season, the proposed action would require sea turtle observer to warn construction operations of nearby sea turtles for avoidance.

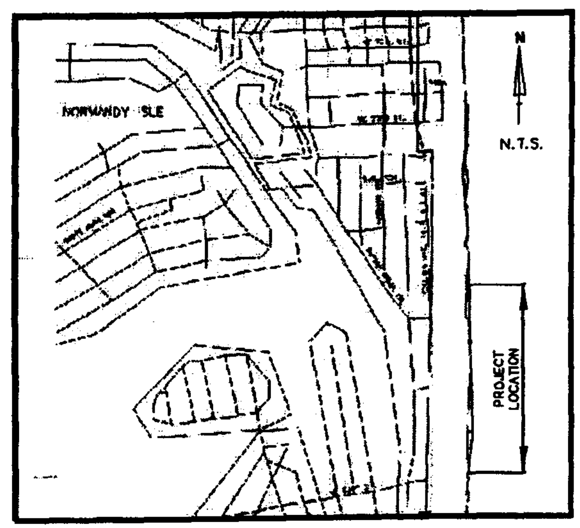
The project sponsor, Miami-Dade County Department of Environmental Resources Management, is responsible for obtaining any real estate easements and rights of way required for this project.

SECTION 227
NATIONAL SHORELINE EROSION
CONTROL DEMONSTRATION PROGRAM
63rd STREET HOT SPOT, DADE COUNTY, FLORIDA

MIAMI-DADE

US Army Corps of Engineers





City of Miami Beach

c:\junk\CMB.gif

COVER SHEET

CITY OF MIAMI BEACH
U.S. ARMY CORPS OF ENGINEERING
63rd STREET HOT SPOT

URS

ENGINEER'S SEAL

C.A.T. JGH 3/11/2002

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Figure 1

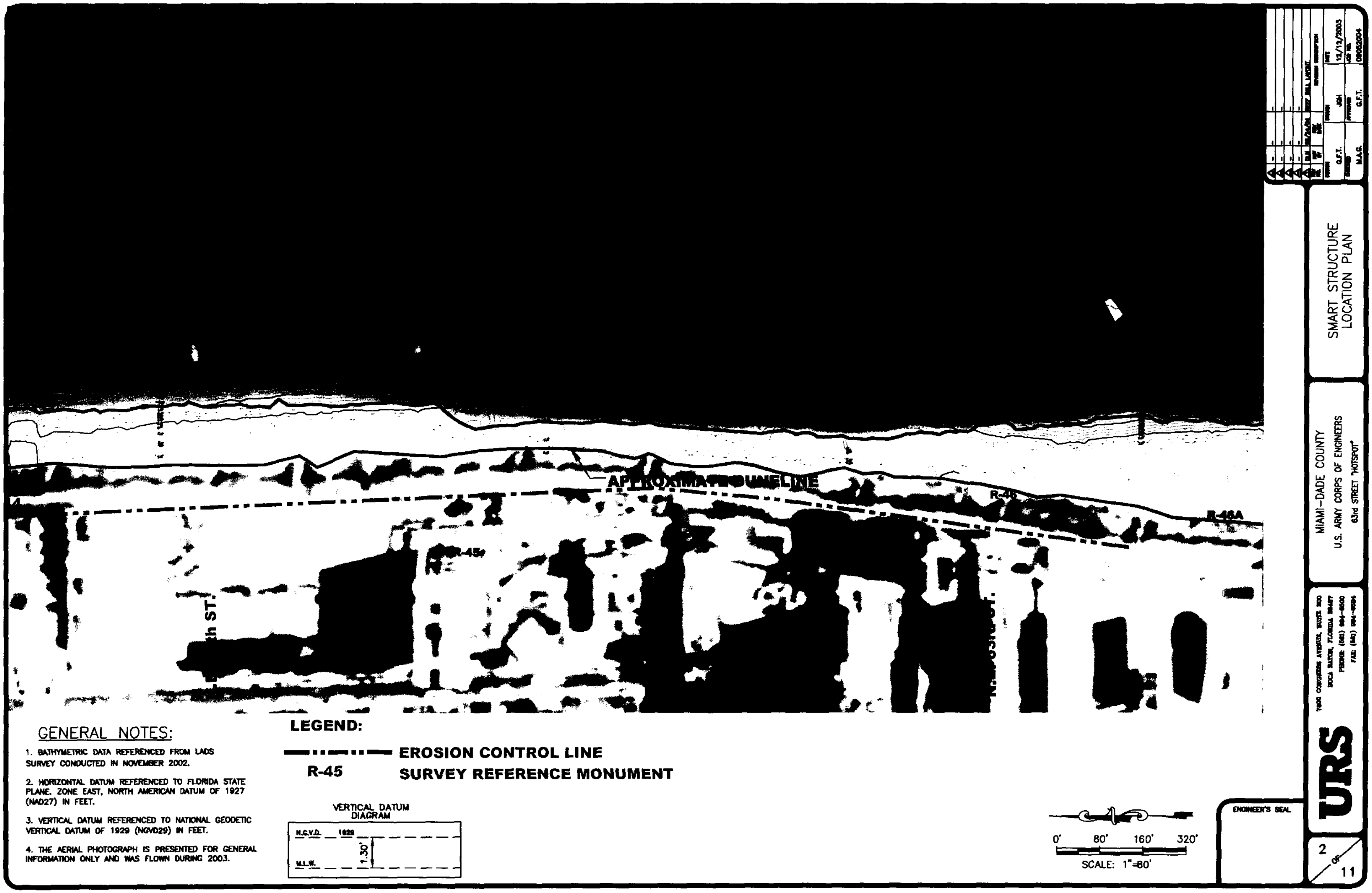
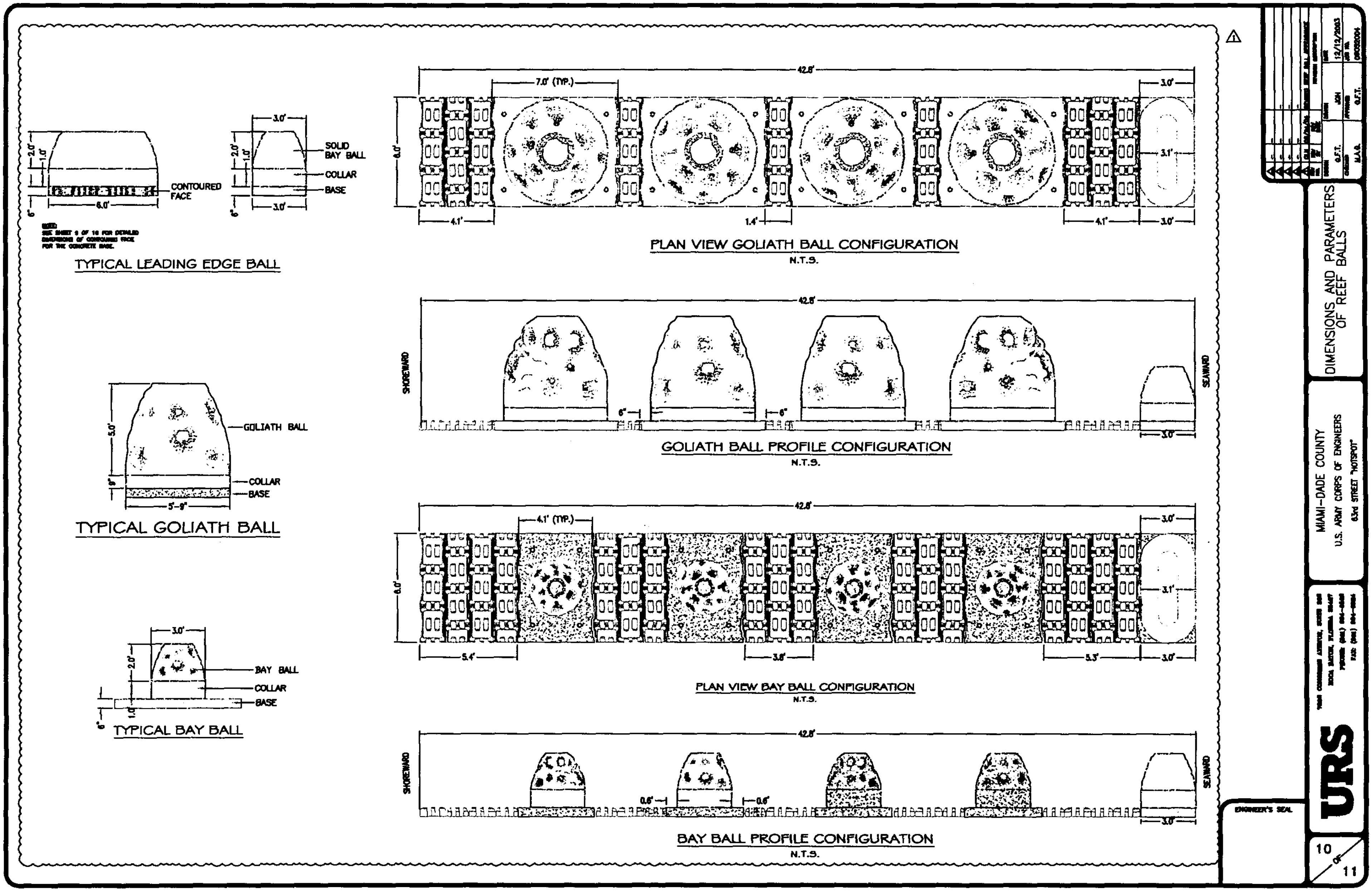

APPROXIMATE DUNE LINE
R-45
R-46A
R-45
th ST.
N. 63rd ST.
GENERAL NOTES:
1. BATHYMETRIC DATA REFERENCED FROM LADS SURVEY CONDUCTED IN NOVEMBER 2002.
2. HORIZONTAL DATUM REFERENCED TO FLORIDA STATE PLANE, ZONE EAST, NORTH AMERICAN DATUM OF 1927 (NAD27) IN FEET.
3. VERTICAL DATUM REFERENCED TO NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD29) IN FEET.
4. THE AERIAL PHOTOGRAPH IS PRESENTED FOR GENERAL INFORMATION ONLY AND WAS FLOWN DURING 2003.
LEGEND:
EROSION CONTROL LINE
R-45 SURVEY REFERENCE MONUMENT
VERTICAL DATUM DIAGRAM
N.G.V.D. 1929
1.30'
M.L.W.
0' 80' 160' 320'
SCALE: 1"=80'
ENGINEER'S SEAL
URS
PHONE: (561) 994-6500
FAX: (561) 994-6524
MIAMI-DADE COUNTY
U.S. ARMY CORPS OF ENGINEERS
63rd STREET "HOTSPOT"
SMART STRUCTURE LOCATION PLAN
G.F.T.
JGH
12/12/2003
M.A.G.
G.F.T.
08052004
2 of 11

Figure 2



TYPICAL LEADING EDGE BALL
CONTOURED FACE
SOLID BAY BALL
COLLAR
BASE
TYPICAL GOLIATH BALL
GOLIATH BALL
TYPICAL BAY BALL
BAY BALL
PLAN VIEW GOLIATH BALL CONFIGURATION
N.T.S.
GOLIATH BALL PROFILE CONFIGURATION
N.T.S.
PLAN VIEW BAY BALL CONFIGURATION
N.T.S.
BAY BALL PROFILE CONFIGURATION
N.T.S.
SHOREWARD
SEAWARD
42.8'
7.0' (TYP.)
4.1' (TYP.)
DIMENSIONS AND PARAMETERS OF REEF BALLS
MIAMI-DADE COUNTY
U.S. ARMY CORPS OF ENGINEERS
63rd STREET "HOTSPOT"
URS
ENGINEER'S SEAL
12/12/2003
10 of 11

Figure 3

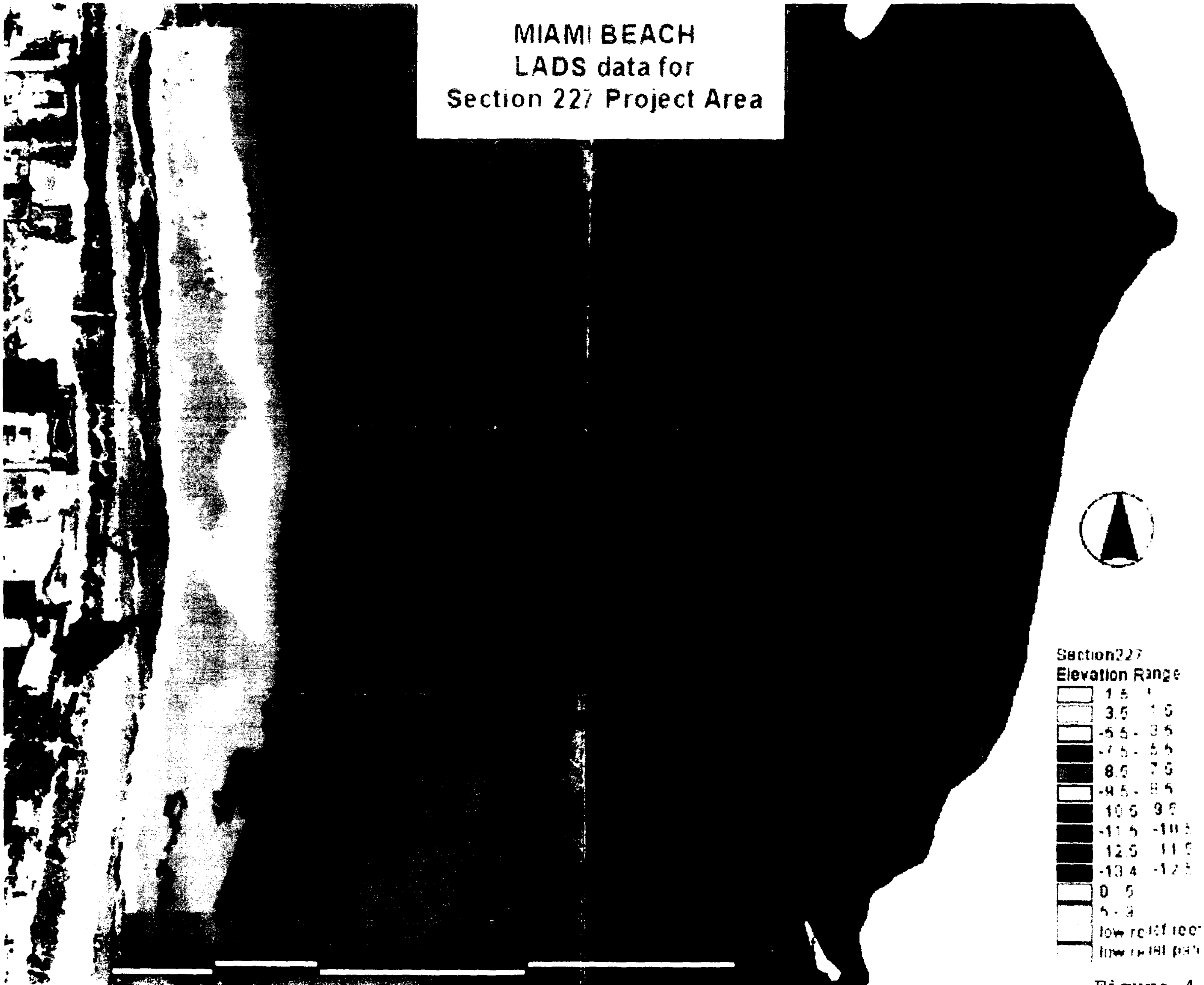

MIAMI BEACH
LADS data for
Section 227 Project Area
Section227
Elevation Range

Figure 4

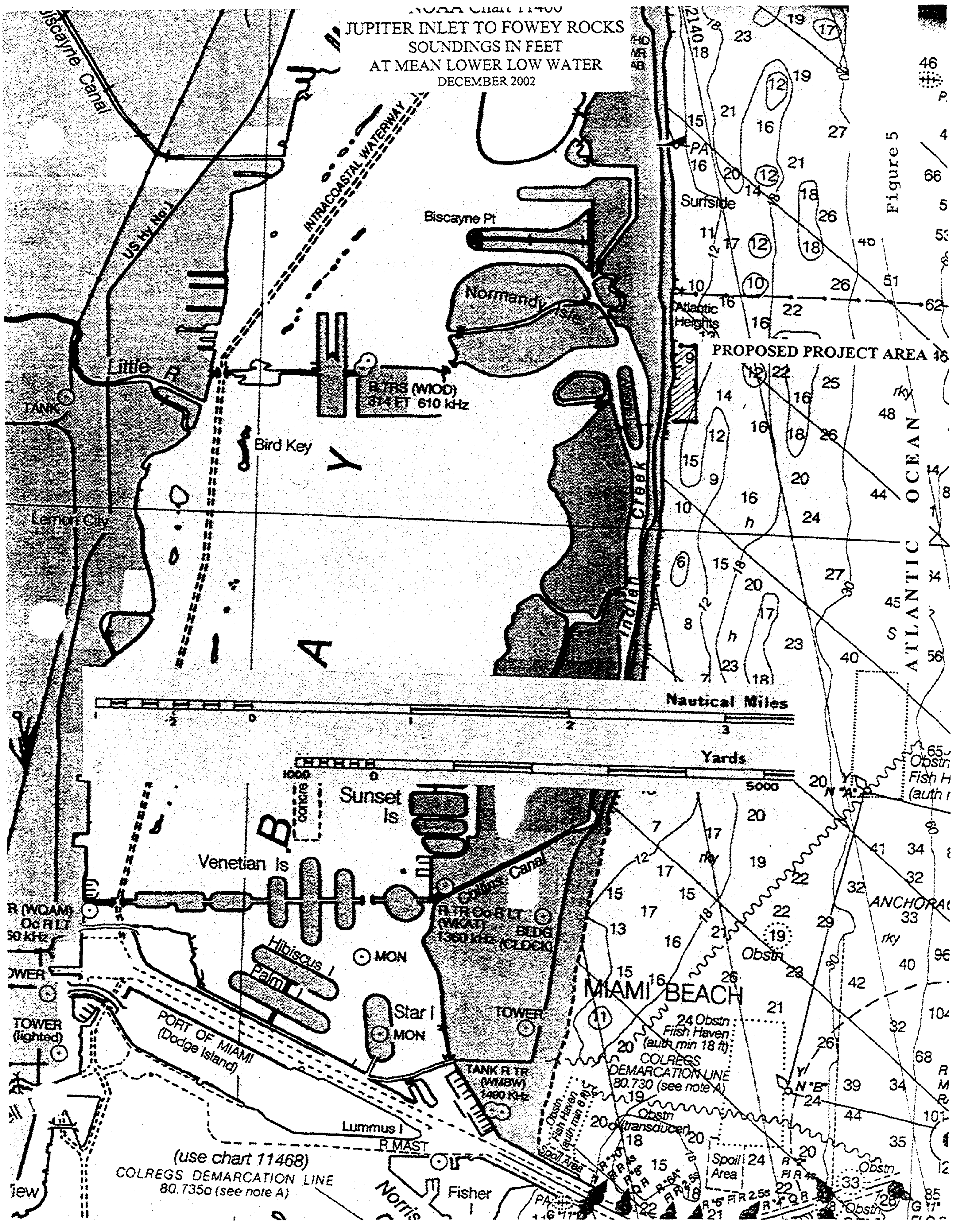

JUPITER INLET TO FOWEY ROCKS
SOUNDINGS IN FEET
AT MEAN LOWER LOW WATER
DECEMBER 2002
Biscayne Canal
INTRACOASTAL WATERWAY
US Hy No 1
Biscayne Pt
Normandy Isle
Surfside
Atlantic Heights
PROPOSED PROJECT AREA
Little R
TANK
R TRS (WIOD)
610 kHz
Bird Key
Lemon City
Indian Creek
ATLANTIC OCEAN
Nautical Miles
Yards
Sunset Is
Venetian Is
Collins Canal
Hibiscus I
Palm I
Star I
MON
BLDG (CLOCK)
TOWER
TOWER (lighted)
MIAMI BEACH
PORT OF MIAMI (Dodge Island)
Lummus I
R MAST
TANK R TR (WMBW)
1490 KHz
(use chart 11468)
COLREGS DEMARCATION LINE
80.735a (see note A)
COLREGS DEMARCATION LINE
80.730 (see note A)
Fisher
Spoil Area
ANCHORAGE
Obstn
Fish Haven (auth min 18 ft)

Figure 5

2 ALTERNATIVES

The alternatives section is the heart of this EA. This section describes in detail the no-action alternative, the proposed action, and other reasonable alternatives that were studied in detail. Then based on the information and analysis presented in the sections on the Affected Environment and the Probable Impacts, this section presents the beneficial and adverse environmental effects of all alternatives in comparative form, providing a clear basis for choice among the options for the decision maker and the public.

As previously mentioned in Section 1.6 the alternatives to provide shore protection for Miami-Dade County beaches were evaluated in prior reports. This EA would not re-evaluate the alternatives for beach renourishment but would address the potential impacts associated with and alternatives to constructing a SubMerged Artificial Reef Training (SMART) structure. This will be compared to the no action alternative.

2.1 DESCRIPTION OF ALTERNATIVES.

2.1.1 CONSTRUCTION OF THE SUMERGED ARTIFICIAL REEF TRAINING (SMART) STRUCTURE

The proposed SMART structure would be constructed parallel to the shoreline approximately 400-foot offshore of the mean shoreline. Hollow Goliath concrete reef balls with piling, coral transplant and ventilation holes would be attached to 6-foot by 6-foot concrete slabs attached to an ABM. One solid 3-foot tall 'Bay Ball' would be attached to the oceanside edge of each ABM segment to enhance stability and prevent scouring. The SMART segments would be 42.8-foot long and 6-foot wide, (consist of 4 goliath reef balls and 1 bay ball) placed next to each other for approximately 2,088 linear feet. 92-foot long angled flanks would help produce a slightly curved submerged reef layout at the structure terminuses for a total length of 2,272-foot (see Figure 2). Every 10th SMART segment would be comprised of approximately 3-foot tall reef balls to provide 'sea turtle access lanes' as requested by USFWS on June 16, 2004. The SMART structure benthic footprint would be approximately 2.1 acres and be located between DEP monument R-46A and R-44. The SMART structure construction would be diver assisted and quality assured. No dredging is proposed.

Characteristics of the SMART Materials.
The SMART structure construction materials would be compatible to the proposed project area waters for the proposed SMART. The SMART reef modules would be hollow, rough textured finish with piling, coral transplant and ventilation holes to absorb and reduce wave energy that is currently eroding the proposed project "Hotspot" area. A reef module 'Trial Mix Design would consist of the following:

- Portland cement Type II to conform to American Society for Testing and Materials (ASTM) C-150.
- Fly Ash to meet ASTM C-618, Type F, as permitted by the Atlantic Marine Fisheries Commission adopted in artificial reefs.
- Fine aggregate to comply with ASTM C-33.
- Coarse aggregate to comply with ASTM C-33 #8 pea gravel (up to 1 inch – limestone aggregate preferred.
- Concrete admixtures to comply with ASTM C-494.

The following additives shall be required in all concrete mix designs:

- High range water reducer to comply with ADVA Flow 120 or 140 (or air entrained if ADVA not used – to comply with ASTM C-260).
- Silica Fume to comply with ASTM C-1240-93.

Optional Additives include:

- Fibers or microfibers 1 ½ inches or longer
- Concrete accelerators to comply with ASTM C-494 Type C or E.
- Concrete retarders to comply with ASTM C-494-Type D

Prohibited Admixtures: All other admixtures are prohibited. No dredging is proposed. No beach use is proposed for construction purposes.

Refer to Appendix E (Specifications) for the complete SMART structure (reef ball/ABM) specification to be used for this project and master environmental specifications.

The objectives of the proposed action are to retain sand at the southern terminus of the Test Fill at Miami Beach project (between 63rd and 83rd Streets), in an environmentally friendly and structurally stable manner, when exposed to the combination of storm surge and design wave events with a 10-year return interval or combination of storm surge and design events with a 50-year return interval. Alternative would continue to address the "Hotspot" by moving sand from other beach segments into the area.

2.1.2 NO-ACTION ALTERNATIVE (STATUS QUO)

With the no-action alternative, the SMART structure would not be constructed. The use of upland sand to prevent shoreline erosion would be constructed without any means to stabilize the erosional hotspot. The present condition of erosion could continue along Miami Beach at its present rate. The no-action alternative does not provide the benefits needed to protect the coast from the effects of erosion and storm damage.

2.2 PREFERRED ALTERNATIVE

The SMART structure would consist of constructing a submerged breakwater approximately 2,272-foot long and 42.8-foot wide, parallel to the proposed Test Fill at Miami Beach (between 63rd and 83rd Streets – DEP Monuments R-46A and R-44). Goliath reef balls would be attached to ABMs, and if need be anchored to benthic substrate. Solid 'bay balls' would be attached to the ABM at the SMART structure oceanward most point to help prevent scour. The work would be diver assisted to ensure quality construction and placement of the reef balls/ABMs in a staggered manner to best fit the benthic landscape, attenuate wave energy and prevent shoreline erosion in an environmentally friendly manner. The structure would be located approximately 400-foot offshore of the mean shoreline, in 7-foot of water, at MLW, to be covered by one foot of water at MLW. No proposed project construction would be undertaken from the land. Under Section 227 of the Water Resources and Development Act (WRDA) of 1996, the National Shoreline Erosion Control Development and Demonstration Program, the SMART structure would be altered or removed if it did not meet program goals and objectives. No dredging is proposed.

2.3 ALTERNATIVES ELIMINATED FROM DETAILED EVALUATION

Limestone boulders were eliminated from consideration for the SMART structure due to the fact that they were used at Sunny Isles for shoreline erosion attenuation. The SMART structure is a much better fit under the Section 227 National Shoreline Erosion Control Development and Demonstration Program and would appear to be a more environmentally friendly alternative to prevent shoreline erosion and attenuate wave energy in the immediate project area.

A different rendition of the SMART structure was proposed in the 30% design report. A mix of 'staggered' Goliath and smaller reef balls was proposed to be attached to ABMs in 40-foot long by 8-foot wide segments. The 30% proposal also planned to have 50-foot wide openings between 200-foot offshore segments for a total length of 1,800-foot. The 50-foot wide gaps were replaced after modeling determined the opening would not adequately attenuate wave energy or abate shoreline erosion. The 30% SMART structure submittal was proposed to be parallel to the shoreline and approximately 150-foot from the proposed toe of fill for the Renourishment at Miami Beach in the Vicinity of 63rd Street. Since the Test Fill Beach Renourishment Project is currently still undergoing coordination, it was decided the SMART structure proposal would be formulated to be constructed without the Test Fill project.

2.4 ALTERNATIVES NOT WITHIN JURISDICTION OF LEAD AGENCY

To the Corps' knowledge, there are no alternatives that are not within the jurisdiction of the lead agency.

2.5 COMPARISON OF ALTERNATIVES

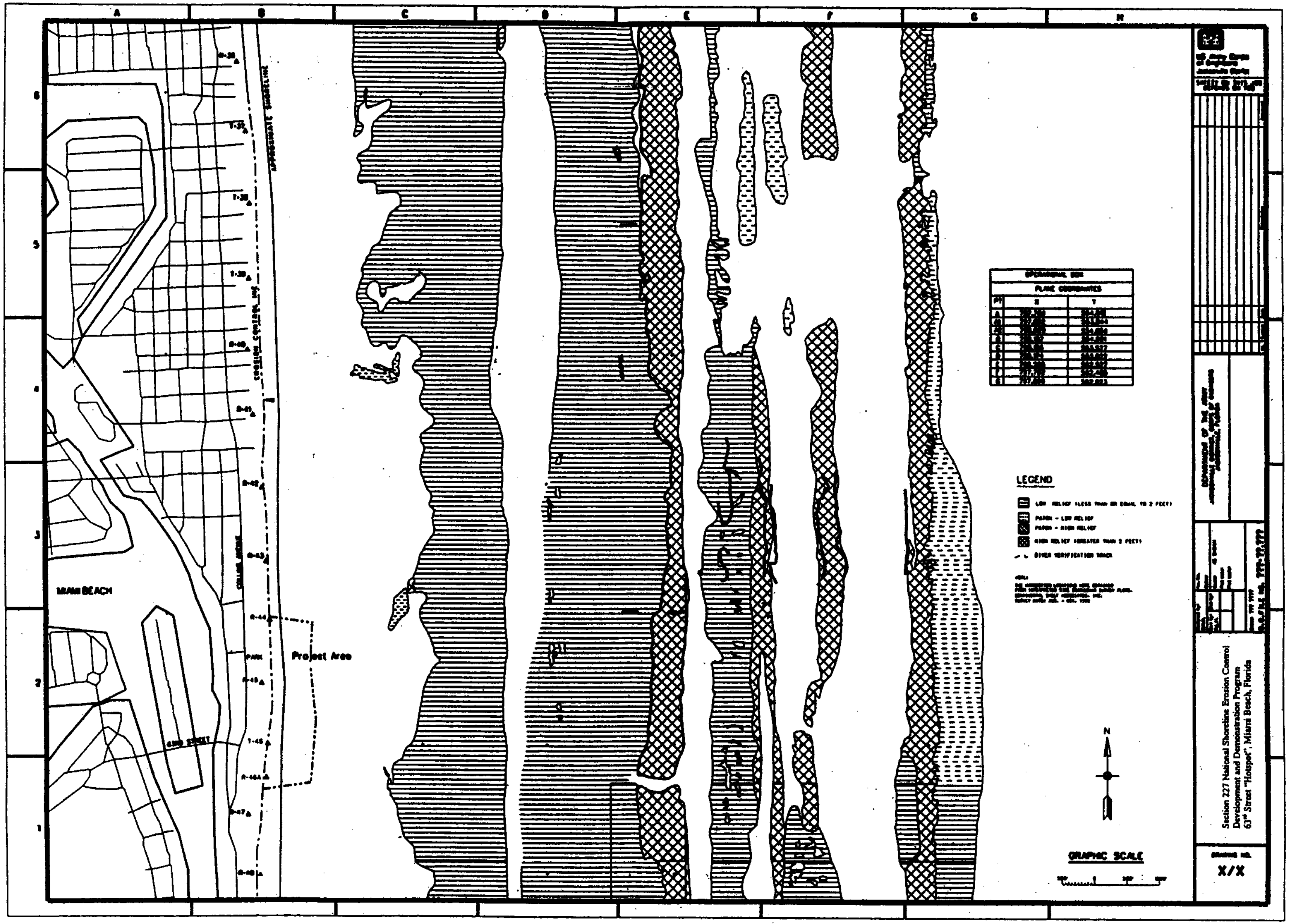
See section 4.0 Environmental Effects for a discussion on the impacts of alternatives.

2.6 MITIGATION

The protection of potentially significant hard ground resources would be undertaken with precision positioning equipment, Geographic Positioning System (GPS), and vessel depth finder to determine existing water depths. Mitigation for hardground impacts are not proposed at this time due to the fact that no adverse effects are likely to occur (see Figure 4). Water depths in the areas of hardground resources provide ample depth for barge and tug clearance even at MLW (See Figure 5 – NOAA Chart and Figure 6 – Project Benthic Survey Info). If hard ground impacts caused by the SMART structure are discovered, coordination with FDEP would be undertaken as directed in the monitoring plan in Appendix F. The proposed SMART structure surfaces are very rough and could provide substrate for infaunal species. Transplant holes within the Goliath reef balls are also proposed. Adverse effects to hardgrounds would be avoided during construction and proposed project construction and performance would not affect offshore hardgrounds. The SMART structure is proposed to be constructed on land and placed well landward of the existing hardgrounds within the project region (see Appendix F).

No mitigation for shoreline losses are proposed as the SMART structure is more porous than the sunny Isles submerged breakwater and designed to attenuate wave energy to hold the shoreline in place. Modeling with SBEACH and GENESIS has produced minimal shoreline effects of SMART construction. Once construction of the SMART structure has been completed the longshore sediment drift will seek equilibrium. Once found the shoreline stabilization process would occur. See Appendix F- Physical and Biological Monitoring Program for SMART objectives and measures for determining structure success. If SMART does not perform as designed it can be altered or removed under Section 227 of WRDA of 1996. Likewise no mitigation of other environmental resources has been proposed due to the benign nature of the SMART structure proposal and function.

Section 5.0 Environmental Commitments, discusses other procedures that would be implemented to avoid or minimize potentially adverse environmental impacts.



MIAMI BEACH
Project Area
LEGEND
GRAPHIC SCALE
Section 227 National Shoreline Erosion Control
Development and Demonstration Program
63rd Street "Hotspot", Miami Beach, Florida
X/X

Figure 6

Table 1: Summary of Direct and Indirect Impacts for Alternative Project Plans Considered.

ALTERNATIVE ENVIRONMENTAL FACTOR	NO ACTION	SUBMERGED ARTIFICIAL REEF TRAINING (SMART) STRUCTURE
PROTECTED SPECIES	Continued erosion could affect sea turtle nesting habitat	No impact on manatees, sea turtles or whales expected –'sea turtle lanes' added (USFWS)
HARDGROUNDS	Continued shoreline erosion could affect hard-grounds in "Hotspot" area	Potential of temporary increase in turbidity w/in project area. No direct effects expected
FISH & WILDLIFE	Probable continued loss of beach & shoreline habitat	Potential temporary construction impacts of turbidity
VEGETATION	Continued erosion could affect dune/beach vegetation	No impact – no upland construction proposed
EFFECTS ON ADJACENT SHORELINES	Continued erosion of project shoreline & adjacent beach during storm events	Potential to stabilize shore line north & south of project, provide extended renourishment cycle
WATER QUALITY	Continued erosion of project shoreline & turbidity within 63rd Street "Hotspot" area	Probable temporary increase in turbidity & suspended sediment at project area
HISTORIC PROPERTIES	No impact	No impact (SHPO concurrence)
ENERGY REQUIREMENTS & CONSERVATION	Increase energy usage from more frequent renourishments or other efforts to control erosion & repair property damage	Lower when compared to beach renourishment cycle
SAND BENTHIC SUBSTRATE	Continued buildup due in 63rd Street "Hotspot" area	Conversion of approximately. 2.1 acres of sand substrate to hard substrate via SMART footprint
RECREATION	No significant impacts	No significant impacts expected – additional recreation potential
AESTHETICS	Continued unsightly erosion, scarps, seagrass & fish washups	Improved aesthetics with protected/stabilized shoreline expected

3 AFFECTED ENVIRONMENT

The Affected Environment section succinctly describes the existing environmental resources of the areas that would be affected if any of the alternatives were implemented. This section describes only those environmental resources that are relevant to the decision to be made. It does not describe the entire existing environment, but only those environmental resources that would affect or that would be affected by the alternatives if they were implemented. This section, in conjunction with the description of the "no-action" alternative forms the base line conditions for determining the environmental impacts of the proposed action and reasonable alternatives.

3.1 GENERAL ENVIRONMENTAL SETTING

The shoreline along Miami Beach is lined with hotels, condominiums, and other commercial establishments. The area is used extensively for recreation.

3.2 VEGETATION

The dune system in Miami-Dade County between Government Cut and Bakers Haulover Inlet is largely artificial and was built as part of the Dade County BEC & HP Project. Dominant plant species in the dune communities include sea grapes, *Coccoloba uvifera*; the beach morning glory, *Ipomoea pes-caprea*; beach bean, *Canavalia rosea*; sea oats, *Uniola paniculata*; dune panic grass, *Panicum amarulum*; bay bean, *Canavalia maritima*. The beach berry or inkberry, *Scaevola plumieri;* sea lavender, *Mallotonia gnaphalodes*; spider lily, *Hymenocalis latifolia*; beach star, *Remirea maritima*; and coconut palm, *Coco nucifera,* are also present.

Algal coverage on the offshore hardground areas fluctuates seasonally. The most common algal species observed within southeast Florida offshore hardground areas are *Caulerpa prolifera*, *Codium isthmocladum*, *Gracillaria* sp., *Udotea* sp., *Halimeda* sp., and various members of the crustose coralline algae of the family Corallinaceae. Algal growth is most luxuriant from late July through late October or early November. There seems to be a particular burst or bloom in the macroalgal population in conjunction with the seasonal upwelling that occurs in late July or early August (Smith, 1981, 1983; Florida Atlantic University and Continental Shelf Associates, Inc., 1994).

Seasonally, there is extensive macroalgal growth in the offshore soft bottom areas, with species of green algae (*Caulerpa* sp., *Halimeda* sp., and *Codium* sp.) being particularly abundant in the summer and the brown algal species (*Dictionary* sp. and *Sargasso* sp.) being more abundant in the winter (Courtenay *et al.*, 1974; Florida Atlantic University and Continental Shelf Associates, Inc., 1994). The sea grass *Homophile decisions* has been observed offshore of Miami-Dade County, but is considered seasonal (April through November) in these offshore soft bottom areas.

3.3 THREATENED AND ENDANGERED SPECIES

3.3.1 SEA TURTLES

Sea turtles are present in the open ocean year-round offshore of Miami-Dade County because of warm water temperatures and hardbottom habitat used for both foraging and shelter. The predominant species is the loggerhead sea turtle, *Caretta carette*, although green turtles, *Chelonia mydas*; leatherback turtles, *Dermochelys coriacea*; hawksbill turtles, *Eretmochelys imbricata*; and Kemp's ridleys, *Lepidochelys kempii* are also known to exist in the area. All the sea turtles except for the loggerhead are listed as endangered. The loggerhead is listed as threatened.

Loggerhead nesting in Miami-Dade County occurs from late April through September (Meylan et. al., 1995). The density of nesting along the Miami-Dade County shoreline north of Government Cut is relatively low. The frequency of nesting along the beach at Sunny Isles has ranged from 9 nests in 1989 to 24 nests in 1997 with the highest occurring in 1995 at 35 nests (DERM 1997, unpublished nesting data). The number of false crawls ranged from 44 in 1989 to 24 in 1997. The lowest number of false crawls occurred in 1993 at 7 with the highest occurring in 1989. For Golden Beach nesting ranged from 45 nests in 1987 to 28 nests in 1992 (Meylan et. al., 1995). The highest number of nests for Golden Beach occurred in 1991 with 80 nests. The number of false crawls in Golden Beach ranged from 11 in 1987 to 9 in 1992. The highest number of false crawls occurred in 1990 with 17 and the lowest occurred in 1992 with 9. The loggerhead accounts for the majority of the nesting in the county with occasional nesting by green and leatherback turtles. Leatherback turtles may start nesting earlier than loggerheads. In Miami-Dade County the earliest nest documented by Meylan et. al., 1995, was on April 11, 1992. During the sea turtle nesting season, the Miami-Dade County Park and Recreation Department conducts daily surveys (commence on April 1) and relocates nests found along the beach from Sunny Isles south to Government Cut. This is done to prevent poaching or nest destruction due to beach maintenance, emergency vehicles which access the beach and other human related causes (Flynn 1992). All nests found during the surveys are relocated to a central hatchery on Miami Beach (pers. comm., B. Flynn, DERM, 2004). Turtle nests laid on the beach within the Town of Golden Beach are not surveyed by the county and are not routinely relocated, but are allowed to remain on the beach.

In conjunction with the threatened and endangered sea turtles that nest on the Miami-Dade County, concerns have been raised about sea turtle access to the beach to nest and hatchling access to the Atlantic Ocean. The SMART structure is proposed to be covered by a foot of water at MLW. Every 10th SMART segment would be constructed with approximately 3-foot tall reef balls to provide 'sea turtle access lanes' as per the USFWS June 16, 2004 request.

Longshore drift concerns have also been discussed in conjunction with sea turtle nesting habitat, which could lead to 'take' conclusions by the USFWS. Some temporary longshore drift effects may be experienced after SMART construction. Once the 'river of sand' drift equilibrium is reached, down drift effects would return to historical conditions. The proposed SMART structure potential downdrift effects are thought to be very similar to the Sunny Isles submerged breakwater effects (see Figure 7 – Comparison Results). The SMART structure is more porous, focuses on 'holding the shoreline' and would most likely be more benign than the Sunny Isles submerged breakwater.

3.3.2 WEST INDIAN MANATEE

The estuarine waters around the inlets and bays within Miami-Dade County provide year-round habitat for the West Indian manatee, *Trichecus manatus*. Although manatees have been observed in the open ocean, they feed and reside mainly in the estuarine areas and around inlets. No significant foraging habitat is known to exist in the areas around the project sites, nor have manatees been known to congregate in the nearshore environment within the project area. Manatees within the project area not likely to be impacted by project activities. Appendix G includes Manatee Protect Measures.

3.3.3 OTHER THREATENED ENDANGERED SPECIES

Other threatened or endangered species that may be found in the in the coastal waters off of Miami-Dade County during certain times of the year are the finback whale, *Balaenoptera physalus*; humpback whale, *Megaptera novaeangliae*; right whale *Eubalaena glacialis*; sei whale, *Balaenoptera borealis*; and the sperm whale *Physeter macrocephalus catodon*. These are infrequent visitors to the area and are not likely to be impacted by project activities.

3.4 FISH AND WILDLIFE RESOURCES

3.4.1 BEACH AND OFFSHORE SAND BOTTOM COMMUNITIES

The beaches of southeast Florida are exposed beaches and receive the full impact of wind and wave action. Intertidal beaches usually have low species richness, but the species that can survive in this high energy environment are abundant. The upper portion of the beach, or subterrestrial fringe, is dominated by various talitrid amphipods and the ghost crab *Ocypode quadrata*. In the midlittoral zone (beach face of the foreshore), polychaetes, isopods, and haustoriid amphipods become dominant forms. In the swash or surf zone, coquina clams of the genus Donax and the mole crab Emerita talpoida typically dominate the beach fauna. All these invertebrates are highly specialized for life in this type of environment (Spring, 1981; Nelson, 1985; and U.S. Fish and Wildlife Service [USFWS], 1997).

Shallow subtidal soft bottom habitats (0 to 1 meters [0 to 3 feet] depth) show an increasing species richness and are dominated by a relatively even mix of polychaetes (primarily spionids), gastropods (*Oliva* sp., *Terebra* sp.), portunid crabs (*Arenaeus* sp., *Callinectes* sp., *Ovalipes* sp.), and burrowing shrimp (*Callianassa* sp.). In slightly deeper water (1 to 3 meters [3 to 10 feet] depth) the fauna is dominated by polychaetes, haustoid and other amphipod groups, bivalves such as *Donax* sp. and *Tellina* sp. (Marsh *et al.*, 1980; Goldberg *et al.*, 1985; Gorzelany and Nelson, 1987; Nelson, 1985; Dodge *et al.*, 1991.

Offshore soft bottom communities are less subject to wave-related stress than are nearshore soft bottom communities. They exhibit a greater numerical dominance by polychaetes as well as an overall greater species richness than their nearshore counterparts. Barry A. Vittor & Associates, Inc. (1984) reported polychaetes made up 68.9 percent of the macrobenthic community off Port Everglades, followed by mollusca (13.2 percent), arthropods (10.7 percent), echinoderms (1.2 percent), and miscellaneous other groups (6.0 percent). Goldberg (1985) reported polychaetes as the dominant taxon from his infaunal survey off northern Broward County. Dodge *et al.* (1991) found polychaetes to be the most abundant group in 18 meters (60 feet) of water off Hollywood, Florida. In March 1989, polychaetes made up 51.7 percent of the macrofaunal community at that location followed by nematodes (14.3 percent), smaller species of crustaceans (9.0 percent), oligochaetes (4.3 percent), nemerteans (3.6 percent), and bivalves (2.9 percent). The infaunal community species are generally very motile and rapid reproducers. The approximate 2.1-acre footprint of the SMART structure could affect some non-motile benthic organisms within the sandy bottom area, but overall, adverse affects are not likely to occur.

Larger members of the invertebrate macrofauna seen occasionally in these offshore soft bottom areas between the second and third reef lines include the queen helmet, *Cassia madagascariensis*; the king helmet, *Cassia tuberosa*; Florida fighting conch, *Strombus alatus*; milk conch, *Strombus costatus*; Florida spiny jewel box, *Arcinella cornuta*; decussate bittersweet, *Glycymeris decussata*; calico clam, *Macrocallista maculata*; tellin, *Tellina* sp.; and cushion star, *Oreaster reticulatus*. Commercially valuable species, such as the Florida lobster, *Panulirus argus* move through this area as they migrate from offshore to nearshore areas (Courtenay *et al.*, 1974).

Surf zone fish communities are typically dominated by relatively few species (Modde and Ross, 1981; Peters and Nelson, 1987). Fish species that can be found in the surf zone include, Atlantic threadfin herring, *Opisthonema oglinum*; blue runner, *Caranx crysos*; spotfin mojarra, *Eucinostomus argenteus*; southern stingray, *Dasyatis americana*; greater barracuda, *Sphyraena barracuda*; yellow jack, *Caranx bartholomaei*; and the ocean triggerfish, *Canthidermis sufflamen*, none of which are of local commercial value. Most of the fish making up the inshore surf community tend to be either small species or juveniles (Modde, 1980).

Fish species specifically associated with the sand flats and soft bottom areas between the first and second reefs off Palm Beach, Broward, and Miami-Dade counties include lizardfish, *Synodus* sp.; sand tilefish, *Malacanthus plumieri*; yellow goatfish, *Mulloidichthys martinicus*; spotted goatfish, *Pseudupeneus maculatus*; jawfish, *Opistognathus* sp.; stargazer, *Platygillellus (Gillellus) rubrocinctus*; flounder, *Bothus* sp.; and various species of gobies and blennies, none of which have significant local commercial value.

3.4.2 REEF/HARDGROUND COMMUNITIES

The classic reef distribution pattern described for southeast Florida reefs north of Key Biscayne consists of an inner reef in approximately 15 to 25 feet (5 to 8 meters) of water, a middle patch reef zone in about 30 to 50 foot (9 to 15 meters) of water, and an outer reef in approximately 60 to 100 foot (18 to 30 meters) of water. This general description was first published by Duane and Meisburger (1969) and has been the basis for most descriptions of hardground areas north of Government Cut, Miami since that time (Goldberg, 1973; Courtenay *et al.*, 1974; Lighty *et al.*, 1978; Jaap, 1984). Development of these three reef terraces into their present form is thought to be related to fluctuations in sea level stands associated with the Holocene sea level transgression that began about 10,000 years ago. An extensive sand zone lies between the shoreline and initial reef communities (see Figure 6 – Project Area Benthic Survey).

Lighty *et al.* (1978) showed that active barrier reef development took place as far north as the Fort Lauderdale area as late as 8,000 years ago. It is possible that the reefs and hardground areas seen from Delray Beach southward are the result of active coral reef growth in the relatively recent past, whereas the hard bottom features seen north of Palm Beach Inlet may represent the outcropping of older, weathered portions on the Anastasia Formation. The reefs north of Palm Beach Inlet (Lake Worth Inlet) do not show the same orientation to shore as those to the south and the classical "three reef" hardgrounds description begins to differ north of that inlet (Continental Shelf Associates, Inc., 1993a).

The composition of hardground biological assemblages along Florida's east coast has been detailed by Goldberg (1970, 1973), Marszalek and Taylor (1977), Raymond and Antonius (1977), Marszalek (1978), Continental Shelf Associates, Inc. (1984; 1985; 1987; 1993b), and Blair and Flynn (1989). Although there are a large variety of hard coral species growing on the reefs north of Government Cut, these corals are no longer actively producing the reef features seen there. The reef features seen north of Government Cut have been termed "gorgonid reefs" (Goldberg, 1970; Raymond and Antonius, 1977) because they support such an extensive and healthy assemblage of octocorals. Goldberg (1973) identified 39 species of octocorals from Palm Beach County waters. The U.S. Environmental Protection Agency (1992) lists 46 species of shallow water gorgonids as occurring along southeast Florida. Surveys by Continental Shelf Associates, Inc. (1984; 1985) identified 33 sponge, 21 octocoral, and 5 hard coral species on offshore reefs off Ocean Ridge and 40 sponge, 18 octocoral, and 14 hard coral species on the offshore reefs off Boca Raton. Blair and Flynn (1989) described the reefs and hard bottom 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. Despite this gradual decrease in the density of hard coral species present, the overall hardground assemblage of hard corals, soft corals, and sponges seen along southeast Florida's offshore reefs remains remarkably consistent throughout the counties of Miami-Dade, Broward, and Palm Beach. Commercially, the most important invertebrate species directly associated with these hardground areas is the Florida lobster, *Panulirus argus*. The construction of the SMART structure is not likely to adversely affect hard bottom resources.

Common fish species identified with the reef/hardground communities include grunts (Haemulidae), angelfish (Pomacanthidae), butterfly fish (Chaetodontidae), damselfish (Pomacentridae), wrasses (Labridae), drum (Sciaenidae), sea basses (Serranidae) snapper (Lutjanidae) and parrotfish (Scaridae). Important commercial and sport fish such as black margate (*Ansiotremus surinamensis*), gag (*Mycteroperca microlepis*), red grouper (*Epinephelus morio*), red snapper (*Lutjanus campechanus*), gray snapper (*L. griseus*) Hogfish (*Lachnolaimus maximus*) and snook (*Centropomus undecimalis*) are also associated with these reefs. The precise composition of the fish assemblage associated with any given location along these hardground areas is dependent upon the structural complexity of the reef at that location. The construction of the SMART structure is not likely to adverse affects hard bottom resources.

Herrema (1974) reported over 300 fish species as occurring off southeast Florida. Approximately 20 percent of these species were designated as "secondary" reef fish. Secondary reef fish are fish species that, although occurring on or near reefs, are equally likely to occur over open sand bottoms. Many of these species, such as the sharks, jacks, mullet, bluefish, sailfish, and marlin (none of which have significant local commercial value), are pelagic or open water species and are transient through all areas of their range. Hardground communities within the project area are not likely to be adversely affected.

3.4.3 ESSENTIAL FISH HABITAT

Habitats within the project area have been designated as Essential Fish Habitat (EFH) as defined in 1996 by amendment to the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), 16USC 1801 et seq. Public Law 104-208. Federal agencies that fund, permit or carry out activities that may adversely impact EFH are required to consult with the National Marine Fisheries Service (NMFS) regarding potential effects of their actions on EFH. In conformance with the 1996 amendment to the Act, the information provided in this EA would comprise the required EFH assessment and would be coordinated with NMFS.

The proposed project is within South Atlantic Fishery Management Council (SAFMC) jurisdiction and is located in areas designated as EFH for water column, sandy bottom, and adjacent to hardbottom, coral and artificial reef. Habitat Areas of Particular Concern (HAPC) have been identified as hardbottom, coral and coral reef habitats.

EFH for species within the project area include brown and pink shrimp, snapper-grouper complex (73 species), Spanish and king mackerel, spiny lobster. Various life stages of some of the managed species found in the project area include larvae, post larvae, juvenile and adult stages of red, gray, schoolmaster, mutton and yellowtail snappers, scamp, speckled hind, red, yellowedge and gag groupers, white grunt and spiny lobster. Coastal migratory pelagic species identified by the NOAA Fisheries include nurse, bonnethead, lemon, black tip and bull sharks. EFH resources within the project area are not likely to be adversely affected (see Biological Assessment in Appendix C).

3.5 COASTAL BARRIER RESOURCES

There are no designated Coastal Barrier Resource Act Units located in the project area that would be affected by this project.

3.6 WATER QUALITY

Waters off the coast of Miami-Dade counties are classified as Class III waters by the State of Florida. Class III category waters are suitable for recreation and the propagation of fish and wildlife. Turbidity is the major limiting factor in coastal water quality in South Florida. Turbidity is measured in Nephelometric Turbidity Units (NTU), which quantitatively measure light-scattering characteristics of the water. However, this measurement does not address the characteristics of the suspended material that creates turbid conditions. According to Dompe and Haynes (1993), the two major sources of turbidity in coastal areas are very fine organic particulate matter and sediments and sand-sized sediments that become resuspended around the seabed from local waves and currents. Florida state guidelines set to minimize turbidity impacts from beach restoration activities confine turbidity values to under 29 NTU above ambient levels outside the turbidity mixing zone for Class III waters.

Ambient turbidity data for South Florida coastal waters are largely non-existent except for several areas around the inlets. However, turbidity values are generally lowest in the summer months and highest in the winter months, corresponding with winter storm events and the rainy season (Dompe and Haynes, 1993; Coastal Planning & Engineering [CPE], 1989). Moreover, higher turbidity levels can generally be expected around inlet areas, and especially in estuarine areas, where nutrient and entrained sediment levels are higher. Although some colloidal material would remain suspended in the water column upon disturbance, high turbidity episodes usually return to background conditions within several days to several weeks, depending on the duration of the perturbation (storm event or other) and on the amount of suspended fines. Project area modeling studies completed with SBEACH and GENESIS indicated suspended littoral transport of sediments may initially be interrupted immediately after SMART structure construction but would most likely return to historical conditions once sediment transport equilibrium was reached, most likely within a year (see Figure 8 – GENESIS Modeled Shoreline). Water quality and the littoral sediment budget are not likely to be adversely affected. Some temporary construction increase in turbidity may be expected. Historical conditions would return after construction completion.

3.7 HAZARDOUS, TOXIC AND RADIOACTIVE WASTE

The coastline within the project area is located adjacent to predominantly residential, commercial and recreational areas. The areas within the project are high energy littoral zones and the material used to construct the SMART structure are composed of construction materials that do not have contaminants associated with them. The nature of the work involved with the placement of the SMART structure segments is such that contamination by hazardous and toxic wastes is very unlikely. No contamination due to hazardous and toxic waste spills is known to be in the study area.

3.8 AIR QUALITY

Air quality within the project area is good due to the presence of either on or offshore breezes. Miami-Dade County is in attainment with the Florida State Air Quality Implementation Plan for all parameters except for the air pollutant ozone. The county is designated as a moderate non-attainment area for ozone.

3.9 NOISE

Ambient noise around the project area is typical to that experienced in recreational environments. Noise levels range from low to moderate based on the density of development and recreational usage. The major noise producing sources include breaking surf, beach and nearshore water activities, adjacent residential and commercial areas, and boat and vehicular traffic. These sources are expected to remain at their present noise levels.

3.10 AESTHETIC RESOURCES

The project area consists of light sandy beige beaches that contrast strikingly with the deep hues of the panoramic Atlantic Ocean. The eastern foreground consisting of dune vegetation is back dropped by condominium and hotel tropical landscape plantings in many areas. Coconut, sabal, and date palm trees provide vertical human scale transition between the structures and the beachfront. Beachfront plantings of sea oats, dune sunflower, seagrapes, morning glory vines and many other tropical beach plantings provide an aesthetic transition between the remaining dunes and the beach. The project segments consist of moderate to good aesthetic values with few exceptions throughout the entire project area.

3.11 RECREATION RESOURCES

Miami-Dade County is a heavily populated county on Florida's Atlantic Coast, which receives a tremendous volume of tourists, particularly during the winter months. Those beaches that 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 beach at Sunny Isles has public access and receives 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 on-shore and offshore fishing, snorkeling, SCUBA diving, windsurfing 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 utilize the natural and artificial reefs located within and adjacent to the project area. Commercial enterprises along the beach rent beach chairs, cushions, umbrellas, and jet skis. Food vendors can also be found along the beach areas. The revenue generated by beachgoers supports a resurgent Miami Beach business district in the project vicinity.

3.12 HISTORIC PROPERTIES

Documented transportation activities along the southeastern coast of Florida date from the second half of the 16th century. As a consequence of over 400 years of navigation in the Bahama Channel, several hundred shipwrecks have been documented in the waters off the southeast coast of the state. Remains of these and other unrecorded shipwrecks may be located offshore of the proposed SMART structure (see Appendix C - Pertinent Correspondence, SHPO letter May 27, 2003) but are not likely to be adversely affected by the proposed project.

Sunny Isles submerged breakwater compared to SMART structure GENESIS modeling.

An acceptable level of wave transmission still needed to be determined. As a first approach, it was decided that the Sunny Isles breakwater structure performed at an acceptable level of shoreline stability. A transmission coefficient of K_t=0.70 was computed for Sunny Isles, using the four wave cases presented in Table 4-1 and Ahrens equation based on the given geometry of crest width of 12.5 ft, structure height of 9.4 ft, structure side slope of 1:1.5, D_{50} of 2.0 ft and a water depth of 11.4 ft.

Figure 5-4 compares the experimental results with the K_t values computed for the Sunny Isles structure using Ahrens approach for the 4 wave cases present in Table 4-1. The figure shows that for smaller wave heights, 3 rows of reefballs would be acceptable, while 5-7 rows of reefballs would be needed for the higher wave heights.

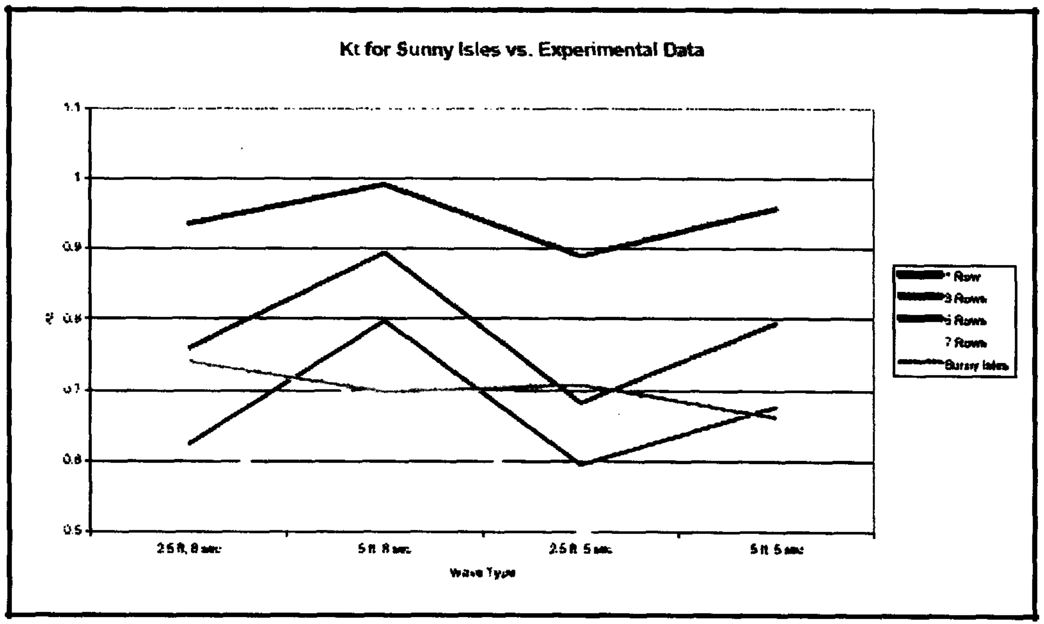


Figure 5-4. Kt for Sunny Isles vs. Experimental Data

Figure 7

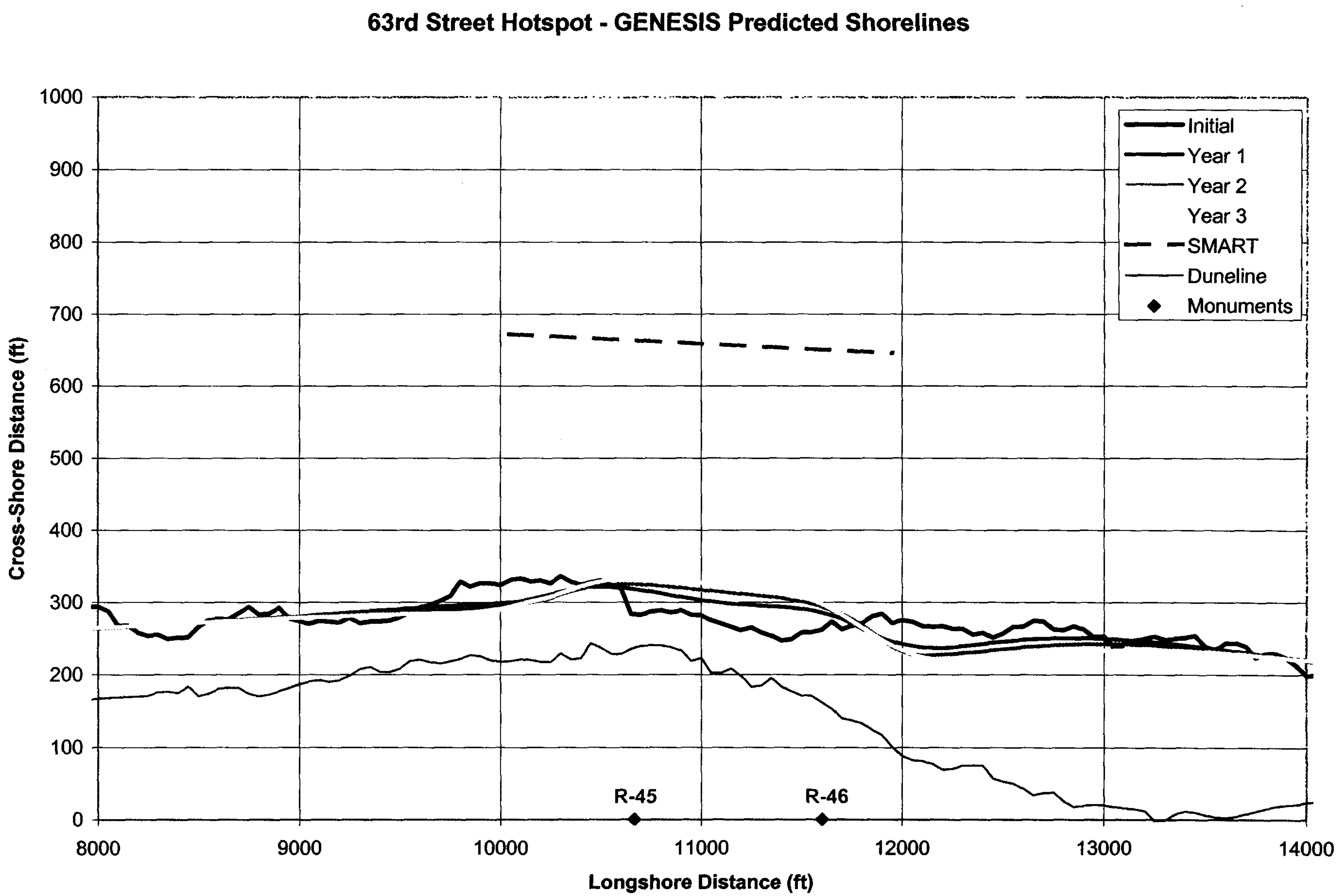

63rd Street Hotspot - GENESIS Predicted Shorelines
Initial
Year 1
Year 2
Year 3
SMART
Duneline
Monuments
Cross-Shore Distance (ft)
1000
900
800
700
600
500
400
300
200
100
0
R-45
R-46
8000
9000
10000
11000
12000
13000
14000
Longshore Distance (ft)

Figure 8

4 ENVIRONMENTAL EFFECTS

This section is the scientific and analytic basis for the comparisons of the alternatives. See Table 1 in Section 2.0 Alternatives, for summary of impacts. The following includes anticipated changes to the existing environment including direct, indirect, and cumulative effects.

4.1 GENERAL ENVIRONMENTAL EFFECTS

The placement of the SMART structure 400-foot from the mean shoreline would aid in retaining sand on the shoreline and beach to provide protection against storms and tidal flooding. It would also enhance the appearance and suitability for recreation along the beach and would provide additional habitat for threatened and endangered species of sea turtles nesting. Hardgrounds are located offshore of the SMART structure and construction vessels would have to cross the hardground community. Based on information for the proposed project area (Figure 4 and Figure 6), SMART structure construction is not likely to adversely affect hardgrounds near the project area. Any adverse impacts to the hardground community would be appropriately mitigated (see Appendix F – Monitoring Program). The proposed project is not likely to adversely affect environmental resources within the proposed project area.

If no action is taken, the project beach would continue to erode and shoreline recession would continue. With limited sand and revenue to construct beach renourishment for storm protection the preferred alternative is a very practical proposal.

4.2 VEGETATION

4.2.1 SMART STRUCTURE CONSTRUCTION

There is no vegetation located in the area the SMART structure is proposed. No impacts to vegetation are expected. No sea grasses or algal communities are present in the 2.1 acre footprint of the SMART structure or the adjacent nearshore areas. No work would be performed on vegetated upland or dune areas. No adverse impacts to either marine or terrestrial vegetation are expected.

4.2.2 NO ACTION ALTERNATIVE (STATUS QUO)

This alternative would have no effect on marine vegetation. However, continued erosion could eventually result in the loss of upland vegetation adjacent to the beach as noted in the USACE Oct 2001 Dade County, Florida, Beach Erosion Control and Hurricane Protection Project, Evaluation Report (migrating ECL towards MLW, pg 93).

4.3 THREATENED AND ENDANGERED SPECIES

4.3.1 SMART STRUCTURE CONSTRUCTION

Construction of the SMART structure has the potential to impact nesting sea turtles and may have the following effects.

a. Littoral drift erosion of adjacent beaches due to SMART structure construction may effect nesting sea turtle habitat. Temporary effects may occur during SMART structure construction until littoral drift sediment patterns reach historical equilibrium conditions but is not anticipated. Once historical conditions are reached beach accretion may occur.

b. Disruption of nesting activities that could lead to reduced nest site selection and energetic cost diminishing egg production. Some temporary disruption may occur during the proposed SMART structure construction but is not anticipated. After construction is completed historical conditions would prevail.

c. Disorientation or misorientation of hatchlings from adjacent beaches by artificial lights on construction equipment in the Atlantic Ocean is possible but not anticipated.

Construction equipment would be very close to shore, onboard lighting would be shielded, turtle disorientation would be minimized if not avoided. By using proper management techniques such as work vessel light shielding, work area specific lighting and sea turtle nest relocation, most of the potential negative work lighting effects would be avoided or corrected (Nelson and Dickerson, 1989a).

Artificial lighting along the beach is known to effect the orientation of hatchlings (Dickerson and Nelson, 1989; Witherington, 1991) and to effect the emergence of nesting females onto the beach (Witherington, 1992). If construction of the SMART structure occurs during the sea turtle nesting season, lighting associated with construction activities may effect hatchlings and nesting females. Note that almost all nests in Miami-Dade County are relocated to a safe hatchery. Research has shown that low pressure sodium (LPS) lights that emit only yellow wavelengths do not attract hatchlings (Dickerson and Nelson 1988 and 1989; Nelson and Dickerson, 1989b). Witherington (1992) demonstrated that LPS lights on the beach did not significantly effect the nesting behavior of green or loggerhead sea turtles. The use of LPS lighting during the SMART structure project construction can reduce the potential for lighting effects on sea turtles. However, the Corps is concerned about the appropriateness of using LPS lights in a marine environment for safety reasons. In a letter dated January 29, 1998, the USFWS revised their requirement for using LPS lights to a recommendation.

4.3.2 NO ACTION ALTERNATIVE (STATUS QUO)

If no action is taken, the beach would continue to erode. If left to erode, this could ultimately result in the loss of sea turtle nesting habitat and/or poor nest site selection. Increased turbidity levels would continue to be experienced under the No Action Alternative. Potential adverse effects to beach vegetation could be realized as well as effects to aesthetics and recreation. Potential future effects to sea turtles from future renourishment projects would be eliminated with the construction of the SMART structure. No adverse impacts are expected on other listed species.

4.4 FISH AND WILDLIFE RESOURCES

4.4.1 PROPOSED ACTION: SMART STRUCTURE CONSTRUCTION

During the construction of the SMART structure there may be some interruption of foraging and resting activities for shorebirds that utilize the project area. This potential impact would be short-term and limited to the immediate area of shoreline east of the proposed project while under construction. There would be sufficient beach area north and south of the construction site that could be used by displaced birds while construction takes place. Potential temporarily elevated turbidity levels within the immediate vicinity of the SMART structure placement may interfere with foraging by sight feeders such as the brown pelican (*Pelecanus occidentalis*). However, increased turbidity levels would be limited to a small portion of the project area and should not result in significant impacts to foraging activities.

The construction of the SMART structure could have temporary impacts to the macroinfaunal community. Some organisms may be buried and lost, but many organisms inhabiting the intertidal zone are motile and well adapted for burrowing and would be able to survive the temporary construction activities. The sediment transport budget along the project site shoreline would temporarily increase, but would return to normal after SMART structure equilibrium is achieved. Organisms inhabiting this zone would be impacted by the turbidity from the project construction area but are adapted for survival in such conditions and impacts should be minor. Dominant infaunal inhabitants of the intertidal zone, such as amphipods, isopods and polychaetes typically possess high fecundity and rapid turnover rates during their breeding season. Because of this, any losses due to construction activities would be replaced within a short time. No long-term adverse effects are anticipated to the intertidal macroinfaunal community due to SMART structure construction activities (Deis, et al. 1992, Nelson 1985, Gorzelany & Nelson 1987, USFWS 1997).

Minimal turbidity impacts to nearshore hardbottom communities may occur due to construction vessel transit across them to the construction area. In conjunction with the Coast of Florida Erosion and Storm Effects Study, the hardground areas offshore of Miami-Dade County were mapped using side scan sonar. The closest hardground community in the 63rd Street vicinity is 750 to 800 feet offshore or more.

The communities found offshore of 63rd Street out to one-half mile from shore are described in Dodge et al. (1987). Dodge characterizes four community types within this area. (1) non-vegetated sand flats occurring; (2) soft coral communities in sand deposits of 3" to 6" or greater depth; (3) soft coral and attached algae on sand bottom; (4) hard coral community hardground "reefs". Of these community types, only the last one is characteristic of hardbottom reef areas (i.e., continuous rocky substrate with epibiotic growth). The other community types noted by Dodge et al. (1987) have developed and grown in these highly dynamic areas of sand movement, characterized by sporadic, episodic sand inundation and removal. The organisms that colonize these areas are more tolerant of the dynamic conditions that exist in these areas, and comprise a stable community adapted to sand movement of the nearshore system. The community types (2) and (3) above correlate to the hardbottom areas located closest to shore as interpreted by side scan sonar. The hardground areas (4) above noted by Dodge et al. (1987) were reported as being "never closer than 1500 feet and generally greater than 1800 feet from shore", and that "the hard coral coverage and diversity is greatest on the seaward portions of the transects" (greater than 3000 feet from shore – See Figure 4 and Figure 6). Because the communities nearest the shore (within 1500 feet) are adapted for periodic sand movement within the zone it is not expected that these communities would be effected by the placement of the SMART structure 400-foot from the mean shoreline by barge and tug. The shoreward edge of the hard coral community described above is at least 600-foot seaward of the proposed SMART structure and would not be directly impacted by the project.

A minor and temporary impact on the microinfaunal community within the SMART structure area would occur during placement activities. Once placed the area within the SMART structure footprint would not be available for recolonization by benthic organisims. During placement, turbidity and sedimentation levels would be elevated within the immediate vicinity of the SMART structure footprint. These would be temporary and would return to normal once SMART structure placement is completed. Increased turbidity and sedimentation may have some impact on nearshore hardbottom community immediately adjacent to the SMART structure placement construction site. Precautions such as turbidity curtains would be implemented to minimize any impacts of the SMART structure placement activities.

4.4.2 NO ACTION ALTERNATIVE (STATUS QUO)

The no action alternative would mostly likely have no impact on fish and wildlife within the project area. Continued erosion of the County's beaches could result in loss of habitat and eventual loss of vegetated dune habitat, poor sea turtle nesting, reduced shorebird activities, structural damage to beachfront buildings and continued high project area turbidity. No direct adverse impacts are expected on listed species. Some cumulative effects would be expected.

4.5 COASTAL BARRIER RESOURCES

The purpose of the Coastal Barrier Resources Act is to minimize the loss of human life, wasteful expenditure of Federal moneys; and the damage to fish, wildlife, and other resources associated with the coastal barriers along the Atlantic coast by restricting future Federal expenditures and financial assistance, which have the effect of encouraging development of these coastal barriers. There are no designated Coastal Barrier Resource Act Units located within or adjacent to the project area.

4.6 WATER QUALITY

The proposed action would cause temporary increases in turbidity along and adjacent to the project placement area. The State of Florida water quality regulations require that water quality standards not be violated during Federal project operations. The standards state that turbidity outside the mixing zone shall not exceed 29 NTU's above background. Results from turbidity monitoring at previous submerged breakwater projects have shown that the turbidity did not exceed the standard. Various protective measures and monitoring programs would be conducted during construction to ensure compliance with state water quality criteria. Should turbidity exceed State water quality standards as determined by monitoring, the contractor would be required to cease work until conditions returned to normal. A temporary disruption of the longshore drift 'river of sand' would be expected with the initial construction of the SMART structure. However, modeling with SBEACH and GENESIS has predicted the temporary effects would find equilibrium within a year after construction (see Figure 8). The proposed action has been evaluated in accordance with Section 404 of the Clean Water Act and a 404(b) evaluation report has been included as Appendix A to this EA.

4.7 HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE

There are no hazardous, toxic, or radioactive waste sites or producers in the project area that would be affected as a result of the preferred alternative. No impacts associated with the disturbance of such sites are anticipated from either the recommended or no-action alternatives.

With the use of construction equipment within the SMART structure placement area, there is the potential for hydrocarbon spills or other effluent releases. However, the likelihood of significant accidents and releases of this sort is very remote. The contract specifications would require the contractor to develop accident and spill prevention plans to prevent, avoid or minimize spill effects. The no-action alternative should not allow conditions to develop that would increase accidents or releases of this sort (see Appendix E).

4.8 AIR QUALITY

Direct emissions from the proposed action would be confined to exhaust emissions of labor and material transport equipment (water vehicles), and construction equipment (barges, tugs, etc.). These emissions would likely be well under the *de minimus* levels for ozone non-attainment areas as cited in 40 CFR 91.853; that is, projects implemented cannot produce total emissions greater or equal to 100 tons per year of Volatile Organic Compounds (VOCs). Any indirect increase in emissions (indirect emissions), as a result of the proposed action is beyond the control and maintenance of the USACE. Consequently, a conformity determination with the Florida State Implementation Plan is inappropriate for increases of indirect emissions from the proposed action. As with the proposed action and alternatives, the no-action alternative would see continued development, which may cause marginal adverse impacts to air quality.

4.9 NOISE

With the implementation of the proposed action there would be a temporary and slight increase in the noise level during SMART structure placement. The principle noise would stem from the vicinity of the SMART structure placement (crane operation). Construction equipment would be properly maintained to minimize the effects of noise. Increases from the current noise levels as a result of the proposed action would be localized and minor, and limited to the time of construction. There would be no noise related impacts associated with the no-action alternative.

4.10 AESTHETICS

There would be a temporary increase in the noise level during construction, as mentioned above. Engine exhaust fumes would be rapidly carried away by breezes. Any temporary decrease in visible air quality caused by this work would subside once work is completed. Proposed project construction and equipment would have a temporary visual impact that would end once work was completed. The negative visual impacts of the equipment would be offset to an extent by the natural curiosity of some individuals to see what is going on and how work is progressing. There would also be a temporary increase in turbidity during SMART structure placement. Turbidity levels would return to historical levels once SMART structure placement activities conclude. Once completed the proposed project would result in some improved changes to aesthetic quality within the proposed project area. The placement of the SMART structure would retain the natural shoreline appearance. With the no-action alternative, the shoreline would continue to erode. This would result in the loss of existing shoreline and increased turbidity which would reduce the visual aesthetics of the area.

4.11 RECREATION

During SMART structure placement activities, the use of the beach in the vicinity of proposed project would drop or increase based on curious beachgoers. Many visitors would seek other areas for sunbathing, swimming, boating, kyacking, surfing or other water oriented-recreation activities as the proposed SMART structure placement area recreational access would be restricted. After the proposed SMART structure placement the public access to water resources for recreation purposes would resume. There would be a temporary adverse effect on recreational fishing in the immediate area of proposed SMART structure due to construction activities and potential turbidity. Fishing would not be affected outside the area of immediate placement area. Nearshore snorkeling, and SCUBA diving activities may also be impacted by turbidity during SMART structure placement activities. Long-term adverse impacts to these water activities are not anticipated. Boat operations may be detoured during construction activities; however, the extent of these detours and time frame of operations render these impacts insignificant. With the no-action alternative, the shoreline would continue to erode. This would eventually reduce the amount of beach available for recreation and would result in the degradation or loss of shorefront property thus, adversely impacting beach recreational opportunities within the area. The no action plan could impact fishing, snorkeling, swimming and SCUBA diving with increased turbidity and potential rip currents based on continued shoreline erosion.

4.12 HISTORIC PROPERTIES IMPACTS

Archival research and field investigations have been completed for past Corps project studies within the proposed SMART structure placement area (Renourishment at Miami Beach in the Vicinity of 63rd Street, USACE, Nov 2000 and Proposed Test Fill at Miami Beach Using a Domestic Upland San Source, USACE Aug 2002). In letters dated June 17, 1993, May 29, 1996 and January 15, 1999, the State Historic Preservation Officer's (SHPO) office concurred with the Jacksonville District's no effect determination for the beach fill area for these projects. In a letter date May 27, 2003, the SHPO stated, based Sections 3.13 and 4.14 of the *Draft Environmental Assessment of the Renourishment at Miami Beach in the Vicinity of 63rd Street for the Beach Erosion Control and Hurricane Protection Project*, we note that a previous magnetometer survey and side scan sonar survey was conducted. The SHPO concluded that no historic properties would be affected by the proposed SMART structure project.

4.13 ENERGY REQUIREMENTS AND CONSERVATION

The energy requirements for this construction activity would be confined to fuel for the tugboat, crane, labor, transportation, and other construction equipment. The expenditure of energy would be much less to construct the SMART structure than to renourish the 63rd Street Hotspot area every 6 to 8 years. The no-action alternative would allow conditions to develop that may endanger coastal property from storm surges and wave erosion during future storm events and or potential hazards to recreational users also. On-site preventive measures and post clean up under the no-action alternative would likely demand greater energy than that required of the proposed action.

4.14 NATURAL OR DEPLETABLE RESOURCES

In this case, the beach quality sand to be retained by the proposed SMART structure would help to conserve the depletable sand resource. Resource agency concern over accelerated shoreline erosion adjacent to the SMART structure has been expressed. Modeling runs with SBEACH and GENESIS have indicated the littoral transport of sediment would be temporarily interrupted until sediment equilibrium or historic conditions resume. Eventually the sand would be redistributed over nearshore areas (see Figure 8). The gasoline and diesel fuel used by the tug, crane and other construction equipment is also a depletable resource.

4.15 CUMULATIVE IMPACTS

Cumulative impact is the impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions (40 CFR 1508.7). The use of reef balls anchored to an ABM 400-foot from the mean shoreline would impact species of relatively non-motile infaunal invertebrates (mollusks). However, many of those species that are not able to escape the SMART structure placement area are expected to recolonize after project completion in adjacent areas. Construction of the SMART structure would provide shoreline erosion prevention within the 63rd Street Hotspot area, thus avoiding the need for future beach renourishments (dredges, pipelines, beach construction, etc.). Approximately 2.1 acres of nearshore sandy benthic habitat would be covered by the SMART structure, producing cumulative effects. These effects would be ameliorated with the shoreline stabilization effects of the SMART structure, avoiding the need for future beach renourishments and associated affects. Some minor and temporary construction turbidity effects may occur to nearshore hardground habitat within the project area caused by vessel transit. The proposed action would result in long-term benefits, which should outweigh any short-term environmental losses. The cumulative impact of shore protection projects along the Florida coast has been to restore and maintain many beaches which otherwise would have experienced severe erosion or would have totally disappeared. In addition, these activities have reduced property damage and helped maintain property value.

4.16 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

4.16.1 IRREVERSIBLE

An irreversible commitment of resources is one in which the ability to use and/or enjoy the resource is lost forever. One example of an irreversible commitment might be the mining of a mineral resource. The proposed SMART structure would alleviate beach and shoreline erosion and would conserve beach quality sand resources within the proposed project area. There would however, be some irreversible impacts to sandy benthic organisms which would be covered by the approximate 2.1 acre SMART structure footprint. These affects would be temporary as sandy benthic organisms generally reproduce rapidly. Impacts to hard coral could be irreversible for practical purposes given the long amount of time needed to regrow older and larger specimens. Measures would be taken to avoid such impacts. The energy and fuel used during construction would also be an irreversible commitment of resources.

4.16.2 IRRETRIEVABLE

An irretrievable commitment of resources is one in which, due to decisions to manage the resource for another purpose, opportunities to use or enjoy the resource as they presently exist are lost for a period of time. An example of an irretrievable loss might be where a type of vegetation is lost due to road construction. Benthic organisms within the SMART footprint (approximately 2.1 acres) that would be eliminated during construction, would be irretrievably lost for a period of time. However, the high rate of repopulation expected from these organisms reduces the significance of the loss. Unlikely impacts from vessel transit turbidity, which are temporary (soft corals, sponges, small hard corals, benthic invertebrates, etc.), would produce an irretrievable affect to those resources for the period of time it takes them to recover.

4.17 UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS

Species of relatively non-motile infaunal invertebrates that inhabit the proposed SMART structure footprint would unavoidably be lost during project placement. Those species that are not able to escape the construction area are expected to recolonize after project completion. There would be an unavoidable reduction in water clarity, increased turbidity and sedimentation. This would be limited to the immediate areas of the proposed SMART structure construction and vessel transit to the footprint area. This impact would be temporary and should disappear shortly after construction completion. Vessel hull, keel or prop contact/impacts to hardgrounds are not anticipated due to water depths within the proposed project area. Measures would be implemented to avoid potential impacts and any impacts that do occur would be mitigated (see Appendix F).

4.18 LOCAL SHORT-TERM USES AND MAINTENANCE/ENHANCEMENT OF LONG-TERM PRODUCTIVITY

We recognize that protection of the shoreline is a continual effort. No acceptable and permanent one-time fix has been identified to date. The installation of the proposed SMART structure is a developmental alternative being considered to help retain sand in a known 'Hotspot' erosional area. Monitoring would be done during and after the SMART structure installation to ensure the proposed objectives are reached. The SMART structure can be removed if found it is not attaining its objectives. It is anticipated the potential SMART structure impacts would not be substantial since there are no special resources within the 2.1 acre structure footprint and littoral transport of sediments would return to historic conditions once stabilized within the proposed project area.

4.19 COMPATIBILITY WITH FEDERAL, STATE, AND LOCAL OBJECTIVES

The proposed action is consistent with the state's Coastal Zone Management plan (see Appendix B on consistency determination). We expect the preferred alternative to be consistent with Federal, State and local plans and objectives.

4.20 CONTROVERSY

Resource agencies, scientists and environmental organizations have expressed concern about impact of erosion control projects on nearshore and adjacent shoreline resources. The controversy tends to involve issues relating to the potential, duration or permanency of the impact and the capacity of the resource to recover from disturbances caused by civil work projects; and the cumulative effect of multiple but unrelated projects in a region of the coast.

In response to this controversy, the USACE has subjected the regulatory compliance determination for the Miami-Dade Test Beach Project and the Section 227, 63rd Street "Hotspot". Miami Beach, Florida Demonstration Program project to full review under the National Environmental Policy Act (NEPA). While public concern for impacts to nearshore habitats cannot be fully alleviated simply by analysis in an Environmental Assessment, the issues of concern would be more closely examined and the sufficiency of measures to avoid, minimize, and mitigate for impacts to resources can be better examined.

In addition, the proposed Section 227 National Shoreline Erosion Control Development and Demonstration Program, 63rd Street "Hotspot", Miami Beach, Florida proposed SMART structure involves components not used in this region, in this manner. With careful diver quality assurance of SMART structure placement, DERM monitoring of structure performance and US Coast Guard safety markings the SMART structure should perform as designed in a safe and environmentally friendly manner. If the SMART structure does not fulfill its objectives it can be altered or removed. Resource agency concerns of artificial reef compliance with NFMS, Corps, USCG, FDEP, and FWC requirements have been addressed even though the SMART structure is not an 'artificial reef', but a submerged breakwater.

4.21 UNCERTAIN, UNIQUE, OR UNKNOWN RISKS

The Section 227 National Shoreline Erosion Control Development and Demonstration Program proposes to help prevent shoreline erosion and retain beach quality sand with the construction and placement of the SMART structure. It is a developmental project whose success would reduce expensive beach renourish projects and conserve beach quality sand resources. Consequently, the means and methods for construction of the project, general performance and public safety are not uncertain, unique or unknown risks as similar project have been constructed around the world, just not at this specific location. Burial of resources under the 2.1 acre SMART structure footprint is a clear unavoidable temporary impact if the shoreline erosion is to be corrected. What is not fully certain is the magnitude of effect of the burial of approximately 2.1 acres of sandy benthic area by the SMART structure footprint if even measurable.

4.22 PRECEDENT AND PRINCIPLE FOR FUTURE ACTIONS

The SMART structure would be a new feature for the project area. Breakwaters have been used at various places in Florida. Most have been hard structures such as stone or fabricated modules. Performance reviews of these have been mixed. Placement, spacing, depth, and orientation are important factors to submerged breakwater success. If the proposed action performs as modeled and expected, further use of these features could be appropriate for Miami-Dade County and other similar coastal areas. If the SMART structure does not attain its objectives it can be altered or removed under Section 227 of the Water Resources Development Act of 1996.

5 ENVIRONMENTAL COMMITMENTS

The U.S. Army Corps of Engineers and contractors commit to avoiding, minimizing or mitigating for adverse effects during construction activities by including the following commitments in the contract specifications:

(1) Inform contractor personnel of the potential presence of sea turtles and manatees in the project area, their endangered status, the need for precautionary measures, and the Endangered Species Act prohibition on taking or harassment sea turtles, manatees and other threatened or endangered species and migratory birds.

(2) Take precautions during construction activities to insure the safety of the manatee. To insure the contractor and his personnel are aware of the potential presence of the manatee in the project area, their endangered status, and the need for precautionary measures, the contract specifications would include the standard protection clauses concerning manatees. The contractor would instruct all personnel associated with the construction of the project about the presence of manatees in the area and the need to avoid collisions with manatees. All vessels associated with the project shall operate at 'no wake' speeds at all times while in shallow waters, or channels, where the draft of the boat provides less than three feet clearance of the bottom. Boats used to transport personnel shall be shallow draft vessels, preferably of the light-displacement category, where navigational safety permits. Vessels transporting personnel between the landing and any workboat shall follow routes of deep water to the extent possible. All personnel would be advised that there are civil and criminal penalties for harming, harassing, or killing manatees, which are protected under the Endangered Species Act and the Marine Mammal Protection Act (including all other marine mammals) or any manatee harmed, harassed, or killed as a result of the construction of the project. If a manatee is sighted within 100 yards of the project area, appropriate safeguards would be taken, including suspension of work, if necessary, to avoid injury to manatees. The contractor shall keep a log of all sightings, collision, injuries, or killings of manatees during the contract period. Any manatee deaths or injuries would be immediately reported to the Corps of Engineers and the USFWS (Vero Beach Office).

(3) Implement the following measures to minimize adverse effects to sea turtles:

a. During the sea turtle nesting and hatching window (April 1 through November 1) contractor would be responsible to stop work if nesting or hatching sea turtles occur within 100 yards of the SMART structure construction equipment or personnel transport vessel.

b. A report describing the actions taken to implement the terms and conditions shall be submitted to the USFWS within 60 days of completion of the proposed work for each year when activity has occurred. The report shall include the dates of actual construction activities, names and qualifications of personnel involved in work stoppage due to nesting or hatching sea turtle occurrences that caused work stoppage.

c. Beaches would be surveyed for escarpments at the conclusion of SMART structure monitoring work for 3 subsequent years. Any escarpments that exceed 18 inches in height and 100 feet length would be leveled by April 1.

d. Measures would be taken to reduce night time beach directed construction lighting including: eliminating extraneous lighting to an amount necessary for safe operations and safety of personnel.

(4) Monitor turbidity at the SMART structure construction sites. Should monitoring reveal turbidity levels above State standards, outside the allowable mixing zone, work would be suspended until turbidity levels return to within those standards.

(5) Precautions would be implemented during construction to minimize potential vessel transit impacts to hardground communities offshore of the proposed SMART structure. Vessel transit would follow deep water that would provide adequate clearance, would be utilized to access the proposed project area.

(6) A biological monitoring program to assess possible impacts of the SMART structure construction to benthic and epibenthic communities would be conducted. SMART structure establishment of species variation would be conducted and reported.

(7) Damaged hard bottom epibenthic organisms would be mitigated for as outlined in Appendix G.

(8) The contractor shall be informed that the release of any vessel bilge water containing any exotic or invasive exotic organisms is strictly prohibited.

6 COMPLIANCE WITH ENVIRONMENTAL REQUIREMENTS

6.1 NATIONAL ENVIRONMENTAL POLICY ACT OF 1969

Environmental information on the project has been compiled and a Draft Environmental Impact Statement, dated February 2004 has been prepared and will be circulated for public review and comment. The project is in compliance with the National Environmental Policy Act.

6.2 ENDANGERED SPECIES ACT OF 1973

On June 3, 1994 the Corps submitted a Biological Assessment (BA) to the National Marine Fisheries Service (NMFS) pursuant to Section 7 of the Endangered Species Act for the 'Renourishment at Miami Beach in the Vicinity of 63rd Street EA'. In the BA the Corps had determined that the project would not likely to adversely affect any listed species (whales and pelagic sea turtles) under their jurisdiction. On January 4, 1995 the NMFS concurred with the Corps' not likely to adversely effect determination if hopper dredging takes place during November through April or if a hopper dredge is not employed ("historical information purposes"). This EA also incorporates the Miami Harbor Sea Turtle NMFS Biological Assessment of February 2003 by reference.

On June 26, 2003 the Corps responded to the NMFS April 28, 2003 request for EFH consultation for the Section 227 National Shoreline Erosion Control Developmental and Demonstration Program, 63rd Street "Hotspot", Miami Beach, Florida project. The Corps completed the EFH consultation and requested NMFS EFH Conservation Recommendations in a May 26, 2003 letter. On July 17, 2003 NMFS responded with conservation recommendations and further questions. On April 20, 2004 the Corps responded to the conservation recommendations, agreeing to implement recommendations 2, 4, 5, 6. The Corps requested notification of elevation to DOA Headquarters in accordance with 50 CFR 600.920 (j) (2). A Biological Assessment will be coordinated with NMFS in the draft EA (see Appendix C).

In an April 4, 1997 letter to the USFWS, the Corps made a determination that the reasonable and prudent measures, and terms and conditions listed in the BO for Miami-Dade County applied to the proposed beach 63rd Street "Hotspot" renourishment project. In a letter dated May 8, 1997 the USFWS concurred with that determination. In a letter dated December 18, 1997, the Corps requested that the requirement for red filters on the headlights of vehicles and construction equipment, and the requirement for using low pressure sodium lights be removed. The USFWS concurred with this request in a letter dated January 29, 1998. On October 24, 1996 the USFWS issued a Biological Opinion for Region III of the Coast of Florida Erosion and Storm Effects Study, which includes the project area considered for modifications at 63rd Street to 71st Street, Miami Beach. ("historical information purposes").

On July 24, 2003 the USFWS responded to the Corps' April 28, 2003 scoping letter and stated the federally threatened and endangered species that may occur within the project area (sea turtles and manatee). The letter also repeated the NMFS comments and recommendations and stated USFWS support. On February 27, 2004 the Corps responded to a USFWS request for proposed project information that included; FMRI sea turtle nesting data and email, NOAA Sounding Chart 11466, LADS/LIDAR hardbottom data, benthic survey data, a copy of the signed MIPR package. April 9, 2004, the Corps submitted a BA to the U S Fish and Wildlife Service (USFWS) pursuant to Section 7 of the Endangered Species Act that stated the proposed project may affect but is not likely to adversely affect manatees and nesting sea turtles under their purview (see copy of BA in Appendix C). This EA also incorporates the Miami Harbor Sea Turtle Biological Assessment of February 2003 by reference (USFWS Section 7).

This project was fully coordinated under the Endangered Species Act and is therefore, in full compliance with the Act.

6.3 FISH AND WILDLIFE COORDINATION ACT OF 1958

This project has been coordinated with the U.S. Fish and Wildlife Service (USFWS). A Coordination Act Report (CAR) dated June 2004 was submitted by the USFWS (refer to Appendix D). There has been no change in the project design since submittal of the CAR. This project is in full compliance with the Act.

6.4 NATIONAL HISTORIC PRESERVATION ACT OF 1966 (INTER ALIA)

(PL 89-665, the Archeology and Historic Preservation Act (PL 93-291), and executive order 11593) Archival research, field investigations, and consultation with the Florida State Historic Preservation Officer (SHPO), have been conducted in accordance with the National Historic Preservation Act, as amended; the Archeological and Historic Preservation Act, as amended and Executive Order 11593. Refer to Section 3.12 for results of SHPO consultation. The project would not affect historic properties included in or eligible for inclusion in the National Register of Historic places. The project is in compliance with each of these Federal laws.

6.5 CLEAN WATER ACT OF 1972

The project is in compliance with this Act. Application for a Section 401 water quality certification has been submitted to the FDEP. All State water quality standards would be met. A Section 404(b) evaluation is included in this report as Appendix A. A public notice would be issued after FDEP RAIs are sufficiently satisfied and the requirements of Section 404 of the Clean Water Act are met.

6.6 CLEAN AIR ACT OF 1972

Refer to Section 4.8 in the EA for a discussion on the compliance with the Clean Air Act General Conformity Rules. No air quality permits would be required for this project. This project has been coordinated with U.S. Environmental Protection Agency (EPA) and is in compliance with Section 309 of the Act. The draft EA was forwarded to EPA for their review in June 2004.

6.7 COASTAL ZONE MANAGEMENT ACT OF 1972

A federal consistency determination in accordance with 15 CFR 930 Subpart C is included in this report as Appendix B. State consistency review would be conducted during the coordination of the draft EA.

6.8 FARMLAND PROTECTION POLICY ACT OF 1981

No prime or unique farmland would be impacted by implementation of this project. This act is not applicable.

6.9 WILD AND SCENIC RIVER ACT OF 1968

No designated Wild and Scenic river reaches would be affected by project related activities. This act is not applicable.

6.10 MARINE MAMMAL PROTECTION ACT OF 1972

Incorporation of the safe guards used to protect threatened or endangered species during dredging and disposal operations would also protect any marine mammals in the area, therefore, this project is in compliance with the Act.

6.11 ESTUARY PROTECTION ACT OF 1968

No designated estuary would be affected by project activities. This act is not applicable.

6.12 FEDERAL WATER PROJECT RECREATION ACT

The principles of the Federal Water Project Recreation Act, (Public Law 89-72) as amended, have been fulfilled by the fact that no effects to recreation resources are anticipated. The SMART structure is located within the recreation swimming zone (extends 500-foot offshore) and will be marked as the Sunny Isles submerged breakwater, per the USCG.

6.13 FISHERY CONSERVATION AND MANAGEMENT ACT OF 1976

The project has been coordinated with the National Marine Fisheries Service (NMFS) and is in compliance with the act (refer to correspondence in Appendix C from NMFS).

6.14 SUBMERGED LANDS ACT OF 1953

The project would occur on submerged lands of the State of Florida. The project has been coordinated with the State and is in compliance with the act.

6.15 COASTAL BARRIER RESOURCES ACT AND COASTAL BARRIER IMPROVEMENT ACT OF 1990

There are no designated coastal barrier resources in the project area that would be affected by this project. These acts are not applicable.

6.16 RIVERS AND HARBORS ACT OF 1899

The proposed work would not obstruct navigable waters of the United States. The proposed action has been subject to a public notice and other evaluations normally conducted for activities subject to the act. The project is in full compliance.

6.17 ANADROMOUS FISH CONSERVATION ACT

Anadromous fish species would not be affected. The project has been coordinated with the National Marine Fisheries Service and is in compliance with the act.

6.18 MIGRATORY BIRD TREATY ACT AND MIGRATORY BIRD CONSERVATION ACT

No migratory birds would be affected by project activities. The project is in compliance with these acts.

6.19 MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

This act requires the preparation of an Essential Fish Habitat (EFH) Assessment and coordination with NMFS. The EFH Assessment has been integrated within the draft EA and would be coordinated with NMFS during the normal NEPA coordination.

6.20 MARINE PROTECTION, RESEARCH AND SANCTUARIES ACT

The term "dumping" as defined in the Act (3[33 U.S.C. 1402](f)) does not apply to the work that would be undertaken with the construction of the SMART structure. Therefore, the Marine Protection, Research and Sanctuaries Act does not apply to this project. No dredging is proposed and no dredge disposal activities have been addressed in this EA nor have been evaluated under Section 404 of the Clean Water Act.

6.21 E.O. 11990, PROTECTION OF WETLANDS

No wetlands would be affected by project activities. This project is in compliance with the goals of this Executive Order.

6.22 E.O. 11988, FLOOD PLAIN MANAGEMENT

The project is in the base flood plain (100-year flood) and has been evaluated in accordance with this Executive Order. Refer to Dade County Beaches, Florida, Beach Erosion Control and Hurricane Protection, General Design Memorandum. Phase I, 1974. Project is in compliance.

6.23 E.O. 12898, ENVIRONMENTAL JUSTICE
The proposed action would not result in adverse human health or environmental effects, nor would the activity impact substance consumption of fish or wildlife. Project is in compliance.

6.24 E.O. 13112, INVASIVE SPECIES
The proposed action would not introduce invasive species and would comply with E.O. 13112 by observing the guidance in the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321 *et seq.*), Non-indigenous Aquatic Nuisance Prevention and Control Act of 1990, as amended (16 U.S.C. 4701 *et seq.*), Lacey Act, as amended (18 U.S.C. 42), Federal Plant Pest Act (7 U.S.C. 150aa *et seq.*), Federal Noxious Weed Act of 1974, as amended (7 U.S.C. 2801 *et seq.*), Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*), and other pertinent statutes for the prevention of the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause.

6.25 E.O. 13089, CORAL REEF PROTECTION
The proposed action is not likely to adversely affect U.S. coral reef ecosystems as defined in the Executive Order. Precautions would be implemented during construction to avoid, minimize or mitigate for impacts. Artificial reefs would be constructed to mitigate for any reef impacts associated with the heavy turbidity effects or vessel hull/keel/prop impacts. Refer to Sections 3.4.2 and 3.4.3 in the EA. Project is in compliance.

7 LIST OF PREPARERS

This Environmental Assessment was prepared by the following personnel:

Preparer	Discipline	Role
Paul Stevenson, USACE	Biology/Landscape Arch.	Principal Writer
Bryan Flynn, DERM	Marine Biology	Monitoring Plan development
Grady Caulk, USACE	Archeology	Historic Properties
Doug Rosen, USACE	Coastal Geology	Geotechnical Analysis
Jonas White, USACE	Civil Engineer	Project Manager
Matthew Miller, USACE	Civil Engineer	Water Quality Certificate
Terri Jordan, USACE	Marine Biology	EFH Consultation
Michael Dupes, USACE	Marine Biology	NEPA Consultation
Kenneth Dugger, USACE	Asst. Environ. Branch Chief	Document Review
Tom Martin, USACE	Civil Engineer	Coastal Engineering
Donald Ward, PhD, ERDC	Research Engineer	SMART Physical Modeling
George Turk, P.E., URS	Coastal Engineer	SMART Design
Michael Giovannozzi, URS	Coastal Engineer	SBEACH & GENESIS Modeling

8 PUBLIC INVOLVEMENT

8.1 SCOPING AND DRAFT EIS

A Notice of Intent (NOI) to prepare a Draft Environmental Impact Statement (DEIS) appeared in the Federal Register on May 15, 2003. In addition, the NOI was mailed to interested and affected parties on April 28, 2003. A copy of the NOI and the transmittal letter can be found in Appendix C as well as copies of any letters of comment/response received. Due to the breadth and scope of the responses received and the potential project impacts an EA/FONSI was felt to be more appropriate.

8.2 AGENCY COORDINATION

The proposed project has been coordinated with the following agencies: U.S. Fish and Wildlife Service, National Marine Fisheries Service, U.S. Environmental Protection Agency, Florida State Clearinghouse, Florida State Historic Preservation Officer (SHPO), Florida Game and Fresh Water Fish Commission, and the FDEP.

8.3 LIST OF STATEMENT RECIPIENTS (DRAFT EA)

A list of Federal, State, and local agencies, interest groups and individuals that receive a copy of this draft EA/FONSI would be included in the final EA/FONSI. A complete mailing list for the NOI can be found in Appendix C.

8.4 COMMENTS RECEIVED

Letters of comment can be found in Appendix C.

8.5 ADDITIONAL MEETINGS

Additional meetings with Federal, State and local resources agencies where held on the dates of April 14, 2003, December 15, 2003, January 27, 2004 and April 7, 2004, May 4, 2004.

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APPENDIX A - SECTION 404(B) EVALUATION

SECTION 404(b) EVALUATION

SECTION 227 NATIONAL SHORELINE EROSION CONTROL DEVELOPMENT AND DEMONSTRATION PROGRAM 63RD STREET "HOTSPOT" MIAMI BEACH, FLORIDA

I. Project Description

a. Location. The project is located on the southeast Florida coast within Miami-Dade County. The proposed location for the test fill is between DNR monuments R-44 and R-46A. The proposed work would be performed as a part of the Miami-Dade County Beach Erosion Control and Hurricane Protection Project. Refer to location map, figure 1, in the Environmental Assessment (EA).

b. General Description. The proposed action consists of constructing a SubMerged Articulated Reef Training (SMART) structure approximately 400-foot offshore of the mean shoreline in –7-foot mean low water (MLW). The SMART structure would be approximately 2,272-foot long and 40-foot wide with tapered ends that would form a crescent shape parallel to the shoreline. The SMART structure would be comprised of 42.8-foot long by 6-foot wide segments place perpendicular the shoreline. Segments would be placed next to each other to form the crescent shaped SMART structure parallel to the shoreline. The SMART structure segments would be comprised of four Goliath reef balls and one solid 'Bay Ball' at the Atlantic Ocean end to prevent scouring. The individual SMART structure segments would be connected with cable in PVC conduit to allow flex but maintain structure and weigh approximately 30 tons each. The SMART structure footprint would be approximately 2.1 acres.

c. Authority and Purpose

The proposed project was authorized under Section 227 of the Water Resources Development Act (WRDA) of 1996, the National Shoreline Erosion Control Development and Demonstration Program of the U.S. Army Corps of Engineers. The Secretary of the Army shall establish and conduct a national shoreline erosion control development and demonstration program for a period of 6 years beginning on the date that funds are made available to carry out this section.

Nourishment of Miami-Dade County Beaches has become a necessity to provide storm protection. The purpose of the project is to prevent or reduce loss of public beachfront to continuing erosional forces and to prevent or reduce periodic damages and potential risk to life, health, and property in the developed lands adjacent to the beach.

d. General Description of Dredged or Fill Material.

(1) General Characteristics.

The SubMerged Artificial Reef Training (SMART) structure would form a crescent shaped submerged breakwater approximately 2,272 feet long, 42.8-foot wide, parallel to the shoreline in approximately 7-foot of water at mean low water (MLW) approximately 400-foot from the mean shoreline. It would be constructed of Portland cement Type II, conforming to ASTM C-150.

The SMART structure is comprised of segments. The segments include four Goliath reef balls and one solid 'Bay Ball' each anchored to a 6-foot by 6-foot concrete slab. The SMART segments weigh about 30 tons each. The slabs are cabled to articulated concrete mats to provide flexibility for terrain change and wave force refraction/absorption. Approximate SMART structure footprint is 2.1 acres. See Appendix E – SMART & Environmental Specifications, for further details.

(2) Quantity of Material. Approximately 1,408 Goliath reef balls and 308 Bay Balls would be used to construct the SMART structure. SMART structure Installation would be done from barge in the Atlantic Ocean after the SMART structure segments are constructed offsite.

(3) Source of Material. A local commercial source for the Type II Portland cement ASTM C-150 would be used to construct the reef balls, base slabs and articulated concrete mats that would be assembled and delivered to the installation site in segments. The Portland cement recipe and further specifications can be found in Appendix E of the EA.

e. Description of the Proposed Discharge Site.

(1) Location. The SMART structure would be placed along the Atlantic Ocean shoreline in northern Miami Beach between DEP monuments R-44 and R-46A approximately 400-foot from the mean shoreline in 7-foot of water at MLW. Refer to figure 2 of the EA.

(2) Size. The proposed SMART structure, would be approximately 2,272 –foot long and 42.8-foot wide.

(3) Type of Site. The SMART structure placement site would be proposed for a section of sandy offshore seabed of the Atlantic Ocean.

(4) Type of Habitat. The SMART structure site would be shallow water sandy bottom of the Atlantic Ocean.

(5) Timing and Duration of Dredging. The exact timing of the SMART structure installation is not known at this time. It is anticipated that construction would occur during 2005, require about 6 months to build and 8 weeks to install in the Atlantic Ocean.

f. Description of Disposal Method. The SMART structure would be installed from a barge in the Atlantic Ocean.

II. Factual Determinations

a. Physical Substrate Determinations.

(1) Substrate Elevation and Slope. The crest of the SMART structure would be at elevation –1.0-foot mlw. Crest width would be 42.8-foot and the side slopes would be 1.5 horizontal to 1.0 vertical. Refer to figure 2 in the EA.

(2) Type of Fill Material. The SMART structure would be constructed of Portland Cement Type II, ASTM C-150.

(3) Dredge/Fill Material Movement. Once placed the SMART structure would not move. Each 42.8-foot long by 6-foot wide segment would weigh approximately 30 tons.

(4) Physical Effects on Benthos. The SMART structure footprint would cover approximately 2.1 acres of non-motile benthic organisms associated with the sandy bottom. The SMART structure would provide substrate for benthic organisms typically associated with hardbottom habitat.

b. Water Circulation, Fluctuation and Salinity Determination.

(1) Water Column Effects. During the placement of the SMART structure some temporary increase in turbidity may occur. The increased turbidity would be short-term; therefore 'fill' placement would have no long-term or significant impacts, if any, on salinity, water chemistry, clarity, color, odor, taste, dissolved gas levels, nutrients or eutrophication.

(2) Current Patterns and Circulation. The project would have no significant impact on large-scale current patterns or velocities along the Miami-Dade County shoreline. Currents may be

increased in the immediate vicinity of the SMART structure, and some localized scour may occur near the structure. The SMART structure's foundation design would prevent excessive settlement of the structure. Wave energy would be decreased slightly in the lee of the SMART structure, allowing sediment deposition to occur along the shoreline landward of the structure as modeled by SBEACH and GENESIS model runs.

(3) Normal Water Level Fluctuations and Salinity Gradients. Mean tidal range in the project area is 3.5 feet with a spring tide range of approximately 4.1 feet. Salinity is that of oceanic water. Fill placement would not affect normal tide fluctuations or salinity.

c. Suspended Particulate/Turbidity Determinations.

(1) Expected Changes in Suspended Particulates and Turbidity Levels in the Vicinity of the Disposal Site. There may be a temporary increase in turbidity levels in the immediate vicinity of the SMART structure during construction. Turbidity would be short-term and localized and no significant adverse impacts are expected. State water quality standards for turbidity would not be exceeded.

(2) Effects on the Chemical and Physical Properties of the Water Column. There would be no effects to the chemical and physical properties of the water as a result of placing of the SMART structure.

(a) Light Penetration. Some decrease in light penetration may occur in the immediate vicinity of construction. This effect would be temporary, limited to the area of construction, and would have no adverse impact on the environment.

(b) Dissolved Oxygen. Dissolved oxygen levels would not be altered by this project due to the high energy wave environment and associated adequate re-aeriation rates.

(c) Toxic Metals, Organics, and Pathogens. No toxic metals, organics, or pathogens are expected to be released by the project.

(d) Aesthetics. The aesthetic quality of the water in the immediate vicinity of construction may be affected during construction from increased turbidity. This would be a short-term and localized condition.

(3) Effects on Biota.

(a) Primary Productivity and Photosynthesis. There would be no effects on the nearshore productivity or photosynthesis as a result of constructing the SMART structure.

(b) Suspension/Filter Feeders. No adverse effects on suspension or filter feeders are expected during or after construction of the SMART structure.

(c) Sight Feeders. No significant impacts on these organisms are expected as the majority of sight feeders are highly motile and can move outside the project area.

d. Contaminant Determinations. The SMART structure would be free of any contaminants.

e. Aquatic Ecosystem and Organism Determinations.

(1) Effects on Plankton. No adverse impacts on autotrophic or heterotrophic organisms are anticipated.

(2) Effects on Benthos. The proposed SMART structure would cover benthic organisms associated with the sandy bottom within the structure footprint. The SMART structure would provide substrate for colonization by benthic organisms typically associated with hardbottom habitat. No significant adverse impacts to benthic organisms are anticipated.

(3) Effects on Nekton. No adverse impacts to nektonic species are anticipated.

(4) Effects on the Aquatic Food Web. No adverse long-term impact to any trophic group in the food web is anticipated.

(5) Effects on Special Aquatic Sites.

(a) Hardground and Coral Reef Communities. Construction of the SMART structure would not adversely impact hardground or coral reef communities. The SMART structure segments used to construct the submerged breakwater would provide substrate for colonization by reef organisms.

(6) Endangered and Threatened Species. There would be no significant adverse impacts on any threatened or endangered species or on critical habitat of any threatened or endangered species.

(7) Other Wildlife. No adverse impacts to small foraging mammals, reptiles, or wading birds, or wildlife in general are expected.

(8) Actions to Minimize Impacts. All practical safeguards would be taken during construction to preserve and enhance environmental, aesthetic, recreational, and economic values in the project area. Specific precautions are discussed elsewhere in this 404(b) evaluation and in the EA for this project.

f. Proposed Disposal Site Determinations.

(1) Mixing Zone Determination. Clean SMART structure constituents would only be used (see Appendix E) to construct the submerged breakwater. This would not cause unacceptable changes in the mixing zone water quality requirements as specified in the State of Florida's Water Quality permit procedures.

(2) Determination of Compliance with Applicable Water Quality Standards. Because of the inert nature of the material to be to be used as the SMART structure, Class III water quality standards would not be violated.

(3) Potential Effects on Human Use Characteristics.

(a) Municipal and Private Water Supplies. No municipal or private water supplies would be impacted by the implementation of the project.

(b) Recreational and Commercial Fisheries. Fishing in the immediate construction area would be prohibited during construction. Otherwise, recreational and commercial fisheries would not be impacted by the implementation of the SMART structure.

(c) Water Related Recreation. Beach/water related recreation in the immediate vicinity of construction would be prohibited during construction activities. This would be a short-term impact.

(d) Aesthetics. The existing environmental setting would not be adversely impacted. Construction activities would cause a temporary increase in noise and air pollution produced by equipment and some temporary increase in turbidity. These impacts are not expected to adversely affect the aesthetic resources over the long term and once construction ends, conditions would return to pre-project levels.

(e) Parks, National and Historic Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves. No such designated sites are located within the SMART structure project area.

g. Determination of Cumulative Effects on the Aquatic Ecosystem. There would be no cumulative impacts that result in a major impairment in water quality of the existing aquatic ecosystem resulting from the placement of SMART structure.

h. Determination of Secondary Effects on the Aquatic Ecosystem. There would be no secondary impacts on the aquatic ecosystem as a result of the installation of the SMART structure.

III. Findings of Compliance or Non-compliance with the Restrictions on Discharge.

a. No significant adaptations of the guidelines were made relative to this evaluation.

b. No practicable alternative exists which meets the study objectives that does not involve fill into waters of the United States. Further, no less environmentally damaging practical alternatives to the proposed actions exist.

c. After consideration of disposal site dilution and dispersion, the discharge of fill materials would not cause or contribute to, violations of any applicable State water quality standards for Class III waters. The discharge operation would not violate the Toxic Effluent Standards of Section 307 of the Clean Water Act.

d. The placement of the SMART structure would not jeopardize the continued existence of any species listed as threatened or endangered or result in the likelihood of destruction or adverse modification of any critical habitat as specified by the Endangered Species Act of 1973, as amended.

e. The placement of the SMART structure would not result in significant adverse effects on human health and welfare, including municipal and private water supplies, recreational and commercial fishing, plankton, fish, shellfish, wildlife, and special aquatic sites. The life stages of aquatic species and other wildlife would not be adversely affected. Significant adverse effects on aquatic ecosystem diversity, productivity and stability, and recreational, aesthetic, and economic values would not occur.

f. On the basis of the guidelines, the proposed fill site for the installation of the SMART structure is specified as complying with the requirements of these guidelines.

APPENDIX B - COASTAL ZONE MANAGEMENT CONSISTENCY

FLORIDA COASTAL ZONE MANAGEMENT PROGRAM
FEDERAL CONSISTENCY EVALUATION PROCEDURES

SECTION 227 NATIONAL SHORELINE EROSION CONTROL DEVELOPMENT AND DEMONSTRATION PROGRAM
63RD STREET "HOTSPOT"
MIAMI BEACH, FLORIDA

1. Chapter 161, Beach and Shore Preservation. The intent of the coastal construction permit program established by this chapter is to regulate construction projects located seaward of the line of mean high water and which might have an effect on natural shoreline processes.

Response: The proposed plans and information would be submitted to the state in compliance with this chapter.

2. Chapters 186 and 187, State and Regional Planning. These chapters establish the State Comprehensive Plan, which sets goals that articulate a strategic vision of the State's future. It's purpose is to define in a broad sense, goals, and policies that provide decision-makers directions for the future and provide long-range guidance for an orderly social, economic and physical growth.

Response: The proposed project has been coordinated with various Federal, State and local agencies during the planning process. The project meets the primary goal of the State Comprehensive Plan through preservation and protection of the shorefront development and infrastructure.

3. Chapter 252, Disaster Preparation, Response and Mitigation. This chapter creates a state emergency management agency, with the authority to provide for the common defense; to protect the public peace, health and safety; and to preserve the lives and property of the people of Florida.

Response: The proposed project involves the placing of a Smart structure -submerged breakwater- in order to help retain the shoreline of an eroding beach as a protective means for residents, development and infrastructure located along the Atlantic shoreline in the vicinity of 63rd Street Hotspot, Miami Beach, Florida. Therefore, this project would be consistent with the efforts of Division of Emergency Management.

4. Chapter 253, State Lands. This chapter governs the management of submerged state lands and resources within state lands. This includes archeological and historical resources; water resources; fish and wildlife resources; beaches and dunes; submerged grass beds and other benthic communities; swamps, marshes and other wetlands; mineral resources; unique natural features; submerged lands; spoil islands; and artificial reefs.

Response: Construction of the SMART structure would help protect an existing recreational beach and potential sea turtle nesting habitat. No seagrass beds are located within the area proposed for SMART structure construction. The proposed project would comply with the intent of this chapter.

5. Chapters 253, 259, 260, and 375, Land Acquisition. This chapter authorizes the state to acquire land to protect environmentally sensitive areas.

Response: Since the affected property already is in public ownership, this chapter does not apply.

6. Chapter 258, State Parks and Aquatic Preserves. This chapter authorizes the state to manage state parks and preserves. Consistency with this statute would include consideration of projects that would directly or indirectly adversely impact park property, natural resources, park programs, management or operations.

Response: The proposed project area does not contain any state parks or aquatic preserves. The project is consistent with this chapter.

7. Chapter 267, Historic Preservation. This chapter establishes the procedures for implementing the Florida Historic Resources Act responsibilities.

Response: This project has been coordinated with the State Historic Preservation Officer (SHPO). Historic Property investigations were conducted in the project area. An archival and literature search were conducted. No known historic properties are located on the proposed project area. The SHPO concurred with the Corps determination that the proposed project would not adversely affect any significant cultural or historic resources. The project would be consistent with the goals of this chapter.

8. Chapter 288, Economic Development and Tourism. This chapter directs the state to provide guidance and promotion of beneficial development through encouraging economic diversification and promoting tourism.

Response: The proposed SMART structure would help protect the beach at Sunny Isles. This would be compatible with tourism for this area and therefore, is consistent with the goals of this chapter.

9. Chapters 334 and 339, Public Transportation. This chapter authorizes the planning and development of a safe balanced and efficient transportation system.

Response: No public transportation systems would be impacted by this project.

10. Chapter 370, Saltwater Living Resources. This chapter directs the state to preserve, manage and protect the marine, crustacean, shell and anadromous fishery resources in state waters; to protect and enhance the marine and estuarine environment; to regulate fishermen and vessels of the state engaged in the taking of such resources within or without state waters; to issue licenses for the taking and processing products of fisheries; to secure and maintain statistical records of the catch of each such species; and, to conduct scientific, economic, and other studies and research.

Response: The proposed SMART structure would impact infaunal invertebrates located within the construction footprint by covering these organisms. Once constructed, the SMART structure would provide hardbottom habitat for fish and invertebrates. It is not expected that constructing the SMART structure would significantly impact sea turtles. Based on the overall impacts of the project, the project is consistent with the goals of this chapter.

11. Chapter 372, Living Land and Freshwater Resources. This chapter establishes the Game and Freshwater Fish Commission and directs it to manage freshwater aquatic life and wild animal life and their habitat to perpetuate a diversity of species with densities and distributions, which provide sustained ecological, recreational, scientific, educational, aesthetic, and economic benefits.

Response: The project would have no effect on freshwater aquatic life or wild animal life.

12. Chapter 373, Water Resources. This chapter provides the authority to regulate the withdrawal, diversion, storage, and consumption of water.

Response: This project does not involve water resources as described by this chapter.

13. Chapter 376, Pollutant Spill Prevention and Control. This chapter regulates the transfer, storage, and transportation of pollutants and the cleanup of pollutant discharges.

Response: The contract specifications would prohibit the contractor from dumping oil, fuel, or hazardous wastes in the work area and would require that the contractor adopt safe and sanitary measures for the disposal of solid wastes. A spill prevention plan would be required.

14. Chapter 377, Oil and Gas Exploration and Production. This chapter authorizes the regulation of all phases of exploration, drilling, and production of oil, gas, and other petroleum products.

Response: This project does not involve the exploration, drilling or production of gas, oil or petroleum product and therefore, this chapter does not apply.

15. Chapter 380, Environmental Land and Water Management. This chapter establishes criteria and procedures to assure that local land development decisions consider the regional impact nature of proposed large-scale development.

Response: The proposed SMART structure would not have any regional impact on resources in the area. Therefore, the project is consistent with the goals of this chapter.

16. Chapter 388, Arthropod Control. This chapter provides for a comprehensive approach for abatement or suppression of mosquitoes and other pest arthropods within the state.

Response: The project would not further the propagation of mosquitoes or other pest arthropods.

17. Chapter 403, Environmental Control. This chapter authorizes the regulation of pollution of the air and waters of the state by the Florida Department of Environmental Regulation (now a part of the FDEP).

Response: An Environmental Assessment was prepared to address the SMART structure using reef balls anchored to concrete slabs and concrete mats. Environmental protection measures would be implemented to ensure that no lasting adverse effects on water quality, air quality, or other environmental resources would occur. Water Quality Certification would be sought from the State prior to construction. The project complies with the intent of this chapter.

18. Chapter 582, Soil and Water Conservation. This chapter establishes policy for the conservation of the state soil and water through the Department of Agriculture. Land use policies would be evaluated in terms of their tendency to cause or contribute to soil erosion or to conserve, develop, and utilize soil and water resources both onsite or in adjoining properties affected by the project. Particular attention would be given to projects on or near agricultural lands.

Response: The proposed project is not located near or on agricultural lands; therefore, this chapter doe s not apply.

APPENDIX C - PERTINENT CORRESPONDENCE

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

REPLY TO
ATTENTION OF

APR 28 2003

Planning Division
Plan Formulation Branch

TO ADDRESSEES ON THE ENCLOSED LIST:

The Jacksonville District, U.S. Army Corps of Engineers (Corps), is gathering information to define issues and concerns that will be addressed during the development of the 100% plans and specifications for the Section 227 National Shoreline Erosion Control Demonstration Project, 63rd Street, Miami-Dade County, Florida. Authority and funds for the project are provided by Section 227 of the Water Resources Development Act of 1996, as amended. The study area is located in Miami Beach between NE 63rd Street and NE 65th Street, Dade County, Florida (Figure 1 - Location Map).

The selection of the 30 percent Contractor submittals has been completed. The URS Group has been contracted to develop the 100 percent submittal for the nearshore Submerged Artificial Reef Training structure (SMART) proposal. SMART is proposed approximately 150-foot from the toe of fill for the Test Beach Renourishment at Miami Beach, in the Vicinity of 63rd Street, Miami Beach, Florida. The SMART design consists of groupings of reef modules in 200-foot by 40-foot segments, attached to an articulated armor concrete mat, parallel to the shoreline for a total length of 1,800-foot. The artificial reef modules would vary in size from 2,400 (4.5-foot high) pounds to 9,800 (6-foot high) pounds and be covered by a minimum of 1-foot of water at Mean Low Water. The reef modules would be anchored to the mats to prevent 'rolling'. Mat ends would be free of reef modules to help prevent scouring. The SMART design breakwater is proposed to protect the beach renourishment and provide environmental benefits (see ftp site ftp://ftp.saj.usace.army.mil/pub/uploads/k3cdstjv/URSMiamiHotSpotSection227/ for the 30 percent submittal). During the 100 percent submittal phase environmental considerations will be addressed in an Environmental Impact Statement.

We welcome your views, comments and information about environmental and cultural resources, study objectives and important features within the described study area, as well as any suggested improvements. If you are aware of any person, organization or agency that may have an interest or comments regarding this study, please inform them of this request. Letters of comment or inquiry should be addressed to the letterhead address to the attention of the Planning Division, Plan Formulation Section and received by this office within thirty (30) days of the date of this letter.

Sincerely,

James C. Duck
Chief, Planning Division

Enclosures

Copy Furnished:

Ms. Trisha Adams, US Fish and Wildlife Service, 1339 20th Street, Vero Beach, FL 32960-3559

Ms. Joceyln Karazsia, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, 11420 North Kendall Drive, Suite 103, Miami, FL 33176

Mr. Steve Blair, Dade County Department of Environmental Resources Management, 33 SW 2nd Avenue, Suite 1000m Miami, FL 33130

Mr. Steve Lau, Office of Environmental Services, FWC-OES Field Office 255 154th Avenue, Vero Beach, FL 32968-9041

Mr. Marty Seeling, Bureau of Beaches Wetland Resources, FDEP, 3900 Commonwealth Blvd, Mail Station 300, Tallahassee, FL 32399-3000

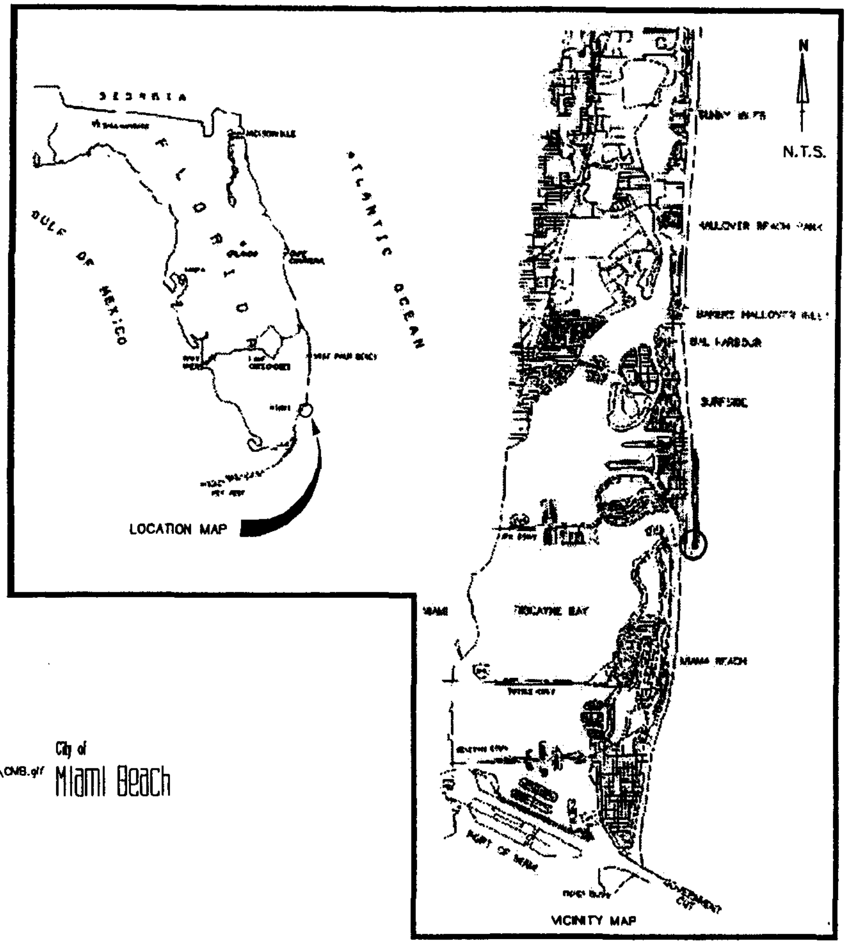
Mr. Paden Woodruff, Bureau of Beaches Wetland Resources, FDEP, 3900 Commonwealth Blvd, Mail Station 300, Tallahassee, FL 32399-3000

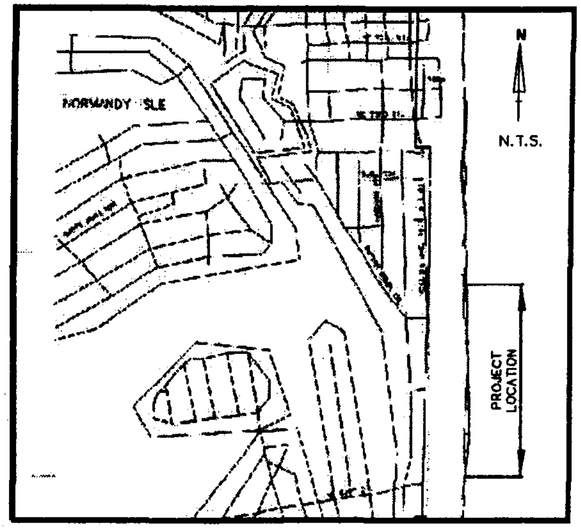
Mr. Russell Synder, Bureau of Beaches Wetland Resources, FDEP, 3900 Commonwealth Blvd, Mail Station 300, Tallahassee, FL 32399-3000

SECTION 227
NATIONAL SHORELINE EROSION
CONTROL DEMONSTRATION PROGRAM
63rd STREET HOT SPOT, DADE COUNTY, FLORIDA

MIAMI-DADE

US Army Corps of Engineers





City of Miami Beach

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ENGINEER'S SEAL

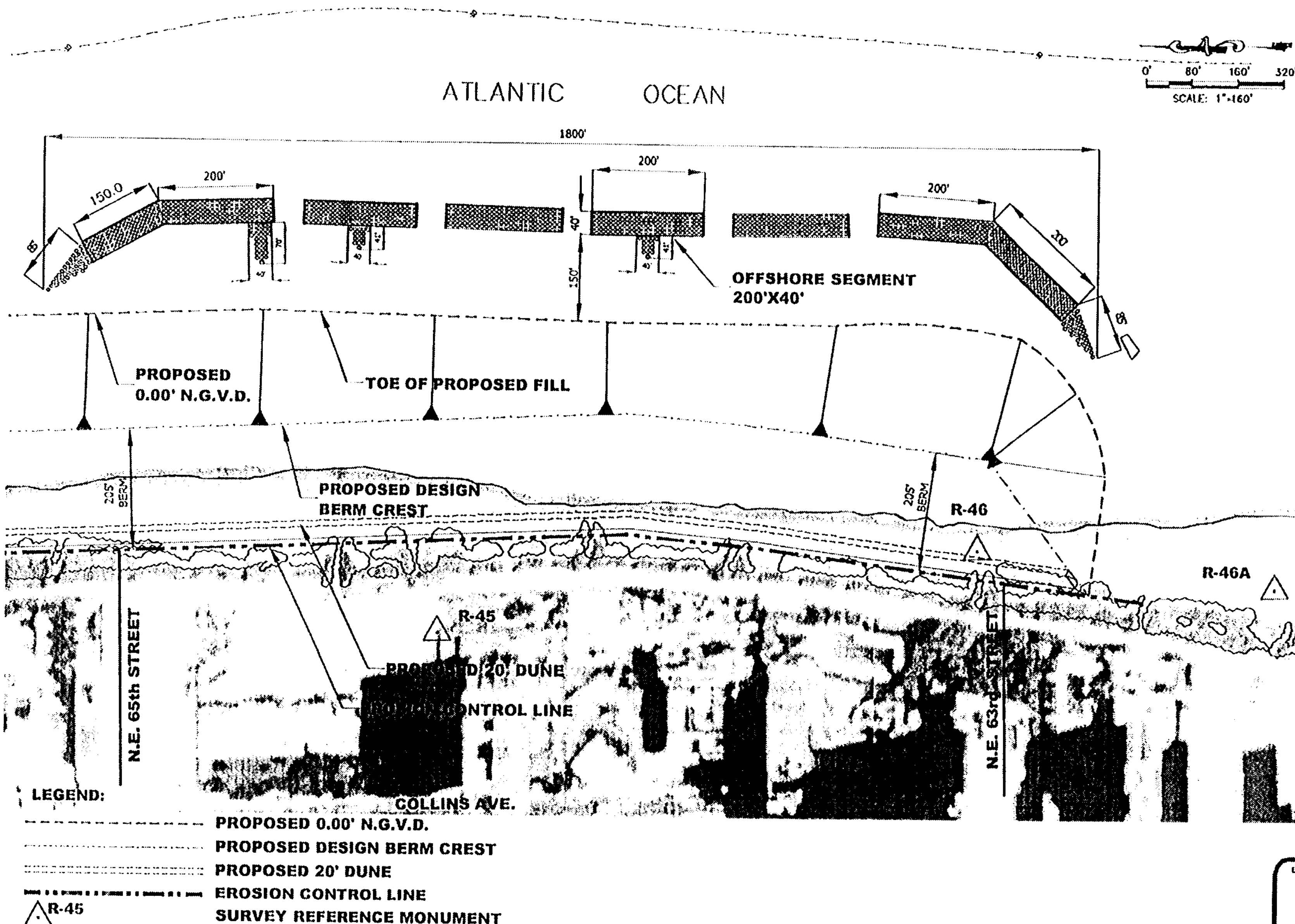
URS

CITY OF MIAMI BEACH
U.S. ARMY CORPS OF ENGINEERING
63rd STREET HOT SPOT

COVER SHEET

C.A.T. | JCH | 3/11/2003

1 of 7



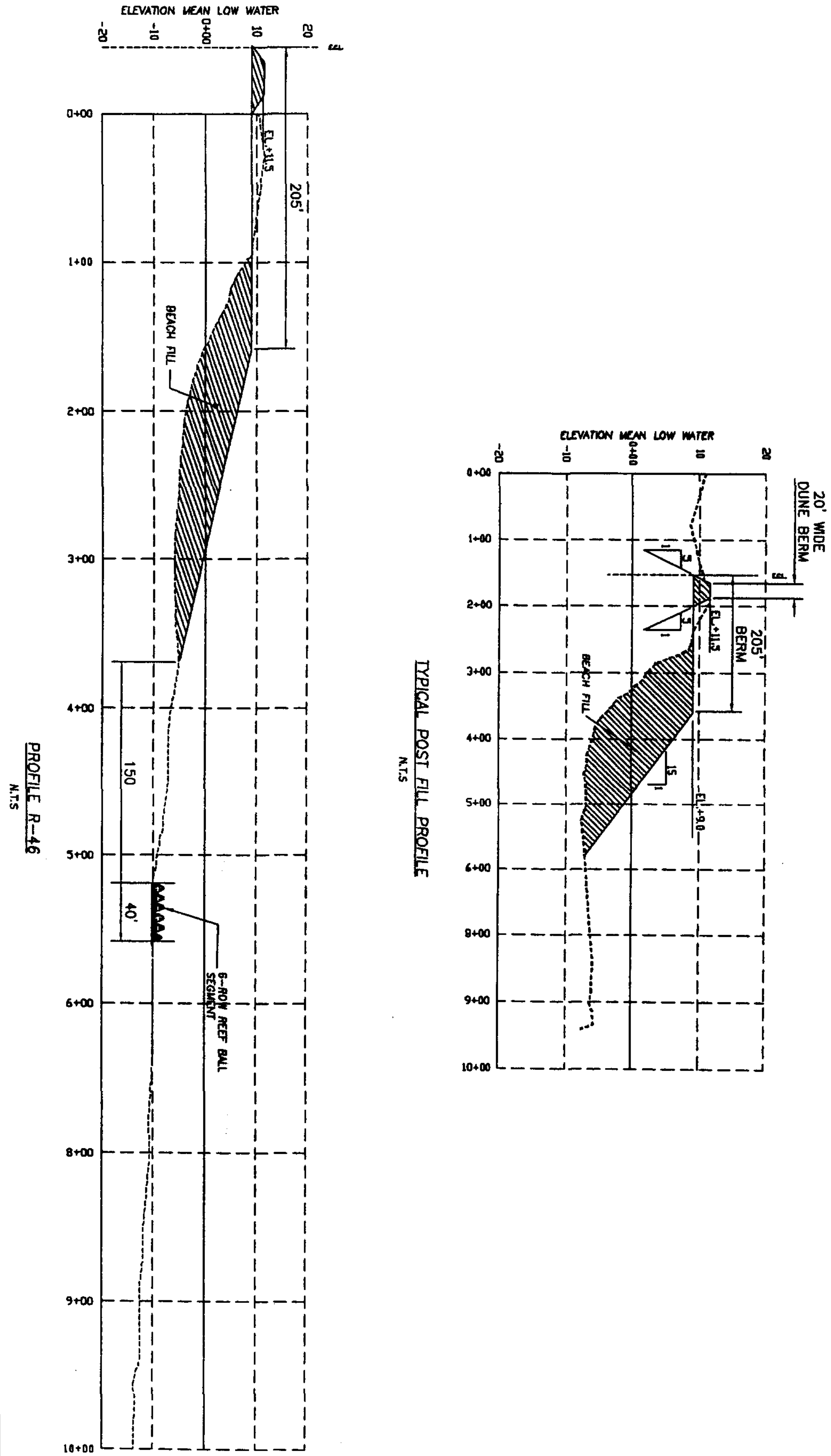
URS

CITY OF MIAMI BEACH
U.S. ARMY CORPS OF ENGINEERS
63rd STREET HOT SPOT

SITE PLAN
OPTION 1

C.A.T.
4/2/03

2 of 7



ENGINEER'S SEAL

7 of 7

URS

CITY OF MIAMI BEACH
U.S. ARMY CORPS OF ENGINEERS
63rd STREET HOT SPOT

TYPICAL PROFILE

DESIGN: C.A.T. | DRAWN: JOH | DATE: 4/3/03

Dated: May 5, 2003.

John C. Speedy III,

SES, Designated Federal Officer, WHINSEC BoV.

[FR Doc. 03–12154 Filed 5–14–03; 8:45 am]

BILLING CODE 3710–08–M

DEPARTMENT OF DEFENSE

Department of the Army; Corps of Engineers

Draft Environmental Impact Statement for the Proposed Royal D'Iberville Hotel and Casino Development, City of D'Iberville, Harrison County, MS

AGENCY: Department of the Army, U.S. Army Corps of Engineers, DoD.

ACTION: Notice of availability.

SUMMARY: This notice of availability announces the public release of the Draft Environmental Impact Statement (DEIS) for the Proposed Royal D'Iberville Hotel and Casino Development, City of D'Iberville, Harrison County, MS. On February 23, 1998, Royal D'Iberville, Inc. submitted a Joint Permit Application and Notification to the U.S. Army Corps of Engineers (Corps), Mobile District, the Mississippi Department of Environmental Quality, Office of Pollution Control and the Mississippi Department of Marine Resources for the D'Iberville project. The proposed action involves the construction of a dockside casino adjacent to the west side of the I–110 bridge over the Back Bay of Biloxi in D'Iberville, Harrison County, Mississippi. Based on a review of the level of impacts associated with the proposed action, the Mobile District published in **Federal Register,** November 21, 2001 (66 FR 58459), a notice of intent to prepare a DEIS for the proposed Royal D'Iberville Casino and Hotel, located in D'Iberville, Harrison County, MS. This DEIS has been developed by the Corps (lead agency) and 10 cooperating Federal and state agencies. The DEIS provides a comprehensive environmental analysis to aid in the decision-making process to deny or approve the Department of the Army permit for the proposed D'Iberville Hotel and Casino Project.

DATES: The public comment period for the DEIS will extend through June 30, 2003.

ADDRESSES: To receive a copy of the DEIS, or to submit comments, contact U.S. Army Corps of Engineers, Mobile District, Coastal Environment Team, Post Office Box 2288, Mobile, AL 36628–0001. A copy of the full document may also be viewed in the Gulfport Public Library, Gulfport, the Margaret Sherry Memorial Library in Biloxi, the D'Iberville Public Library in D'Iberville, or in the Mobile District.

FOR FURTHER INFORMATION CONTACT: Susan Ivester Rees, Ph.D., EIS Manager, (334) 694–4141, facsimile number (334) 690–2727 or e-mail address (*susan.i.rees@sam.usace.army.mil*).

SUPPLEMENTARY INFORMATION: Public comments can be submitted through a variety of methods. Written comments may be submitted to the Corps by mail, facsimile, or electronic methods, comments (written or oral) may be presented at a public meeting to be scheduled during the month of June in D'Iberville, MS. Additional information on these meetings will be mailed in a public notice to the agencies and public and announced in news releases.

Dated: May 5, 2003.

Ronald A. Krizman,

Chief, Regulatory Branch.

[FR Doc. 03–12156 Filed 5–14–03; 8:45 am]

BILLING CODE 3710–CR–M

DEPARTMENT OF DEFENSE

Department of the Army; Corps of Engineers

Intent to Prepare a Draft Environmental Impact Statement on the Proposed Section 227 National Shoreline Erosion Control Demonstration Project, 63rd Street, "Hotspot" Miami Beach, Dade County, FL

AGENCY: Department of the Army, Corps of Engineers, DOD.

ACTION: Notice of intent.

SUMMARY: The Jacksonville District, U.S. Army Corps of Engineers (Corps) intends to prepare a Technical Report and 100% Plans and Specifications with a Draft Environmental Impact Statement (DEIS) for the placement of an innovative breakwater design to help control erosion along the upcoming Test Fill at North Miami Beach using a domestic upland sand source. The proposed project is to be constructed from NE. 63rd Street to NE. 65th Street, Miami Beach, Dade County, FL. The Secretary of the Army is responsible for report approval. a collaborative effort between the Jacksonville District and Waterways Experiment Station, Vicksburg, MS.

FOR FURTHER INFORMATION CONTACT: Paul C. Stevenson, U.S. Army Corps of Engineers, Planning Division, Plan Formulation Branch, 701 San Marco Blvd, Jacksonville, FL, 32207, *paul.c.stevenson@usace.army.mil* by e-mail, or phone 904–232–3747.

SUPPLEMENTARY INFORMATION:

a. *Authorization.* Authority and funds for the project are provided by section 227, of the Water Resources Development Act (WRDA) of 1996, as amended. The proposed section 227, National Shoreline Erosion Control Demonstration Project, 63rd Street, "Hotspot", Miami Beach, Dade County, Florida, has awarded a contract to URS Group to complete 100% plans and specifications for an innovative breakwater to help control erosion along the Dade County Beach Erosion Control and Hurricane Protection (BEC&HP) Project in the same location. The BEC&HP for Dade County, Florida was authorized by the Flood Control Act of 1968 (with supplemental Appropriation Act of 1985 and WRDA 1986) to protect, reduce the loss of public beachfront and to prevent or reduce periodic damages and potential risk life, health and property in the developed lands adjacent to the beach.

b. *Study Area:* The project area begins at NE. 63rd Street and continues north to NE. 65th Street, Miami Beach, FL, an erosion hot spot.

c. *Project Scope:* The proposed project area is very specific to the erosion hot spot area of Miami Beach, between NE. 63rd Street and NE. 65th Street. The proposed project footprint will cover approximately 1,800 linear foot by 40-foot wide and 4.5 to 6-foot high, covered by at least one foot of water at Mean Low Water (MLW), 150-foot from the toe of fill.

d. *Preliminary Alternatives:* The DEIS will evaluate the No Action Plan and the nearshore Submerged Artificial Reef Training (SMART) structure. SMART is proposed approximately 150-foot from the toe of fill for the Test Beach Renourishment at Miami Beach, in the vicinity of 63rd Street, "Hotspot", Miami Beach, FL. The SMART design consists of groupings of reef modules in 200-foot by 40-foot segments, attached to an articulated armor concrete mat, parallel to the shoreline for a total length of 1,800-foot. The artificial reef modules would vary in size from 2,400 (4.5-foot high) pounds to 9,800 (6-foot high) pounds and be covered by a minimum of 1-foot of water at MLW. The reef modules would be anchored to the mats to prevent "rolling". Mat ends would be free of reefs modules to help prevent scouring. The SMART design breakwater is proposed to help control erosion along the renourished and provide environmental benefits (*see* ftp site *ftp://ftp.saj.usace.army.mil/pub/uploads/k3cdstjv/*

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

REPLY TO
ATTENTION OF

CESAJ-PD-ES (1110-2-1150a) 30 April 2003

MEMORANDUM FOR Commander, U.S. Army Records Management Center
ATTN: TAPC-PDD-RP (Ms. Ortiz), 6000 6th Street
Stop 5603, Fort Belvoir, Virginia 22060-5603

SUBJECT: Notice of Intent to Prepare a Draft Environmental Impact Statement (DEIS)

1. Enclosed for publication in the Federal Register are three (3) copies of a Notice of Intent to Prepare a Draft Environmental Impact Statement (DEIS) for the Section 227 National Shoreline Erosion Control Demonstration Project, 63rd Street, Miami-Dade County, Florida. The billing code is 3710-AJ.

2. The point of contact for further information is Mr. Paul Stevenson at 904-232-3747.

FOR THE COMMANDER:

Encl

JAMES C. DUCK
Chief, Planning Division

CF (w/encl):
Commander, South Atlantic Division (CESAD-CM-P)

BILLING CODE: 3710-AJ

DEPARTMENT OF DEFENSE

Department of the Army; Corps of Engineers

Intent to prepare a Draft Environmental Impact Statement on the proposed Section 227 National Shoreline Erosion Control Demonstration Project, 63rd Street, "Hotspot" Miami Beach, Dade County, Florida.

AGENCY: Department of the Army, Corps of Engineers.

ACTION: Notice of Intent.

SUMMARY: The Jacksonville District, U.S. Army Corps of Engineers (Corps) intends to prepare a Technical Report and 100% Plans and Specifications with a Draft Environmental Impact Statement for the placement of an innovative breakwater design to help control erosion along the upcoming Test Fill at North Miami Beach using a domestic upland sand source. The proposed project is to be constructed from NE 63rd Street to NE 65th Street, Miami Beach, Dade County, Florida. The Secretary of the Army is responsible for report approval, a collaborative effort between the Jacksonville District and Waterways Experiment Station, Vicksburg, Mississippi.

FOR FURTHER INFORMATION CONTACT: Paul C. Stevenson, U.S. Army Corps of Engineers, Planning Division, Plan Formulation Branch, 701 San Marco Blvd, Jacksonville, Florida, 32207, paul.c.stevenson@usace.army.mil by email, or phone 904-232-3747.

SUPPLEMENTARY INFORMATION:

a. Authorization. Authority and funds for the project are provided by Section 227 of the Water Resources Development Act (WRDA) of 1996, as amended. The proposed Section 227 National Shoreline Erosion Control Demonstration Project, 63rd Street, "Hotspot", Miami Beach, Dade County, Florida, has awarded a contract to URS Group to complete 100% plans and specifications for an innovative breakwater to help control erosion along the Dade County Beach Erosion Control and Hurricane Protection (BEC&HP) Project in the same location. The BEC&HP for Dade County, Florida was authorized by the Flood Control Act of 1968 (with supplemental Appropriation Act of 1985 and WRDA 1986) to protect, reduce the loss of public beachfront and to prevent or reduce periodic damages and potential risk to life, health and property in the developed lands adjacent to the beach.

b. Study Area: The project area begins at NE 63rd Street and continues north to NE 65th Street, Miami Beach, Florida, an erosion hot spot.

c. Project Scope: The proposed project area is very specific to the erosion hot spot area of Miami Beach, between NE 63rd Street and NE 65th Street. The proposed project footprint will cover approximately 1,800 linear foot by 40-foot wide and 4.5 to 6-foot high, covered by at least one foot of water at Mean Low Water (MLW), 150-foot from the toe of fill.

d. Preliminary Alternatives: The draft environmental impact statement (DEIS) will evaluate the No Action Plan and the nearshore Submerged Artificial Reef Training structure (SMART). SMART is proposed approximately 150-foot from the toe of fill for the Test Beach Renourishment at Miami Beach, in the Vicinity of 63rd Street, "Hotspot", Miami Beach, Florida. The SMART design consists of groupings of reef modules in 200-foot by 40-foot segments, attached to an articulated armor concrete mat, parallel to the shoreline for a total length of 1,800-foot. The artificial reef modules would vary in size from 2,400 (4.5-foot high) pounds to 9,800 (6-foot high) pounds and be covered by a minimum of 1-foot of water at MLW. The reef modules would be anchored to the mats to prevent 'rolling'. Mat ends would be free of reef modules to help prevent scouring. The SMART design breakwater is proposed to help control erosion along the renourished and provide environmental benefits (see ftp site ftp://ftp.saj.usace.army.mil/pub/uploads/k3cdstjv/URSMiamiHotSpotSection227/ for the 30% submittal).

e. Issues: This DEIS will evaluate the potential impacts of the innovative submerged breakwater. The environmental analysis will incorporate the results of studies/surveys of environmental resources within the proposed project area and cumulative effects the proposed structure may produce.

f. Scoping: Scoping for the Section 227 National Shoreline Erosion Control Development and Demonstration Project, 63rd Street "Hotspot", Miami Beach, Dade County, Florida was initiated April 28, 2003, via letter. A scoping meeting and teleconference was held April 14, 2003 with interested resource agency participants.

The proposed project area has been scoped for several previous EISs and EAs in the past. We invite the participation of affected Federal, state and local agencies, affected Indian tribes, other interested private organizations and the public.

g. DEIS Preparation: The forecasted completion date for the EIS and NEPA work is February 4, 2004.

1 MAY 03
DATE

GEORGE M. STRAIN
Acting Chief, Planning Division

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FLORIDA DEPARTMENT OF STATE
Glenda E. Hood
Secretary of State
DIVISION OF HISTORICAL RESOURCES

Mr. James C. Duck, Chief
Jacksonville District Corps of Engineers
Planning Division, Plan Formulation Branch
P.O. Box 4970
Jacksonville, Florida 32232-0019

May 27, 2003

RE: DHR No. 2003-3727
Received by DHR: April 30, 2003 *5/28/03*
Project Name: SMART Proposal
Dade County, Florida

Dear Mr. Duck:

Our office received and reviewed the above referenced project in accordance with *National Environmental Policy Act of 1969*, and Section 106 of the *National Historic Preservation Act of 1966*, as amended. The State Historic Preservation Officer is to advise and assist federal agencies when identifying historic properties listed or eligible for listing, in the National Register of Historic Places, assessing the project's effects, and considering alternatives to avoid or reduce the project's effect on such properties.

Based on sections 3.13 and 4.13, both dealing with Historical Properties, of the *Draft Environmental Assessment of the Renourishment at Miami Beach in the Vicinity of 63rd Street for the Beach Erosion Control and Hurricane Protection Project,* we note that a previous magnetometer and side scan survey was conducted of the borrow areas. Four potentially significant anomalies were identified during the survey. However, a 250' buffer will be in place around the anomalies during project activities. Therefore, based on the information provided, it is the opinion of this office that no historic properties will be affected by this undertaking.

If you have any questions concerning our comments, please contact Samantha Earnest, Historic Sites Specialist, at searnest@dos.state.fl.us or (850) 245-6333. Your interest in protecting Florida's historic properties is appreciated.

Sincerely,

Barbara E. Mattick
DSHPO for Survey & Registration

for Janet Snyder Matthews, Ph.D., Director, and
State Historic Preservation Officer

500 S. Bronough Street • Tallahassee, FL 32399-0250 • http://www.flheritage.com

☐ Director's Office (850) 245-6300 • FAX: 245-6435
☐ Archaeological Research (850) 245-6444 • FAX: 245-6436
☑ Historic Preservation (850) 245-6333 • FAX: 245-6437
☐ Historical Museums (850) 245-6400 • FAX: 245-6433
☐ Palm Beach Regional Office (561) 279-1475 • FAX: 279-1476
☐ St. Augustine Regional Office (904) 825-5045 • FAX: 825-5044
☐ Tampa Regional Office (813) 272-3843 • FAX: 272-2340

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

REPLY TO
ATTENTION OF

Planning Division
Plan Formulation Branch

JUN 2 6 2003

Mr. Frederick C. Sutter III
Deputy Regional Administrator
National Marine Fisheries Service
Southeast Regional Office
9721 Executive Center Drive North
St. Petersburg, Florida 33702

Dear Mr. Sutter:

Pursuant to the Magnuson-Stevens Fishery Conservation and Management Act, 16USC 1801 et seq. Public Law 104-208, reflects the Secretary of Commerce and Fishery Management Council authority, the following constitutes the U.S. Army Corps of Engineers, Jacksonville District (Corps) Essential Fish Habitat (EFH) Assessment. The EFH Assessment was requested in your May 27, 2003 (enclosed), responding to the Corps April 28, 2003 Scoping Letter for the *Section 227 National Shoreline Erosion Control Demonstration Project, 63rd Street, Miami-Dade County, Florida*. With this letter we are initiating EFH consultation with your agency.

The proposed study will consider the No Action Plan and the Submerged Artificial Reef Training Structure (SMART) alternatives. The SMART project footprint would be approximately 1,800-feet long and 40-feet wide (about 1.65 acres) from NE 63rd Street to NE 65th Street. It would consist of reef modules attached to an articulated concrete mat anchored to the solid substrate beneath the sandy bottom in 200-foot long segments, with six, 50-foot gaps between segments. The SMART structure would be placed in 10 feet of water approximately 150-feet from the toe of beach fill. SMART would be covered by 1-foot of water at mean low water.

The proposed project is within the jurisdiction of the South Atlantic Fishery Management Council (SAFMC) and is designated EFH for shrimp, red drum, snapper-grouper complex, Spanish and king mackerel and coastal migratory pelagic species. Spiny lobster and coral habitat is more than 500-feet east of the proposed SMART footprint. The project area is within the offshore soft bottom communities that are less subject to wave related stress and are home to polychaetes, mollusca, arthropods, echinoderms and other miscellaneous groups that make up the macro faunal community. Various life stages of some of the managed species found in the project area include larvae, post larvae, juvenile and adult stages of red, gray, lane, school-master, mutton and yellowtail snappers, scamps, speckled hind, red yellow edge, gag groupers and white grunt. Categories of EFH include water column and open sand habitat. No Habitat Areas of Particular Concern (HAPC) are within the proposed project area.

The Corps has determined that the proposed erosion control alternative, SMART, is not likely to adversely affect designated EFH (sandy substrate, water column) or the SAFMC managed species associated with the EFH habitats. Spiny lobster may benefit from the proposed project. The SMART alternative would cover a small percentage of sandy bottom within the region and would provide substrate for many plankton, algae, fish, invertebrates, sponges, coral and epi-biota that could be transported within the water column. SMART would increase biomass within the project area and provide an 'edge effect' for small fish as well as habitat for fish correlated to module opening size. The different sized reef modules, openings, vertical walls, flow patterns and light levels would cater to a diverse benthic community structure. Although some current change is anticipated with the SMART alternative, it is determined not likely to adversely affect EFH.

Increased turbidity and disturbance during construction may temporarily hinder feeding and migration of fishes within these habitats. Due to the relatively small habitat being impacted during the proposed project construction, and the available adjacent habitats, fishes should be able to utilize these adjacent habitats until construction is complete. Impacts associated with the proposed project are expected to be temporary in nature and do not present any long-term significant adverse affects to EFH. Cumulative impacts to EFH would be minimal, if any.

The proposed submerged breakwater, for erosion control purposes, would not pose a navigation hazard, would be constructed of concrete and would be designed and constructed to be stable given the wave climate and water depth environment.

Initial research indicates the SMART alternative complies with the State of Florida, Department of Environmental Protection, National Marine Fisheries Service and US Army Corps of Engineers artificial reef criteria. Monitoring of the SMART alternative is proposed. Collected data would be available for comparison with the submerged lime rock breakwater in nearby Sunny Isles. If the SMART structure does not perform it's intended purpose it can be removed under Section 227 of the Water Resources Development Act of 1996.

We request your EFH Conservation Recommendations pursuant to MSFMCA within 30 days. If you have any questions or need further information, please contact Mr. Paul Stevenson at 904-232-3747, fax at 904-232-3976 or e-mail at paul.c.stevenson@usace.army.mil.

Sincerely,

James C. Duck
Chief, Planning Division

Copies Furnished:

Mr. David H. Rackly, National Marine Fisheries Service, 219 Fort Johnson Road, Charleston, South Carolina 29412-9110

Ms. Jocelyn Karazsia, National Marine Fisheries Service, 11420 North Kendall Drive, Suite 103, Miami, Florida 33176

Mr. Steve Blair, Dade County Department of Environmental Resources Management, 33 SW 2nd Avenue, Suite 1000, Miami, Florida 33130

Commanding Officer, US Coast Guard Civil Engineering Unit Miami, 15608 SW 117th Ave, Miami, FL 33177-1630

Mr. Ron Miedema, US Environmental Protection Agency, 400 North Congress Avenue Suite 120, West Palm Beach, FL, 33401-2912

Ms. Patricia Adams, US Fish & Wildlife Service, 1339 20th Street, Vero Beach, Florida 32960-3559

Mr. Keith Mille, Division of Marine Fisheries - Artificial Reef Program, Fish and Wildlife Conservation Commission, 620 South Meridian Street, Box MF-MFM Tallahassee, FL 32399-1600

Mr. Paden Woodruff, Bureau of Beaches, Wetland Resources, FDEP 3900 Commonwealth Blvd, Mail Station 300, Tallahassee, FL 32399-3000

Mr. Marty Seeling, Bureau of Beaches, Wetland Resources, FDEP 3900 Commonwealth Blvd, Mail Station 300, Tallahassee, FL 32399-3000

Bcc: (wo/encl)
CESAJ-DP-C (Stevens)

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
9721 Executive Center Drive North
St. Petersburg, Florida 33702

July 17, 2003

Mr. James C. Duck
Chief, Planning Division
Plan Formulation Branch, Jacksonville Branch
Department of the Army, Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

Dear Mr. Duck:

The National Marine Fisheries Service (NOAA Fisheries) has reviewed your letter dated June 26, 2003, which initiated Essential Fish Habitat (EFH) consultation for development of the Section 227 National Shoreline Erosion Control Demonstration Project at 63rd Street for the nearshore Submerged Artificial Reef Training Structure (SMART) proposal in Dade County, Florida. The proposed structure would be located approximately 150-foot from the toe of fill for the Test Beach Renourishment, in the vicinity of 63rd Street, in Miami Beach, Florida. The SMART design consists of 200-foot by 40-foot reef module segments, attached to an articulated concrete mat and positioned parallel to the shoreline for a total length of 1,800 feet. The artificial reef modules would vary in size from 2,400 (4.5 feet high) pounds to 9,800 (6 feet high) pounds and would be covered by a minimum of one foot of water at mean low water. The reef modules would be anchored to the mats to prevent rolling and the mat ends would be free of reef to help prevent scouring. According to the information provided, "the SMART design breakwater is proposed to protect the beach renourishment and provide environmental benefits." The primary benefit of the SMART is sand retention; however, the Corps of Engineers (COE) expects the artificial reef will provide increased habitat for juvenile marine organisms.

By letter dated April 28, 2003, the COE requested that NOAA Fisheries define issues and concerns that would be addressed during the development of the "100 percent plans and specifications" for the Section 227 National Shoreline Erosion Control Demonstration Project at 63rd Street in Dade County, Florida. The URS Group, on behalf of the COE, is developing the 100 percent submittal for the SMART proposal. By letter dated May 27, 2003, NOAA Fisheries acknowledged the COE's effort to provide additional marine habitat and recreational benefits and we requested additional information [see Essential Fish Habitat (EFH) Conservation Recommendations, below].

The project is located in an area identified as EFH by the South Atlantic Fishery Management Council (SAFMC). Categories of EFH currently found within the project area include the water column. In addition, artificial/manmade reefs are designated EFH. The marine water column has been designated as EFH due to its importance as the medium of transport for nutrients and for movement of living marine resources between essential habitats. Managed species associated with the marine water column include eggs and sub-adult brown and pink shrimp; gag and yellowedge grouper; gray, mutton, lane, and schoolmaster snappers; and white grunt. In addition, NOAA Fisheries has identified EFH for highly migratory species that utilize the water column including nurse, bonnethead, lemon, black tip, and bullsharks. Artificial reefs have been designated EFH because they provide suitable substrate for the proliferation of live bottom (e.g., coral) and habitat for managed species. Hardbottom/coral reef habitats have been identified as EFH for juvenile and adult gag and yellowedge groupers, and gray and mutton snappers. Detailed information on shrimp, the snapper/grouper complex (containing ten families and 73 species), and other Federally managed fisheries and their EFH is provided in the 1998 generic amendment of the Fishery Management Plans (FMP) for the South Atlantic region prepared by the SAFMC. The 1998 amendment was prepared as required by the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA). Finally in this regard, we note that the SAFMC has designated hardbottom habitat and coral as a Habitat Area of Particular Concern (HAPC) for the snapper/grouper complex and spiny lobster. HAPCs are subsets of EFH that are rare, particularly susceptible to human-induced degradation, especially ecologically important, or located in an environmentally stressed area.

NOAA Fisheries supports the creation of properly designed artificial reefs as fishery management tools to attract fish and, in some situations, mitigate for anthropogenic and natural damage to coral and hard bottom reefs, when coupled with additional fishery management measures (for example the designation of no-take zones). NOAA Fisheries also concurs with leading artificial reef researchers in this region (see Bohnsack 1989) that artificial reefs are unlikely to benefit heavily exploited or overfished populations without other management actions. Additionally, we are concerned that the newly created hardbottom would create habitat that is conducive to use by predatory organisms (see EFH Consrvation Recommendation #1A) and that juvenile fish numbers could be significantly reduced by predation. To address this, predation could be reduced through reef structure designs that use stable materials and increased cover for juvenile fish (see EFH Conservation #1B). We further note that, if not properly sited, the reefs may have only minimal habitat value and could even degrade existing hard bottom and other local habitats. Accordingly, it would be desirable to perform and evaluate a benthic survey of the overall project area (see EFH Conservation Recommendation #2).

According to the information you provided, it is expected that the SMART will provide substrate for coral growth. We note that by letter dated April 28, 2003, addressed to the COE Planning Division, NOAA Fisheries provided comments on the Miami Harbor Draft Environmental Impact Statement (DEIS) and General Reevaluation Report (GRR) for the proposed Port of Miami dredging and expansion project. We recommended the COE develop a plan to relocate hard corals that comprise the high-relief hardbottom/coral reef, if dredging in areas that support coral cannot be avoided. NOAA Fisheries recommended that, at a minimum, all hard coral colonies larger than 12 inches in diameter be relocated by experienced personnel and using established methods, to suitable nearby hardbottom substrate. NOAA Fisheries would support a coral relocation effort within the SMART project area and we request that the COE evaluate the feasibility of this.

The National Artificial Reef Plan (Plan) is a guide for artificial reef program managers and policy makers regarding how to access and understand the many facets of artificial reef development and use. The Plan was developed by the Secretary of Commerce under direction of the National Fishing Enhancement Act of 1984. Under this Act, the Secretary of the Army, when issuing a permit for artificial reefs, shall consult with and consider the views of appropriate local, state, and federal agencies and other interested parties; ensure that the provisions for siting, constructing, monitoring, and managing artificial reefs are consistent with established criteria and standards; and ensure that the title to the artificial reef construction material is unambiguous and that responsibility for maintenance and the financial ability to assume liability is clearly established. NOAA Fisheries recommends the COE demonstrate full consistency with provisions of the *National Artificial Reef Plan* (1985) and the draft plan revision (2001), including: (1) Demonstrated consistency with the State of Florida's Artificial Reef Plan; (2) Have a specific objective for fisheries management or other purpose stated in the goal of the statewide, or site-specific plan; (3) Have biological justification relating to present and future fishery management needs; (4) Have minimal negative effects on existing fisheries, and/or conflicts with other uses, and have minimal negative effects on other natural resources and their future use; (5) Use materials that have long-term compatibility with the aquatic environment; and (6) Conduct monitoring during and after construction to determine whether reefs meet permit terms and conditions and are functioning as anticipated. This monitoring plan should be provided for our review (see EFH Conservation Recommendations #3 and #4). In addition, we note that, artificial reefs should be placed in areas that will support the structures. We note that artificial reefs have been subject to partial burial and lowered habitat quality in some areas of Palm Beach County due to reef subsidence. Please also provide geotechnical information that documents the sand depth below the reef and supports the determination that the SMART will not subside (see EFH Conservation Recommendation #5).

Given the limited information provided, additional information is warranted to evaluate the expected benefits of the proposed work on fishery resources. In view of the unforeseen effects that this project may have on EFH and NOAA trust resources, NOAA Fisheries recommends that the following additional information be submitted for our review:

EFH Conservation Recommendations

1. It should be demonstrated that the project will provide enhanced marine fisheries habitat. In connection with this, the following information should be provided:
   A. Identification of the specific fisheries and life history stages that would be enhanced by the proposed activity.
   B. Demonstrating that the structural design of the reef will provide suitable cover for juvenile fish and that populations of these fish will not be susceptible to unacceptable levels of predation.

2. The COE should prepare a benthic survey of the overall project area to ensure the proposed artificial reef structures will not threaten the integrity of natural habitats in the area, including live/hard bottoms, corals, seagrasses, and macroalgae. NOAA Fisheries recommends a 30-foot-wide or greater buffer between the proposed structures and natural habitats that occur within the project area.

3. The COE should demonstrate full consistency with the *National Artificial Reef Plan* (1985) and the draft plan revision (2001), including, but not limited to, the following provisions:
   A. Demonstrated consistency with the State of Florida's Artificial Reef Plan. Through this, the COE should:
      1. have a specific objective for fisheries management or other purpose stated in the goal of the statewide, or site-specific plan;
      2. have biological justification relating to present and future fishery management needs;
      3. have minimal negative effects on existing fisheries, and/or conflicts with other uses;
      4. have minimal negative effects on other natural resources and their future use;
      5. use materials that have long-term compatibility with the aquatic environment; and
      6. conduct monitoring during and after construction to determine whether reefs meet permit terms and conditions and are functioning as anticipated (note that this monitoring plan shall be provided for NOAA Fisheries review);

4. The COE should demonstrate the capability of assuming long-term financial liability for the deployment, monitoring, and maintenance of the project; and

5. Please provide geotechnical information that documents the sand depth below the reef and supports the determination that the SMART will not subside.

We appreciate the opportunity to provide these comments. Related correspondence should be addressed to the attention of Ms. Jocelyn Karazsia at our Miami Office. She may be reached at 11420 North Kendall Drive, Suite #103, Miami, Florida 33176, or by telephone at (305) 595-8352.

Sincerely,

David H. Rackley

for Frederick C. Sutter III
Deputy Regional Administrator

cc:
EPA, WPB
FWS, Vero
DEP, Tallahassee
FFWCC, Tallahassee
F/SER45-Karazsia

Literature Cited

Bohnsack, J. A. 1989. Are high densities of fishes at artificial reefs the result of habitat limitation or behavioral preference? Bulletin of Marine Science 44(2): 631-645.

National Artificial Reef Plan (revised 2001). National Marine Fisheries Service. Available on-line at: http://www.nmfs.noaa.gov/irf/Revised_PLAN_11_16.pdf

RTMENT OF COMMERCE NOAA
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James C. Duck
Chief, Planning Division
Plan Formulation Branch, Jacksonville Branch
Department of the Army, Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
South Florida Ecological Services Office
1339 20th Street
Vero Beach, Florida 32960

July 24, 2003

James C. Duck
District Engineer
U.S. Army Corps of Engineers
701 San Marco Boulevard, Room 372
Jacksonville, Florida 32207-8175

Service Log No.: 4-1-03-I-2890
Date: April 28, 2003
Project: Section 227 National Shoreline Erosion Control Demonstration Project
County: Miami-Dade

Dear Mr. Duck:

The Fish and Wildlife Service (Service) has reviewed the plans, maps, and other information provided by U.S. Army Corps of Engineers (Corps) in the letter dated April 28, 2003, for the proposed construction of an experimental erosion control structure under Section 227 of the Water Resources Development Act of 1996, as amended. This letter is provided in accordance with section 7 of the Endangered Species Act of 1973, as amended (87 Stat. 884; 16 U.S.C. 1531 *et seq.*) and the Fish and Wildlife Coordination Act of 1958, as amended (48 Stat.401; 16 U.S.C. 661 *et seq.*).

Project Description

The Corps proposes to construct a nearshore Submerged Artificial Reef Training (SMART) structure offshore of the erosional "hot-spot" near 63rd Street on Miami Beach, Florida. The structure will be constructed approximately 150-foot from the equilibrium toe-of-fill associated with construction of the federally authorized Miami Beach Shoreline Protection Project.
The SMART structure design includes the placement of eight groups of concrete reef modules in 200-foot by 40-foot segments, which are attached to an articulated armor concrete mat and oriented parallel to the shoreline. The artificial reef modules will range in height from approximately 4.5 to 6 feet and range in weight from approximately 2,400 pounds to 9,800 pounds. The Corps anticipates that the structures may be within 1-foot of the surface at mean-low water. To minimize movement and scouring, the structures will be anchored to the concrete mats and the mats will extend beyond the bottom edge of the structure. According to the information provided, the submerged breakwater is designed to enhance the performance of beach renourishment projects and increase protective habitat for juvenile marine organisms.
Threatened and Endangered Species

Within the project area, the federally listed threatened loggerhead sea turtle (*Caretta caretta*), endangered green sea turtle (*Chelonia mydas*), endangered hawksbill sea turtle (*Eretmochelys imbricata*), endangered leatherback sea turtle (*Dermochelys coriacea*), and the endangered West Indian manatee (*Trichechus manatus*) are known to occur. Specifically, suitable nesting habitat for listed sea turtle species occur on the shoreline adjacent to the project. The manatee is known to utilize offshore waters during various time of the year, particularly during seasonal migration to warmer waters.

The suitable sea turtle nesting habitat located adjacent to the proposed SMART structure may be adversely affected after construction as a result of the change in hydrological conditions related to the structures. This may cause an increased risk of erosion of suitable sea turtle habitat in the vicinity of the structures. Therefore, the Service recommends that a thorough analysis of the effects of the structures on adjacent beaches be conducted prior to construction to determine if the shoreline will be affected and if so, to what extent. After construction, if it is determined that the structure has caused significant erosion of adjacent beaches, the Service recommends that the structure is removed.

In addition, the Service is concerned with the long term durability of the SMART structure and the articulated concrete mat, including the material with which the reef structures will be connected to the concrete mat. If a portion or all of the SMART structure fails, it is possible that the material may be washed onto the beach and adversely affect the ability of sea turtles to nest. The Service recommends: (1) annual inspections of the structure's integrity are conducted; (2) repairs are made as necessary to minimize the threat of structure failure; (3) a contingency plan is developed in the event of structure failure; and (4) any debris related to the SMART structure should be removed from the beach as soon as possible.

Since the manatee may be present in project area, the Service recommends that the Corps incorporate the *Standard Manatee Construction Protection Measures* to minimize possible adverse affects to the manatee during construction.

Fish and Wildlife Resources

In a letter dated May 23, 2003, the National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NOAA Fisheries), provided several comments and recommendations to the Corps related to fish and wildlife resources, in particular, Essential Fish Habitat. Specifically, NOAA Fisheries requested that the Corps: (1) demonstrate how the SMART structure will provide enhanced marine fishery habitat; (2) demonstrate consistency with the National Artificial Reef Plan and the State of Florida's Artificial Reef Plan; (3) demonstrate how the SMART structures will not threaten natural habitats within the area (*e.g.*, hardbottom, corals, seagrass, and macroalgae); (4) identify the coral seed source or discuss coral relocation proposed; (5) demonstrate the financial integrity for the long-term liability related to the deployment, monitoring, and maintenance of the SMART structure; and (6) identify the amount of sand overburden in the SMART structure footprint to support the determination that subsidence will not occur. In addition, NOAA Fisheries recommends that a minimum of a 30-foot buffer is established between the proposed structure and natural habitats within the project area. The Service fully supports NOAA Fisheries's comments and recommendations.

Thank you for your cooperation and effort in protecting fish and wildlife resources. Should you have additional questions or require clarification, please contact Trish Adams at 772-562-3909, extension 232.

Sincerely yours,

Allen V Webb for

Linda S. Ferrell
Assistant Field Supervisor
South Florida Ecological Services Office

cc:
FWS, Jacksonville, Florida (Sandy MacPherson)
FWC, Bureau of Protected Species Management, Tallahassee, Florida (Robbin Trindell)
NMFS, Protected Species Division, St. Petersburg, Florida
NMFS, Habitat Conservation Division, Miami, Florida
DEP, Office of Beaches and Coastal Systems, Tallahassee, Florida

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

REPLY TO
ATTENTION OF

Planning Division
Plan Formulation Branch

JAN 16 2004

Commander
7th Coast Guard District
Brickell Plaza Federal Building
909 SE First Avenue
Miami, Florida 33131-3050

Dear Commander:

Provided for your review and comment is the enclosed ***Section 227 National Shoreline Erosion Control Development and Demonstration Program, 63rd Street "Hotspot", Miami Beach, Florida, Design Submittal*** produced by URS Corporation for the US Army Corps of Engineers (Corps) and the Miami Dade Department of Environmental Resources Management (DERM). The National Shoreline Erosion Control Development and Demonstration Program seeks to evaluate the functional and structural performance of innovative or non-traditional means of abating coastal erosion. The program is intended to advance the state-of-the art of shoreline erosion control technology, encourage the development of innovative solutions, and provide technical and public information designed to further the use of well-engineered alternative approaches. Compliance with the National Environmental Policy Act (NEPA) of 1969 as amended, (40 CFR 1500 - 1508), has begun.

Based on the responses to the April 28, 2003 Scoping Letter published in the Federal Register (Volume 68, Number 94, Thursday, May 15, 2003 Notices), the Corps has concluded an Environmental Assessment with Finding of No Significant Impact (EA/FONSI) will be undertaken for the proposed SubMerged Artificial Reef Training (SMART) Structure. The enclosed design report is provided for your review and comment to assist in determining potential proposed project effects.

Please provide your comments by January 20, 2004. We would appreciate it if a member of your staff could arrange to attend the meeting and provide your agency comments. A meeting to discuss comments and questions is scheduled for Tuesday, January 27, 2004, at the DERM office in Miami, Florida. Meeting information will be provided shortly. If you have any questions or need further information, please contact Mr. Paul Stevenson of my staff at 904-232-3747, fax at 904-232-3442 or e-mail paul.c.stevenson@saj02.usace.army.mil.

Sincerely,

James C. Duck

James C. Duck
Chief, Planning Division

Copy Furnished (wo/encl):
Mr. Joe Embres, 7th Coast Guard District, Brickell Plaza Federal Building, 909 SE First Avenue, Miami, Florida 33131-3050

Commanding Officer, US Coast Guard Civil Engineering Unit Miami, 15608 SW 117th Avenue, Miami, Florida 33177-1630

DEC 1 9 2003

Planning Division
Plan Formulation Branch

Mr. David Rackley
National Marine Fisheries Service
National Oceanographic and Atmospheric Administration
219 Fort Johnson Road
Charleston, South Carolina 29412-9110

Dear Mr. Rackley:

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Sincerely,

James C. Duck
Chief, Planning Division

Copy Furnished (wo/encl):

Ms. Jocelyn Karazsia, National Marine Fisheries Service, 11420 North Kendall Drive, Suite 103, Miami Florida 33176

Regional Administrator, National Marine Fisheries Service, 9721 Executive Center Drive North, St. Petersburg, Florida 33702

bcc (wo/encl.):
CESAJ-DP-C (C. Stevens)

Stevenson/CESAJ-PD-PN/3747/als 19 Dec 03
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Dugger/CESAJ-PD-EG
Mason/CESAJ-PD-E 19 Dec 03
Strain/CESAJ-PD-P
Duck/CESAJ-PD

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DEC 1 9 2003

Planning Division
Plan Formulation Branch

Mr. James J. Slack, Field Supervisor
South Florida Ecological Services Office
U.S. Fish and Wildlife Service
1339 20th Street
Vero Beach, Florida 32960-3559

Dear Mr. Slack:

Provided for your review and comment is the enclosed ***Section 227 National Shoreline Erosion Control Development and Demonstration Program, 63rd Street "Hotspot", Miami Beach, Florida, Design Submittal*** produced by URS Corporation for the U.S. Army Corps of Engineers (Corps) and the Miami Dade Department of Environmental Resources Management (DERM). The National Shoreline Erosion Control Development and Demonstration Program seeks to evaluate the functional and structural performance of innovative or non-traditional means of abating coastal erosion. The program is intended to advance the state-of-the art of shoreline erosion control technology, encourage the development of innovative solutions, and provide technical and public information designed to further the use of well-engineered alternative approaches. Compliance with the National Environmental Policy Act (NEPA) of 1969 as amended, (40 CFR 1500 - 1508), has begun.

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Sincerely,

James C. Duck
Chief, Planning Division

Copies Furnished (wo/encl):

Ms. Trish Adams, U.S. Fish and Wildlife Service, 1339 20th Street, Vero Beach, Florida 32960-3559

Mr. Spencer Simon, U.S. Fish and Wildlife Service, 1339 20th Street, Vero Beach, Florida 32960-3559

bcc (wo/encl.):
CESAJ-DP-C (C. Stevens)

Stevenson/CESAJ-PD-PN/3747/ls 19 Dec 03
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Schwichtenberg/CESAJ-PD-PN
Dugger/CESAJ-PD-EG 19 Dec 03
Mason/CESAJ-PD-E 19 Dec 03
Strain/CESAJ-PD-P
Duck/CESAJ-PD

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DEC 1 9 2003

Planning Division
Plan Formulation Branch

Mr. Heinz Mueller
U.S. Environmental Protection Agency
Environmental Policy Section
61 Forsythe Street
Atlanta, Georgia 30303-3104

Dear Mr. Mueller:

Provided for your review and comment is the enclosed ***Section 227 National Shoreline Erosion Control Development and Demonstration Program, 63rd Street "Hotspot", Miami Beach, Florida, Design Submittal*** produced by URS Corporation for the U.S. Army Corps of Engineers (Corps) and the Miami Dade Department of Environmental Resources Management (DERM). The National Shoreline Erosion Control Development and Demonstration Program seeks to evaluate the functional and structural performance of innovative or non-traditional means of abating coastal erosion. The program is intended to advance the state-of-the art of shoreline erosion control technology, encourage the development of innovative solutions, and provide technical and public information designed to further the use of well-engineered alternative approaches. Compliance with the National Environmental Policy Act (NEPA) of 1969 as amended, (40 CFR 1500 - 1508), has begun.

Based on the responses to the April 28, 2003 Scoping Letter published in the Federal Register (Volume 68, Number 94, Thursday, May 15, 2003 Notices), the Corps has concluded an Environmental Assessment with Finding of No Significant Impact (EA/FONSI) will be undertaken for the proposed Submerged Artificial Reef Training (SMART) Structure. The enclosed design report is provided for your review and comment to assist in determining potential proposed project effects.

Please provide your comments by January 20, 2004. We would appreciate it if a member of your staff could arrange to attend the meeting and provide your agency comments. A meeting to discuss comments and questions is scheduled for Tuesday, January 27, 2004, at the DERM office in Miami, Florida. Meeting information will be provided shortly. If you have any questions or need further information, please contact Mr. Paul Stevenson of my staff at 904-232-3747, fax at 904-232-3442 or e-mail paul.c.stevenson@saj02.usace.army.mil.

Sincerely,

James C. Duck
Chief, Planning Division

Copy Furnished (wo/encl):

Mr. Ron Mediema, U.S. Environmental Protection Agency, 400 North Congress Avenue, Suite 120, West Palm Beach, Florida 33401-2912

bcc (wo/encl.):
CESAJ-DP-C (C. Stevens)

Stevenson/CESAJ-PD-PN/3747/als 19 Dec 03
White/CESAJ-PD-PN
Schwichtenberg/CESAJ-PD-PN
Dugger/CESAJ-PD-EG
Mason/CESAJ-PD-E 19 Dec 03
Strain/CESAJ-PD-P
Duck/CESAJ-PD

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Planning Division
Plan Formulation Branch

Dr. Robbin Trindell, Ph.D.
Biological Administrator
Florida Wildlife Conservation Commission
BTS
620 South Meridian Street
Tallahassee, Florida 32399

Dear Dr. Trindell:

Provided for your review and comment is the enclosed ***Section 227 National Shoreline Erosion Control Development and Demonstration Program, 63rd Street "Hotspot", Miami Beach, Florida, Design Submittal*** produced by URS Corporation for the U.S. Army Corps of Engineers (Corps) and the Miami Dade Department of Environmental Resources Management (DERM). The National Shoreline Erosion Control Development and Demonstration Program seeks to evaluate the functional and structural performance of innovative or non-traditional means of abating coastal erosion. The program is intended to advance the state-of-the art of shoreline erosion control technology, encourage the development of innovative solutions, and provide technical and public information designed to further the use of well-engineered alternative approaches. Compliance with the National Environmental Policy Act (NEPA) of 1969 as amended, (40 CFR 1500 - 1508), has begun.

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Please provide your comments by January 20, 2004. We would appreciate it if a member of your staff could arrange to attend the meeting and provide your agency comments. A meeting to discuss comments and questions is scheduled for Tuesday, January 27, 2004, at the DERM office in Miami, Florida. Meeting information will be provided shortly. If you have any questions or need further information, please contact Mr. Paul Stevenson of my staff at 904-232-3747, fax at 904-232-3442 or e-mail paul.c.stevenson@saj02.usace.army.mil.

Sincerely,

James C. Duck
Chief, Planning Division

Copies Furnished (wo/encl):

Mr. Brian Barnett, Florida Wildlife Conservation Commission, 620 South Meridian Street, Tallahassee, Florida 32399-1600

Dr. Anne Meylen, Ph.D., Florida Wildlife Conservation Commission, BTS, 620 South Meridian Street, Tallahassee, Florida 32399

bcc (wo/encl.):
CESAJ-DP-C (C. Stevens)

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White/CESAJ-PD-PN
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Strain/CESAJ-PD-P
Duck/CESAJ-PD

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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

FEB 4 2004

Mr. James J. Slack, Field Supervisor
South Florida Ecological Services Office
U.S. Fish and Wildlife Service
1339 20th Street
Vero Beach, Florida 32960

Dear Mr. Slack:

Enclosed is the Scope of Work for FY 2004 Fish and Wildlife Coordination Act Transfer Funding for the Section 227 National Shoreline Erosion Control Development and Demonstration Program, 63rd Street "Hotspot", Miami Beach, Dade County, Florida. Please sign it and return a copy to this office. Based on the April 28, 2003 Scoping Letter responses and the similarity to the Sunny Isles submerged breakwater project nearby, we are undertaking an Environmental Assessment and Finding of No Significant Impact for coordination with your office and the public. No hardgrounds will be affected.

Direct your questions concerning the letter or the enclosed scope of work and government estimate to Mr. Paul Stevenson of my staff at telephone number 904-232-3747 or via electronic mail at paul.c.stevenson@saj02.usace.army.mil.

Sincerely,

James C. Duck
Chief, Planning Division

Enclosure

SCOPE OF WORK
FISH AND WILDLIFE COORDINATION ACT
SECTION 227 NATIONAL SHORELINE EROSION CONTROL
DEVELOPMENT and DEMONSTRATION PROGRAM
63rd STREET "HOTSPOT"
MIAMI BEACH, FLORIDA

1.0 Project Title: Section 227 National Shoreline Erosion Control Development and Demonstration Program, 63rd Street "Hotspot", Miami Beach, Dade County, Florida.

2.0 Project Objectives: Stabilize shoreline erosion of the 63rd Street "Hotspot" with construction of the SubMerged Artificial Reef Training (SMART) structure. The other project objective is for the SMART to remain stable and not incur substantial damage if exposed to storm surge and design wave events during the 50-year life span.

3.0 Project Description: The Corps is proposing to construct a SMART structure approximately 400-foot from and parallel to the mean shoreline, in the vicinity of NE 63rd Street, Miami Beach, Florida (see FTP site for report and plans ftp.urscorp.com/Boca Raton/63rd-st). The proposed SMART structure will be installed between the R46-A and R-44 FDEP monuments. The proposed SMART structure is approximately 2,272-foot long and 42.8-foot wide (2.1 acre footprint). The ends are slightly angled toward the shoreline to form an overall crescent shape. The SMART structure would be placed at a depth of 7-foot below Mean Low Water (MLW) to create a submerged breakwater that would stabilize the shoreline without affecting hardgrounds or the regional sediment budget as depicted by SBEACH and GENESIS modeling.

The SMART design consists of 6-foot wide by 42.8-foot long segments, laid perpendicular to the shoreline and next to each other for approximately 2,088 linear feet. Tapered ends measure 92-foot long on each end. The segments include four porous, dome-shaped, concrete, Goliath reef balls and one solid bay ball, anchored to an articulated concrete mat (Armorflex 50-L Class Articulated Open Concrete Block Mat). The broad-crested multi-row breakwater will refract and help diminish wave energy within the breaker zone. Each SMART structure segment weighs approximately 30-tons.

b). Identify potential impacts, management opportunities and mitigation during project design, construction and operation.

c). Discuss alternatives to avoid or minimize significant impacts to natural resources. Recommendations to mitigate possible impacts.

d). Include copies of all correspondence pertaining to the FWCA studies and report.

5.3 Report Submittal:

a). Literature search and fieldwork will by conducted by (60 days from Notice to Proceed)

b). A draft CAR will be submitted to the Corps by (60 days from the completion of the fieldwork).

c). A final CAR shall be submitted to the Corps within 30 days after receipt of the Corps comments on the draft CAR.

5.4 Coordination:

a). Coordinate and notify the Corps well in advance of all proposed field trips so the Corps can participate, if desired.

b). Notify the Corps of proposed meetings with other agencies, including times and place, so the Corps may participate, if desired.

6.0 Work and Information to be provided by the Corps:

6.1 Available information on the project maps, plans and design to include (a) project location, (b) project design, and (c) construction methods and materials.

7.0 Further Environmental Study: If upon data analysis Corps and Service biologists agree that data gaps exist which require additional field studies, or if project plans or design change significantly, an amended SOW will be negotiated.

8.0 Agreement: In accordance with the enclosed itemized cost estimate, the undersigned certify intention to perform respective tasks within the time frames stated in this Scope of Work.

8.0 Agreement: In accordance with the enclosed itemized cost estimate, the undersigned certify intention to perform respective tasks within the time frames stated in this Scope of Work.

James J. Slack
Field Supervisor
U.S. Fish and Wildlife Service

Loren M. Mason, Ph.D.
Chief, Environmental Branch
Jacksonville District
U.S. Army Corps of Engineers

DATE:

DATE: Sep 04/2004

FEB 2 7 2004

Planning Division
Plan Formulation Branch

Mr. James J. Slack, Field Supervisor
South Florida Ecological Services Office
U.S. Fish and Wildlife Service
1339 20th Street
Vero Beach, Florida 32960

Dear Mr. Slack:

The Jacksonville District, U.S. Army Corps of Engineers (Corps) is providing the requested information to help expedite the development of a draft U.S. Fish and Wildlife Coordination Act Report (CAR) for the ***Section 227 National Shoreline Erosion Control Development and Demonstration Program, 63rd Street "Hotspot", Miami Beach, Florida***. The Military Interdepartmental Purchase Request (MIPR) has been processed and funds are now available. In response to Ms. Trish Adam's request, find the following information enclosed:

- Sea turtle nesting data for Miami-Dade County from the FMRI website
- Email from FMRI with 2003 sea turtle nesting data for the project specific area
- NOAA Chart 11466 Jupiter Inlet to Fowey Rocks soundings in feet at mean lower low water, December 2002
- Hardground and coral resources location map based on side scan sonar for the project area
- Hardground information from the May 2002, Corps/DERM Proposed Test Fill At Miami Beach Using A Domestic Upland Sand Source, Draft EA, with website location noted
- A copy of the signed USFWS CAR MIPR package

Jacksonville District requests a draft CAR for inclusion in the draft environmental assessment (EA) with preliminary finding of no significant impact (FONSI) for public coordination by the end of June 2004. A final CAR 30 days following the draft CAR would help to ensure the Corps meets their program schedule.

If you have any questions or need further information, please contact Mr. Paul Stevenson at 904-232-3747, fax at 904-232-3442 or e-mail paul.c.stevenson@saj02.usace.army.mil.

Sincerely,

James C. Duck
Chief, Planning Division

Copies Furnished (wo/encl):

Ms. Trish Adams, U.S. Fish and Wildlife Service, 1339 20th Street, Vero Beach, Florida 32960-3559

Mr. Spencer Simon, U.S. Fish and Wildlife Service, 1339 20th Street, Vero Beach, Florida 32960-3559

bcc (wo/encl.):
CESAJ-DP-C (C. Stevens)

Stevenson/CESAJ-PD-PN/3747/als 2-25-04
White/CESAJ-PD-PN
Schwichtenberg/CESAJ-PD-PN
Dugger/CESAJ-PD-EG
Mason/CESAJ-PD-E 2-25-04
Strain/CESAJ-PD-P
Duck/CESAJ-PD

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3 AFFECTED ENVIRONMENT

This section describes only those environmental resources that are relevant to the decision to be made. It does not describe the entire existing environment, but only those environmental resources that would affect or that would be affected by the alternatives if they were implemented. This section, in conjunction with the description of the "no-action" alternative forms the base line conditions for determining the environmental impacts of the proposed action and reasonable alternatives.

3.1 GENERAL ENVIRONMENTAL SETTING

The shoreline along Miami Beach is lined with hotels, condominiums, and other commercial establishments. The area is used extensively for recreation.

3.2 VEGETATION

The dune system in Miami-Dade County between Government Cut and Bakers Haulover Inlet is largely artificial and was built as part of the Dade County BEC & HP Project. Dominant plant species in the dune communities include sea grapes, *Coccoloba uvifera*; the beach morning glory, *Ipomoea pes-caprea*; beach bean, *Canavalia rosea*; sea oats, *Uniola paniculata*; dune panic grass, *Panicum amarulum*; bay bean, *Canavalia maritima*. The beach berry or inkberry, *Scaevola plumieri;* sea lavender, *Mallotonia gnaphalodes*; spider lily, *Hymenocalis latifolia*; beach star, *Remirea maritima*; and coconut palm, *Coco nucifera* are also present.

Algal coverage on the offshore hardground areas fluctuates seasonally. The most common algal species observed within southeast Florida offshore hardground areas are *Caulerpa prolifera*, *Codium isthmocladum*, *Gracillaria* sp., *Udotea* sp., *Halimeda* sp., and various members of the crustose coralline algae of the family Corallinaceae. Algal growth is most luxuriant from late July through late October or early November. There seems to be a particular burst or bloom in the macroalgal population in conjunction with the seasonal upwelling that occurs in late July or early August (Smith, 1981, 1983; Florida Atlantic University and Continental Shelf Associates, Inc., 1994).

Seasonally, there is extensive macroalgal growth in the offshore soft bottom areas, with species of green algae (*Caulerpa* sp., *Halimeda* sp., and *Codium* sp.) being particularly abundant in the summer and the brown algal species (*Dictyota* sp. and *Sargassum* sp.) being more abundant in the winter (Courtenay *et al.*, 1974; Florida Atlantic University and Continental Shelf Associates, Inc., 1994). The sea grass *Halophila decipiens* has been observed offshore of Miami-Dade County, but is considered seasonal (April through November) in these offshore soft bottom areas.

3.3 THREATENED AND ENDANGERED SPECIES

3.3.1 SEA TURTLES

Sea turtles are present in the open ocean year-round offshore of Miami-Dade County because of warm water temperatures and hardbottom habitat used for both foraging and shelter. The predominant species is the loggerhead sea turtle, *Caretta caretta*, although green turtles, *Chelonia mydas*; leatherback turtles, *Dermochelys coriacea*; hawksbill turtles, *Eretmochelys imbricata*; and Kemp's ridleys, *Lepidochelys kempii* are also known to exist in the area. All the sea turtles except for the loggerhead are listed as endangered. The loggerhead is listed as threatened.

On the 37.8 miles of beach surveyed within the Miami-Dade County, a total of 505 nests were found in 2001 (FMRI, 2002a,b, & c). Loggerhead nesting in Miami-Dade County occurs from late April through September (Meylan et. al., 1995). The density of nesting along the Miami-Dade County shoreline north of Government Cut is relatively low. The frequency of nesting along the beach at Sunny Isles has ranged from 9 nests in 1989 to 24 nests in 1997 with the highest occurring in 1995 at 35 nests (DERM 1997, unpublished nesting data). The number of false crawls ranged from 44 in 1989 to 24 in 1997. The lowest number of false crawls occurred in 1993 at 7 with the highest occurring in 1989. For Golden Beach nesting ranged from 45 nests in 1987 to 28 nests in 1992 (Meylan et. al., 1995). The highest number of nests for Golden beach occurred in 1991 with 80 nests. The number of false crawls in Golden Beach ranged from 11 in 1987 to 9 in 1992. The highest number of false crawls occurred in 1990 with 17 and the lowest occurred in 1992 with 9. The loggerhead accounts for the majority of the nesting in the county with occasional nesting by green and leatherback turtles. Leatherback turtles may start nesting earlier than loggerheads. In Miami-Dade County the earliest nest documented by Meylan et. al., 1995, was on April 11, 1992. During the sea turtle nesting season, the Miami-Dade County Park and Recreation Department conducts daily surveys (commence on April 1) and relocates nests found along the beach from Sunny Isles south to Government Cut. This is done to prevent poaching or nest destruction due to beach maintenance, emergency vehicles which access the beach and other human related causes (Flynn 1992). All nests found during the surveys are relocated to a central hatchery on Miami Beach (pers.

comm., B. Flynn, Miami-Dade Co. Dept. of Env. Res. Mgmt., 1993). Turtle nests laid on the beach within the Town of Golden Beach are not surveyed by the county and are not routinely relocated, but are allowed to remain on the beach.

3.3.2 WEST INDIAN MANATEE

The estuarine waters around the inlets and bays within Miami-Dade County provide year-round habitat for the West Indian manatee, *Trichecus manatus*. Although manatees have been observed in the open ocean, they feed and reside mainly in the estuarine areas and around inlets. No significant foraging habitat is known to exist in the areas around the project sites, nor have manatees been known to congregate in the nearshore environment within the project area.

3.3.3 OTHER THREATENED ENDANGERED SPECIES

Other threatened or endangered species that may be found in the in the coastal waters off of Miami-Dade County during certain times of the year are the finback whale, *Balaenoptera physalus*; humpback whale, *Megaptera novaeangliae*; right whale *Eubalaena glacialis*; sei whale, *Balaenoptera borealis*; and the sperm whale *Physeter macrocephalus catodon*. These are infrequent visitors to the area and are not likely to be impacted by project activities.

3.4 FISH AND WILDLIFE RESOURCES

3.4.1 BEACH AND OFFSHORE SAND BOTTOM COMMUNITIES

The beaches of southeast Florida are exposed beaches and receive the full impact of wind and wave action. Intertidal beaches usually have low species richness, but the species that can survive in this high energy environment are abundant. The upper portion of the beach, or subterrestrial fringe, is dominated by various talitrid amphipods and the ghost crab *Ocypode quadrata*. In the midlittoral zone (beach face of the foreshore), polychaetes, isopods, and haustoriid amphipods become dominant forms. In the swash or surf zone, coquina clams of the genus Donax and the mole crab Emerita talpoida typically dominate the beach fauna. All these invertebrates are highly specialized for life in this type of environment (Spring, 1981; Nelson, 1985; and U.S. Fish and Wildlife Service [USFWS], 1997).

Shallow subtidal soft bottom habitats (0 to 1 meters [0 to 3 feet] depth) show an increasing species richness and are dominated by a relatively even mix of polychaetes (primarily spionids), gastropods (*Oliva* sp., *Terebra* sp.), portunid crabs (*Arenaeus* sp., *Callinectes* sp., *Ovalipes* sp.), and burrowing shrimp (*Callianassa* sp.). In slightly deeper water (1 to 3 meters [3 to 10 feet] depth) the fauna is dominated by polychaetes, haustoid and other amphipod groups, bivalves such as *Donax* sp. and *Tellina* sp. (Marsh *et al.*, 1980; Goldberg *et al.*, 1985; Gorzelany and Nelson, 1987; Nelson, 1985; Dodge *et al.*, 1991.

Surf zone fish communities are typically dominated by relatively few species (Modde and Ross, 1981; Peters and Nelson, 1987). Fish species that can be found in the surf zone include, Atlantic threadfin herring, *Opisthonema oglinum*; blue runner, *Caranx crysos*; spotfin mojarra, *Eucinostomus argenteus*; southern stingray, *Dasyatis americana*; greater barracuda, *Sphyraena barracuda*; yellow jack, *Caranx bartholomaei*; and the ocean triggerfish, *Canthidermis sufflamen*, none of which are of local commercial value. Most of the fish making up the inshore surf community tend to be either small species or juveniles (Modde, 1980).

3.4.2 REEF/HARDGROUND COMMUNITIES

The classic reef distribution pattern described for southeast Florida reefs north of Key Biscayne consists of an inner reef in approximately 15 to 25 feet (5 to 8 meters) of water, a middle patch reef zone in about 30 to 50 foot (9 to 15 meters) of water, and an outer reef in approximately 60 to 100 foot (18 to 30 meters) of water. This general description was first published by Duane and Meisburger (1969) and has been the basis for most descriptions of hardground areas north of Government Cut, Miami since that time (Goldberg, 1973; Courtenay *et al.*, 1974; Lighty *et al.*, 1978; Jaap, 1984). Development of these three reef terraces into their present form is thought to be related to fluctuations in sea level stands associated with the Holocene sea level transgression that began about 10,000 years ago.

Lighty *et al.* (1978) showed that active barrier reef development took place as far north as the Fort Lauderdale area as late as 8,000 years ago. It is possible that the reefs and hardground areas seen from Delray Beach southward are the result of active coral reef growth in the relatively recent past, whereas the hard bottom features seen north of Palm Beach Inlet may represent the outcropping of older, weathered portions on the Anastasia Formation. The reefs north of Palm Beach Inlet (Lake Worth Inlet) do not show the same orientation to shore as those to the south and the classical "three reef" hardgrounds description begins to differ north of that inlet (Continental Shelf Associates, Inc., 1993).

The composition of hardground biological assemblages along Florida's east coast has been detailed by Goldberg (1970, 1973), Marszalek and Taylor (1977), Raymond and Antonius (1977), Marszalek (1978), Continental Shelf Associates, Inc. (1984; 1985; 1987; 1993), and Blair and Flynn (1989). Although there are a large variety of hard coral species growing on the reefs north of Government Cut, these corals are no longer actively producing the reef features seen there. The reef features seen north of Government Cut have been termed "gorgonid reefs" (Goldberg, 1970; Raymond and Antonius, 1977) because they support such an extensive and healthy assemblage of octocorals. Goldberg (1973) identified 39 species of octocorals from Palm Beach County waters. The U.S. Environmental Protection

Agency (1992) lists 46 species of shallow water gorgonids as occurring along southeast Florida. Surveys by Continental Shelf Associates, Inc. (1984; 1985) identified 33 sponge, 21 octocoral, and 5 hard coral species on offshore reefs off Ocean Ridge and 40 sponge, 18 octocoral, and 14 hard coral species on the offshore reefs off Boca Raton. Blair and Flynn (1989) described the reefs and hard bottom 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. Despite this gradual decrease in the density of hard coral species present, the overall hardground assemblage of hard corals, soft corals, and sponges seen along southeast Florida's offshore reefs remains remarkably consistent throughout the counties of Miami-Dade, Broward, and Palm Beach. Commercially, the most important invertebrate species directly associated with these hardground areas is the Florida lobster, *Panulirus argus*.

Common fish species identified with the reef/hardground communities include grunts (Haemulidae), angelfish (Pomacanthidae), butterflyfish (Chaetodontidae), damselfish (Pomacentridae), wrasses (Labridae), drum (Sciaenidae), sea basses (Serranidae) snapper (Lutjanidae) and parrotfish (Scaridae). Important commercial and sport fish such as black margate (*Ansiotremus surinamensis*), gag (*Mycteroperca microlepis*), red grouper (*Epinephelus morio*), red snapper (*Lutjanus campechanus*), gray snapper (*L. griseus*) Hogfish (*Lachnolaimus maximus*) and snook (*Centropomus undecimalis*) are also associated with these reefs. The precise composition of the fish assemblage associated with any given location along these hardground areas is dependent upon the structural complexity of the reef at that location.

Herrema (1974) reported over 300 fish species as occurring off southeast Florida. Approximately 20 percent of these species were designated as "secondary" reef fish. Secondary reef fish are fish species that, although occurring on or near reefs, are equally likely to occur over open sand bottoms. Many of these species, such as the sharks, jacks, mullet, bluefish, sailfish, and marlin (none of which have significant local commercial value), are pelagic or open water species and are transient through all areas of their range.

3.4.3 ESSENTIAL FISH HABITAT

Habitats within the project area have been designated as Essential Fish Habitat (EFH) as defined in 1996 by amendment to the Magnuson-Stevens Fishery Conservation and Management Act (SAFMC, 1998). EFH for species within the project area include shrimp, snapper-grouper complex (73 species), Spanish and king mackerel, coral and coral communities, and spiny lobster. Various life stages of some of the managed species found in the project area include larvae, post larvae, juvenile, and adult stages of red, gray, lane, schoolmaster, mutton and yellowtail snappers, scamp, speckled hind, red, yellowedge and gag groupers, white grunt and spiny lobster. Categories of EFH that occur within the project area include water column, hardbottom, coral, artificial reef, and open sand habitat. Habitat Areas of Partilcular Concern (HAPC) have also been identified for south Florida. These include hardbottom, coral and coral reef habitats.

3.5 COASTAL BARRIER RESOURCES

There are no designated Coastal Barrier Resource Act Units located in the project area that would be affected by this project.

3.6 WATER QUALITY

Waters off the coast of Miami-Dade County are classified as Class III waters by the State of Florida. Class III category waters are suitable for recreation and the propagation of fish and wildlife. Turbidity is the major limiting factor in coastal water quality in South Florida. Turbidity is measured in Nephelometric Turbidity Units (NTU), which quantitatively measure light-scattering characteristics of the water. However, this measurement does not address the characteristics of the suspended material that creates turbid conditions. According to Dompe and Haynes (1993), the two major sources of turbidity in coastal areas are very fine organic particulate matter and sediments and sand-sized sediments that become resuspended around the seabed from local waves and currents. Florida state guidelines set to minimize turbidity impacts from beach restoration activities confine turbidity values to under 29 NTU above ambient levels outside the turbidity mixing zone for Class III waters.

Turbidity values are generally lowest in the summer months and highest in the winter months, corresponding with winter storm events and the rainy season (Dompe and Haynes, 1993; Coastal Planning & Engineering [CPE], 1989). Moreover, higher turbidity levels can generally be expected around inlet areas, and especially in estuarine areas, where nutrient and entrained sediment levels are higher. Although some colloidal material will remain suspended in the water column upon disturbance, high turbidity episodes usually return to background conditions within several days to several weeks, depending on the duration of the perturbation (storm event or other) and on the amount of suspended fines.

3.7 HAZARDOUS, TOXIC AND RADIOACTIVE WASTE

The coastline within the project area is located adjacent to predominantly residential, commercial and recreational areas. The areas within the project are high energy littoral zones and the material used for nourishment are composed of particles with large grain sizes that do not normally have contaminants adsorbing to them. The nature of the work involved with the renourishment of beaches is such that contamination by hazardous and toxic wastes is very unlikely. Beach fill materials obtained from upland sources will be screened according to the requirements set forth in the Sand Specifications for Beach Fill (Appendix A). No contamination due to hazardous and toxic waste spills is known to be in the study area.

3.8 AIR QUALITY

Air quality within the project area is good due to the presence of either on or offshore breezes. Miami-Dade County is in attainment with the Florida State Air Quality Implementation Plan for all parameters except for the air pollutant ozone. The county is designated as a moderate non-attainment area for ozone.

3.9 NOISE

Ambient noise around the project area is typical to that experienced in recreational environments. Noise levels range from low to moderate based on the density of development and recreational usage. The major noise producing sources include breaking surf, beach and nearshore water activities, adjacent residential and commercial areas, and boat and vehicular traffic. These sources are expected to remain at their present noise levels.

3.10 AESTHETIC RESOURCES

The project area consists of light sandy beige beaches that contrast strikingly with the deep hues of the panoramic Atlantic Ocean. The eastern foreground consisting of dune vegetation is backdropped by condominium and hotel tropical landscape plantings in many areas. Coconut, sabal, and date palm trees provide vertical human scale transition between the structures and the beachfront. Beachfront plantings of sea oats, dune sunflower, seagrapes, morning glory vines and many other tropical beach plantings provide an aesthetic transition between the remaining dunes and the beach. The project segments consist of moderate to good aesthetic values with few exceptions throughout the entire project.

3.11 RECREATION RESOURCES

Miami-Dade County is a heavily populated county on Florida's Atlantic Coast, which receives a tremendous volume of tourists, particularly during the winter months. Those beaches that 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.

Miami Beach has public access and receives 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 on-shore and offshore fishing, snorkeling, SCUBA diving, windsurfing 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 utilize the natural and artificial reefs located within and adjacent to the project area. Commercial enterprises along the beach rent beach chairs, cushions, umbrellas, and jet skis. Food vendors can also be found along the beach areas. The revenue generated by beachgoers supports a resurgent Miami Beach business district in the project vicinity.

3.12 HISTORIC PROPERTIES

The current project will not impact any cultural resources within the project area. No offshore borrow areas are being utilized for the project. Material placed on the beach may help to preserve cultural resources in danger of being lost due to erosion. It is not believed any cultural resources are present within the fill area, however.

It is assumed that the fill material to be obtained by the contractor will have been obtained from an upland source with no cultural significance.

Stevenson, Paul C SAJ

To: Brost, Beth
Subject: RE: Nesting Data for Miami Beaches - Thanks

Thanks so much Beth - very helpful info and amazing fast.

One last question - can you recommend a point of contact or website for benthic info/data on hardground and or coral locations/associated resources for Dade County (is it Bryan Flynn DERM)? I know its a broad topic but my web searches have produced zilch. Your web based GIS site is neat but could not get info layers attached at the scale needed to zoom into specific project area. Give me a call, fax or email - whichever is easier for you. Thanks Paul

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-----Original Message-----
From: Brost, Beth [mailto:Beth.Brost@fwc.state.fl.us]
Sent: Tuesday, February 24, 2004 9:55 AM
To: Stevenson, Paul C
Subject: Nesting Data for Miami Beaches

Paul,

Per our conversation yesterday, I have attached two files: (1) a spreadsheet containing crawl data for Miami Beaches zones H, I, and J for the years 2001 - 2003; and (2) a map illustrating those zones. If you have any questions or need additional information, please don't hesitate to contact me.

Thanks.
Beth

<<Miami Bchs Zones H,I,J (01-03).pdf>> <<miami bchs-zones h,i,j (01-03).jpg>>

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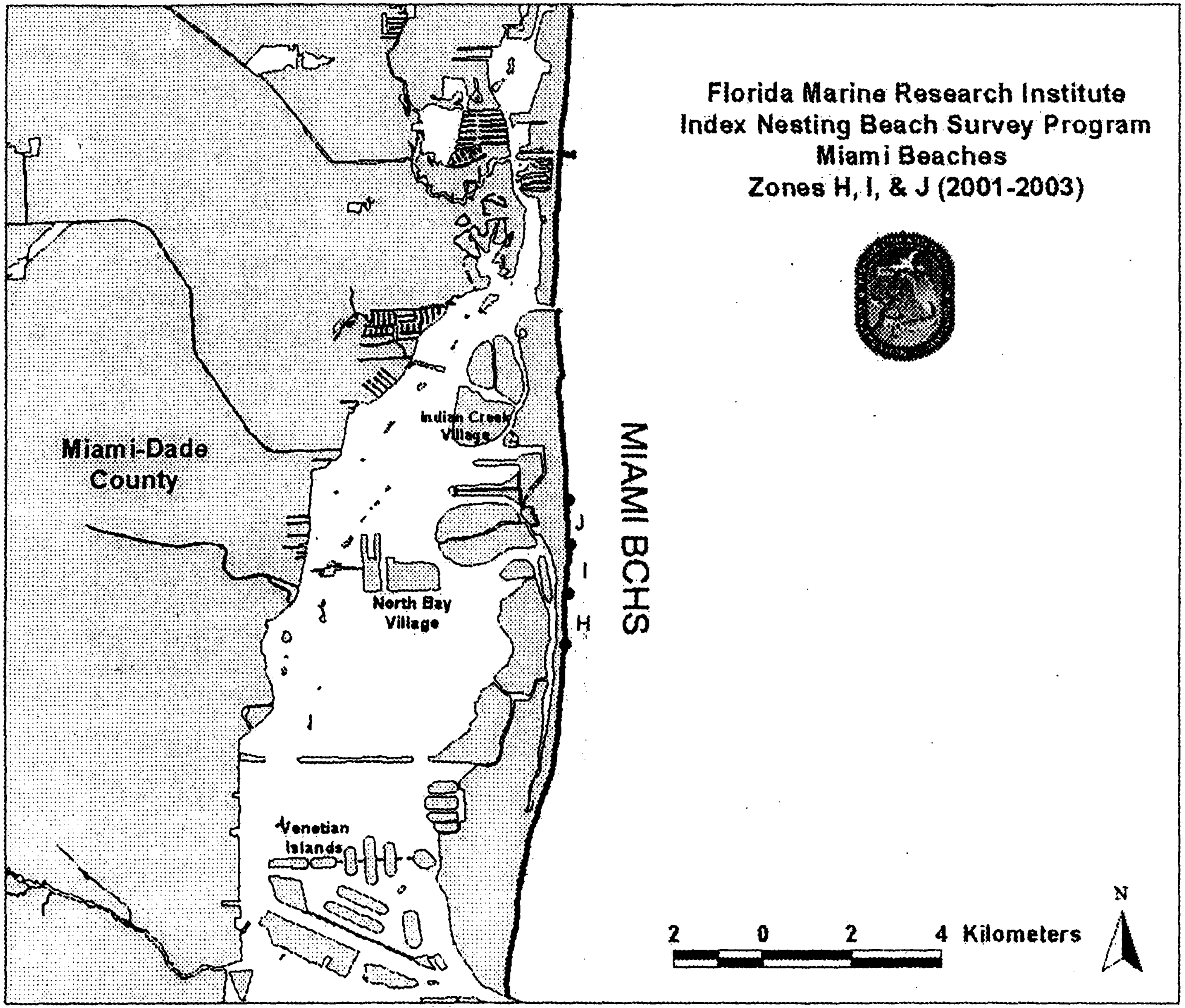
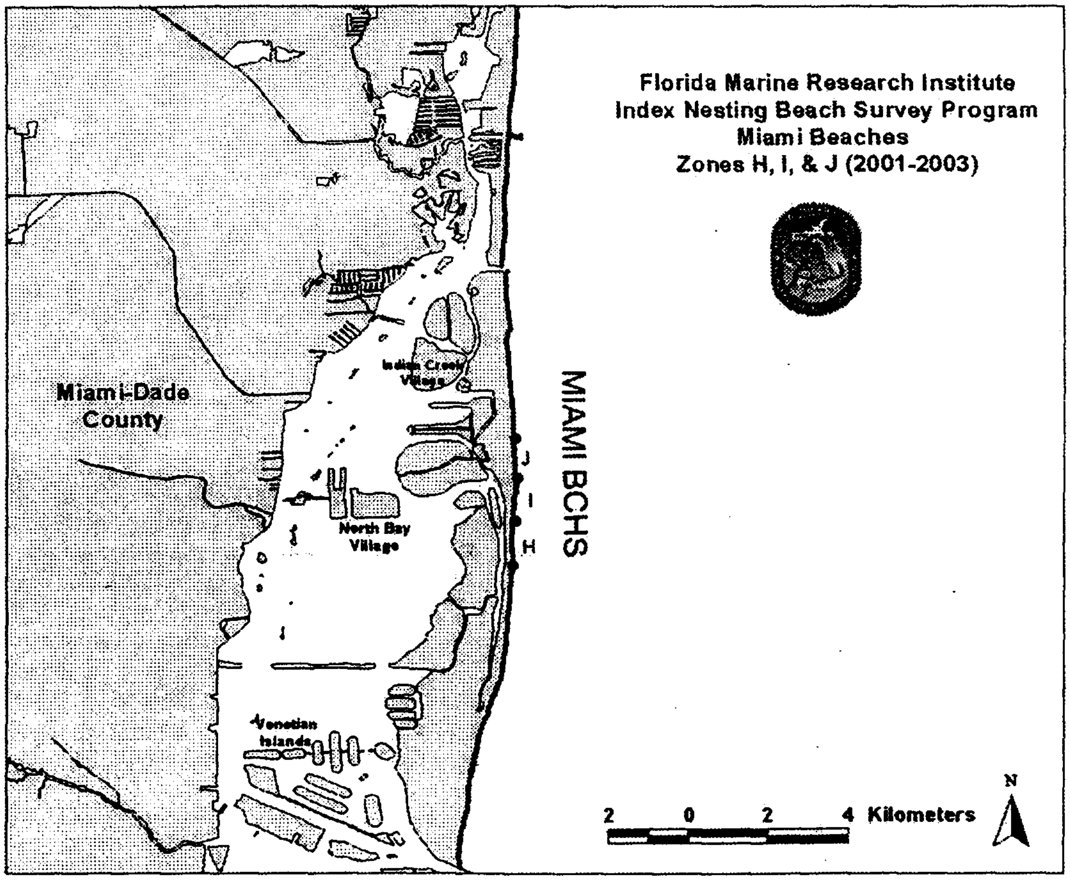
Florida Fish and Wildlife Conservation Commission
Florida Marine Research Institute
Index Nesting Beach Survey Program
Miami Beaches Zones H, I, and J (2001-2003)

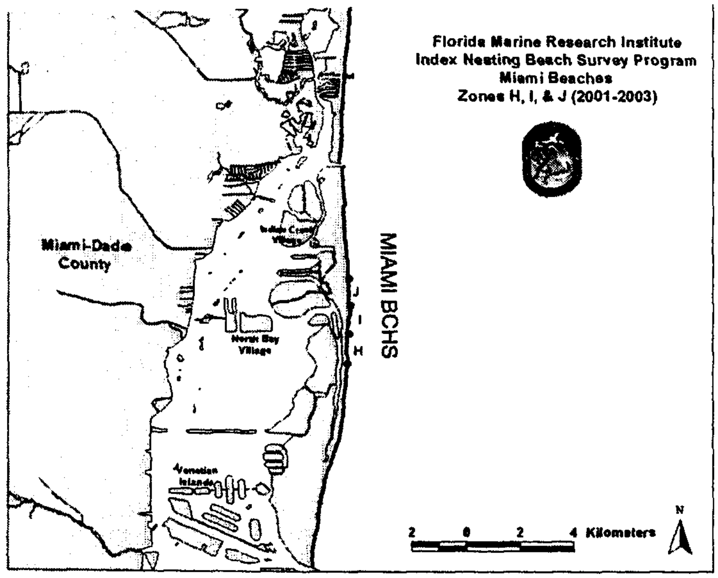
Year	Zone	Loggerhead Nests	Loggerhead False Crawls	Green Turtle Nests	Green Turtle False Crawls	Leatherback Nests	Leatherback False crawls
2001	H	6	9	0	0	0	0
2002	H	2	4	0	0	0	0
2003	H	11	8	0	0	0	0
2001	I	5	5	0	0	0	0
2002	I	4	5	0	0	0	0
2003	I	8	9	0	0	0	0
2001	J	5	2	0	0	0	0
2002	J	1	3	0	0	0	0
2003	J	4	5	0	0	0	0



55th ST. → 77th ST.



55th ST. → 77th ST.



55th ST. → 77th ST.

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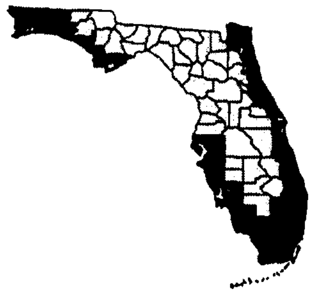

Sea Turtle Nesting Data

The series of data tables in this section lists loggert and leatherback turtle nesting data. Nesting data ha *on a county-by-county basis since 1988.*

ARTICLES:

Green Turtle Nesting Data for Northeast Florida

These tables provide green turtle nesting data from five counties in Florida: Volusia, Flagler, St. Johns, Duval, and Nassau.

Green Turtle Nesting Data for Northwest Florida

These tables provide green turtle nesting data from six counties in Florida: Escambia, Santa Rosa, Okaloosa, Walton, Bay, and Gulf.

Green Turtle Nesting Data for Southeast Florida

These tables provide green turtle nesting data from seven counties in Florida: Dade Broward, Palm Beach, Martin, St. Lucie, Indian River, and Brevard.

Green Turtle Nesting Data for Southwest Florida

These tables provide green turtle nesting data from eight counties in Florida: Hillsborough, Pinellas, Manatee, Sarasota, Charlotte, Lee, Collier, and Monroe.

Leatherback Nesting Data for Northeast Florida

These tables provide leatherback turtle nesting data from five counties in Florida: Volusia, Flagler, St. Johns, Duval, and Nassau.

Leatherback Nesting Data for Northwest Florida

These tables provide leatherback turtle nesting data from six counties in Florida: Escambia, Santa Rosa, Okaloosa, Walton, Bay, and Gulf.

Leatherback Nesting Data for Southeast Florida

These tables provide leatherback turtle nesting data from seven counties in Florida: Miami-Dade, Broward, Palm Beach, Martin, St. Lucie, Indian River, and Brevard.

Leatherback Turtle Nesting Data for Southwest Florida

These tables provide leatherback turtle nesting data from eight counties in Florida: Hillsborough, Pinellas, Manatee, Sarasota, Charlotte, Lee, Collier, and Monroe.

Loggerhead Nesting Data for Northeast Florida
These tables provide loggerhead nesting data from five counties in Florida: Volusia, Johns, Duval, and Nassau.

Loggerhead Nesting Data for Northwest Florida
These tables provide loggerhead nesting data from six counties in Florida: Escambia, Santa Rosa, Okaloosa, Walton, Bay, and Gulf.

Loggerhead Nesting Data for Southeast Florida
These tables provide Loggerhead nesting data from seven counties in Florida: Dade Broward, Palm Beach, Martin, St. Lucie, Indian River, and Brevard.

Loggerhead Nesting Data for Southwest Florida
These tables provide loggerhead nesting data from eight counties in Florida: Hillsborough, Pinellas, Manatee, Sarasota, Charlotte, Lee, Collier, and Monroe.

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Green Turtle Nesting Data for Southeast Florida

These tables provide green turtle nesting data from seven counties in Florida: Dade, Browa Beach, Martin, St. Lucie, Indian River, and Brevard.

BREVARD					
Year	Beach Length (km)	Number of Nests	Number of Non-Nesting Emergences	Date of First Nest	Date of Last Nest
1988	77.9	134	143	6/28/88	9/20/88
1989	97.4	246	181	5/24/89	9/6/89
1990	98.3	841	708	5/24/90	9/10/90
1991	98.5	214	247	5/23/91	9/18/91
1992	101.0	1232	1176	6/1/92	9/12/92
1993	100.1	116	96	6/21/93	10/1/93
1994	102.8	1720	1451	5/28/94	9/27/94
1995	103.4	171	259	5/20/95	9/17/95
1996	105.2	1351	1468	6/7/96	10/10/96
1997	110.0	259	247	5/26/97	9/13/97
1998	108.0	2764	3764	5/27/98	9/20/98
1999	108.0	125	197	6/5/99	8/29/99
2000	108.0	3907	3492	5/13/00	9/23/00
2001	115.2	193	217	6/9/01	10/4/01
2002	115.2	4316	4322	5/17/02	9/23/02

INDIAN RIVER					
Year	Beach Length (km)	Number of Nests	Number of Non-Nesting Emergences	Date of First Nest	Date of Last Nest
1988	19.8	31	13	6/20/88	9/21/88
1989	19.8	35	34	6/4/89	9/4/89
1990	19.7	116	74	6/6/90	9/12/90
1991	19.7	30	13	6/4/91	8/22/91
1992	19.8	87	55	6/1/92	8/30/92
1993	21.1	14	11	7/2/93	8/24/93
1994	21.1	177	128	5/29/94	9/22/94
1995	19.5	20	7	5/20/95	8/28/95

1996	19.5	97	105	6/13/96	9/22/96
1997	27.6	56	35	5/13/97	9/21/97
1998	26.8	302	257	5/9/98	9/22/98
1999	20.6	44	28	4/23/99	8/31/99
2000	30.0	633	451	5/20/00	9/11/00
2001	30.0	48	29	6/18/01	10/8/01
2002	30.0	589	406	4/19/02	8/30/02

ST LUCIE					
Year	**Beach Length (km)**	**Number of Nests**	**Number of Non-Nesting Emergences**	**Date of First Nest**	**Date of Last Nest**
1988	27.7	46	35	6/14/88	9/6/88
1989	34.1	36	59	5/11/89	9/23/89
1990	34.1	81	81	5/20/90	9/12/90
1991	34.1	26	52	5/29/91	7/4/91
1992	34.1	98	102	5/29/92	9/8/92
1993	34.1	22	29	5/25/93	9/11/93
1994	34.4	117	102	5/31/94	9/19/94
1995	34.4	14	15	5/31/95	8/6/95
1996	34.4	130	145	6/17/96	9/15/96
1997	34.4	30	36	6/23/97	9/1/97
1998	34.4	192	287	6/05/98	9/12/98
1999	34.4	21	49	6/17/99	8/18/99
2000	34.4	369	283	5/28/00	9/16/00
2001	34.4	54	22	5/15/01	9/19/01
2002	34.4	402	318	5/24/02	9/11/02

MARTIN					
Year	**Beach Length (km)**	**Number of Nests**	**Number of Non-Nesting Emergences**	**Date of First Nest**	**Date of Last Nest**
1988	34.0	99	99	6/15/88	9/15/88
1989	33.7	122	107	6/3/89	9/6/89
1990	33.6	323	304	4/30/90	9/1/90
1991	33.9	87	102	6/2/91	9/1/91
1992	33.6	289	416	6/9/92	9/16/92
1993	35.3	67	96	6/15/93	9/12/93
1994	35.3	475	557	5/29/94	9/30/94
1995	35.4	76	74	5/29/95	9/15/95
1996	35.4	300	766	6/10/96	10/1/96
1997	35.3	95	159	5/22/97	9/23/97
1998	35.3	474	1747	5/30/98	9/23/98
1999	35.3	48	103	6/8/99	9/5/99

2000	35.3	753	1571	5/22/00	9/17/00
2001	35.3	62	113	6/10/01	10/5/01
2002	35.3	808	1993	5/3/02	9/27/02

PALM BEACH					
Year	Beach Length (km)	Number of Nests	Number of Non-Nesting Emergences	Date of First Nest	Date of Last Nest
1988	46.2	81	28	5/13/88	9/18/88
1989	57.1	90	70	5/3/89	8/27/89
1990	66.5	728	435	5/14/90	10/3/90
1991	64.1	153	97	4/29/91	9/2/91
1992	61.1	553	478	5/4/92	9/19/92
1993	47.6	154	109	5/24/93	9/27/93
1994	55.8	936	686	5/5/94	10/15/94
1995	48.8	184	139	5/23/95	9/8/95
1996	55.5	864	807	5/23/96	9/28/96
1997	59.9	227	157	5/26/97	9/10/97
1998	63.4	1278	2246	5/1/98	10/1/98
1999	63.6	194	135	3/19/99	8/25/99
2000	63.6	1942	1931	4/30/00	9/7/00
2001	63.6	175	103	3/30/01	9/25/01
2002	67.4	2339	2824	4/24/02	10/10/02

BROWARD					
Year	Beach Length (km)	Number of Nests	Number of Non-Nesting Emergences	Date of First Nest	Date of Last Nest
1998	38.4	35	25	5/27/88	6/29/88
1989	42.1	30	24	6/2/89	8/17/89
1990	38.3	106	82	5/13/90	9/12/90
1991	38.6	11	25	6/12/91	9/4/91
1992	41.3	132	205	6/6/92	9/5/92
1993	42.5	31	25	6/30/93	9/3/93
1994	42.5	123	189	6/2/94	9/10/94
1995	37.9	52	97	5/12/95	9/13/95
1996	42.5	130	188	5/31/96	9/11/96
1997	42.5	29	48	5/24/97	9/10/97
1998	42.5	200	265	5/30/98	9/6/98
1999	38.6	24	32	5/24/99	9/3/99
2000	38.6	255	294	5/17/00	9/3/00
2001	38.6	26	48	3/16/01	8/4/01
2002	38.6	216	342	5/16/02	9/26/02

MIAMI-DADE					
Year	Beach Length (km)	Number of Nests	Number of Non-Nesting Emergences	Date of First Nest	Date of Last Nest
1988	29.9	6	2	6/13/88	7/8/88
1989	29.9	2	6	7/1/89	7/7/89
1990	31.5	3	2	5/16/90	7/1/90
1991	30.7	2	2	7/17/91	7/26/91
1992	38.6	4	5	6/27/92	8/3/92
1993	38.9	1	0	6/20/93	6/20/93
1994	34.7	1	1	6/2/94	6/2/94
1995	37.4	2	0	5/21/95	6/27/95
1996	37.6	12	13	6/17/96	8/19/96
1997	38.1	0	2		
1998	38.1	4	10	5/31/98	7/28/98
1999	37.8	64	78	4/23/99	8/18/99
2000	37.8	5	7	6/20/00	7/28/00
2001	37.8	0	0		
2002	37.8	15	9	6/21/02	8/27/02

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Leatherback Nesting Data for Southeast Florida

These tables provide leatherback turtle nesting data from seven counties in Florida: Miami-Broward, Palm Beach, Martin, St. Lucie, Indian River, and Brevard.

BREVARD					
Year	Beach Length (km)	Number of Nests	Number of Non-Nesting Emergences	Date of First Nest	Date of Last Nest
1988	77.9	0	0		
1989	97.4	1	0	6/6/89	6/6/89
1990	98.3	0	0		
1991	98.5	3	0	4/12/91	6/7/91
1992	101.0	2	2	4/21/92	6/6/92
1993	100.1	1	1	6/6/89	6/6/89
1994	102.8	5	0	5/25/94	6/13/94
1995	103.4	4	0	5/3/95	6/5/95
1996	105.2	16	3	5/23/96	6/30/96
1997	110.0	11	0	5/11/97	7/10/97
1998	108.0	30	8	3/30/98	7/3/98
1999	108.0	43	1	4/2/99	8/2/99
2000	108.0	22	5	3/27/00	7/25/00
2001	115.2	61	8	3/3/01	8/16/01
2002	115.2	18	8	4/16/02	7/2/02

INDIAN RIVER					
Year	Beach Length (km)	Number of Nests	Number of Non-Nesting Emergences	Date of First Nest	Date of Last Nest
1988	19.8	0	0		
1989	19.8	3	0	5/16/89	6/8/89
1990	19.7	1	0	6/27/90	6/27/90
1991	19.7	5	0	5/6/91	6/17/91
1992	19.8	0	0		
1993	21.1	1	0	6/26/93	6/26/93
1994	21.1	2	0	5/16/94	6/18/94
1995	19.5	7	1	4/25/95	7/3/95

1996	19.5	0	0		
1997	27.6	11	3	4/5/97	6/21/97
1998	26.8	9	6	4/5/98	6/21/98
1999	20.6	15	3	3/26/99	6/10/99
2000	30.0	16	1	3/29/00	7/7/00
2001	30.0	41	7	3/17/01	7/15/01
2002	30.0	16	5	4/13/02	7/9/02

ST LUCIE					
Year	Beach Length (km)	Number of Nests	Number of Non-Nesting Emergences	Date of First Nest	Date of Last Nest
1988	27.7	19	7	3/26/88	6/18/88
1989	34.1	19	13	3/30/89	6/18/89
1990	34.1	6	6	4/18/90	7/3/90
1991	34.1	25	8	4/5/91	7/7/91
1992	34.1	18	3	3/26/92	7/5/92
1993	34.1	7	2	3/30/93	7/12/93
1994	34.4	27	6	3/24/94	6/9/94
1995	34.4	14	10	4/19/95	6/3/95
1996	34.4	18	6	3/29/96	6/13/96
1997	34.4	21	10	3/21/97	6/22/97
1998	34.4	41	29	3/30/98	7/01/98
1999	34.4	49	39	3/22/99	7/17/99
2000	34.4	63	24	4/3/00	7/27/00
2001	34.4	137	33	5/15/01	9/19/01
2002	34.4	95	25	3/18/02	7/16/02

MARTIN					
Year	Beach Length (km)	Number of Nests	Number of Non-Nesting Emergences	Date of First Nest	Date of Last Nest
1988	34.0	31	10	4/19/88	6/30/88
1989	33.7	32	13	4/6/89	7/17/89
1990	33.6	30	12	3/25/90	6/26/90
1991	33.9	59	16	4/6/91	7/18/91
1992	33.6	36	13	3/31/92	7/14/92
1993	35.3	39	10	3/28/93	7/22/93
1994	35.3	85	17	3/21/94	7/17/94
1995	35.4	106	25	3/5/95	7/16/95
1996	35.4	75	31	3/3/96	7/3/96
1997	35.3	122	57	3/18/97	7/5/97
1998	35.3	107	43	3/16/98	7/3/98
1999	35.3	193	93	2/26/99	8/15/99

2000	35.3	160	97	3/2/00	7/21/00
2001	35.3	278	162	3/10/01	8/1/01
2002	35.3	186	192	3/15/02	7/15/02

PALM BEACH

Year	Beach Length (km)	Number of Nests	Number of Non-Nesting Emergences	Date of First Nest	Date of Last Nest
1988	46.2	41	2	3/22/88	7/10/88
1989	57.1	39	13	4/11/89	8/13/89
1990	66.5	81	2	3/14/90	7/8/90
1991	64.1	86	7	4/1/91	7/10/91
1992	61.1	104	12	3/18/92	7/16/92
1993	47.6	65	37	4/12/93	7/31/93
1994	55.8	129	27	3/5/94	8/19/94
1995	48.8	72	6	4/7/95	7/20/95
1996	55.5	94	24	3/12/96	8/9/96
1997	59.9	172	33	2/27/97	7/7/97
1998	63.4	138	47	3/18/98	8/7/98
1999	63.6	221	32	3/10/99	8/5/99
2000	63.6	160	33	3/6/00	8/3/00
2001	63.6	334	36	3/15/01	7/29/01
2002	67.4	250	47	3/1/02	8/9/02

BROWARD

Year	Beach Length (km)	Number of Nests	Number of Non-Nesting Emergences	Date of First Nest	Date of Last Nest
1998	38.4	4	0	5/12/88	6/1/88
1989	42.1	4	2	4/24/89	5/19/89
1990	38.3	1	2	5/9/90	5/9/90
1991	38.6	4	1	4/1/91	5/28/91
1992	41.3	7	6	4/15/92	6/16/92
1993	42.5	17	4	4/6/93	6/19/93
1994	42.5	9	0	3/24/94	5/28/94
1995	37.9	15	5	3/16/95	6/29/95
1996	38.6	2	0	5/8/96	6/3/96
1997	38.6	42	10	2/28/97	6/19/97
1998	38.6	14	8	4/26/98	6/11/98
1999	38.6	12	2	3/11/99	5/26/99
2000	38.6	13	4	5/5/00	6/3/00
2001	38.6	39	7	4/20/01	8/21/01
2002	38.6	18	7	3/2/02	6/22/02

MIAMI-DADE					
Year	Beach Length (km)	Number of Nests	Number of Non-Nesting Emergences	Date of First Nest	Date of Last Nest
1988	29.9	5	0	4/25/88	5/14/88
1989	29.9	0	0		
1990	31.5	0	0		
1991	30.7	0	0		
1992	38.6	6	3	4/11/92	5/29/92
1993	38.9	1	0	5/9/93	5/9/93
1994	34.7	0	0		
1995	37.4	2	2	5/15/95	5/25/95
1996	37.6	0	0		
1997	38.1	3	3	4/30/97	5/19/97
1998	38.1	2	1	3/30/98	5/16/98
1999	37.8	9	5	3/29/99	6/9/99
2000	37.8	2	5	3/5/00	3/20/00
2001	37.8	9	7	3/28/01	5/24/01
2002	37.8	4	4	5/3/02	6/12/02

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Loggerhead Nesting Data for Southeast Florida

These tables provide Loggerhead nesting data from seven counties in Florida: Dade, Brow. Beach, Martin, St. Lucie, Indian River, and Brevard.

BREVARD					
Year	Beach Length (km)	Number of Nests	Number of Non-Nesting Emergences	Date of First Nest	Date of Last Nest
1988	77.9	13181	10916	5/3/88	9/18/88
1989	97.4	19589	19925	4/30/89	9/11/89
1990	98.3	27673	24133	4/24/90	9/14/90
1991	98.5	28279	26523	4/25/91	9/7/91
1992	101.0	25555	21442	4/27/92	9/8/92
1993	100.1	20600	18854	5/1/93	9/23/93
1994	102.8	28029	23427	4/20/94	9/21/94
1995	103.4	31653	25969	4/29/95	9/13/95
1996	105.2	28742	27256	5/1/96	9/23/96
1997	110.0	25221	18435	4/25/97	9/11/97
1998	108.0	34596	33988	4/24/98	9/13/98
1999	108.0	34134	32130	4/17/99	9/7/99
2000	108.0	32910	28212	4/23/00	9/10/00
2001	115.2	26198	17340	4/18/01	9/12/01
2002	115.2	23492	26165	4/13/02	9/9/02

INDIAN RIVER					
Year	Beach Length (km)	Number of Nests	Number of Non-Nesting Emergences	Date of First Nest	Date of Last Nest
1988	19.8	1937	1456	5/5/88	9/7/88
1989	19.8	2383	2267	5/4/89	9/7/89
1990	19.7	2425	1975	5/1/1990	8/30/90
1991	19.7	3401	2555	4/29/91	9/4/91
1992	19.8	2786	2022	4/29/92	8/30/92
1993	21.1	2792	2359	5/4/93	8/31/93
1994	21.1	3044	2681	4/26/94	9/8/94
1995	19.5	3468	2980	5/3/95	8/27/95

1996	19.5	3645	3391	5/6/96	9/15/96
1997	27.6	3371	2594	4/15/97	8/31/97
1998	26.8	4491	4680	4/22/98	9/1/98
1999	20.6	3591	332	4/26/99	9/3/99
2000	30.0	5104	4680	4/24/00	9/4/00
2001	30.0	3380	3023	5/1/01	9/6/01
2002	30.0	3648	3860	4/19/02	8/30/02

ST LUCIE

Year	Beach Length (km)	Number of Nests	Number of Non-Nesting Emergences	Date of First Nest	Date of Last Nest
1988	27.7	3236	1975	5/4/88	9/12/88
1989	34.1	3815	3555	4/27/89	9/4/89
1990	34.1	4911	4229	4/19/90	9/14/90
1991	34.1	5146	4376	4/21/91	9/2/91
1992	34.1	4981	3761	4/23/92	9/7/92
1993	34.1	4325	3961	4/27/93	9/7/93
1994	34.4	4934	4428	4/22/94	9/14/94
1995	34.4	5812	5376	4/19/95	9/13/95
1996	34.4	6197	5664	4/21/96	9/10/96
1997	34.4	4587	3547	4/19/97	9/11/97
1998	34.4	6601	6660	4/27/98	9/04/98
1999	34.4	5864	6124	4/22/99	9/5/99
2000	34.4	6586	6457	4/21/00	9/3/00
2001	34.4	5650	5006	4/15/01	9/3/01
2002	34.4	5051	5190	4/14/02	8/31/02

MARTIN

Year	Beach Length (km)	Number of Nests	Number of Non-Nesting Emergences	Date of First Nest	Date of Last Nest
1988	34.0	8183	6884	4/30/88	9/10/88
1989	33.7	9407	9604	4/26/89	9/7/89
1990	33.6	10626	11111	4/15/90	9/8/90
1991	33.9	10798	10399	4/19/91	9/20/91
1992	33.6	8095	8681	4/23/92	9/16/92
1993	35.3	9376	10249	3/28/93	9/8/93
1994	35.3	11258	12006	4/20/94	9/7/94
1995	35.4	11606	12654	4/19/95	9/3/95
1996	35.4	9304	11402	4/18/96	9/20/96
1997	35.3	7894	8239	4/16/97	9/8/97
1998	35.3	10174	16173	4/29/98	9/26/98
1999	35.3	9380	9918	4/16/99	8/18/99

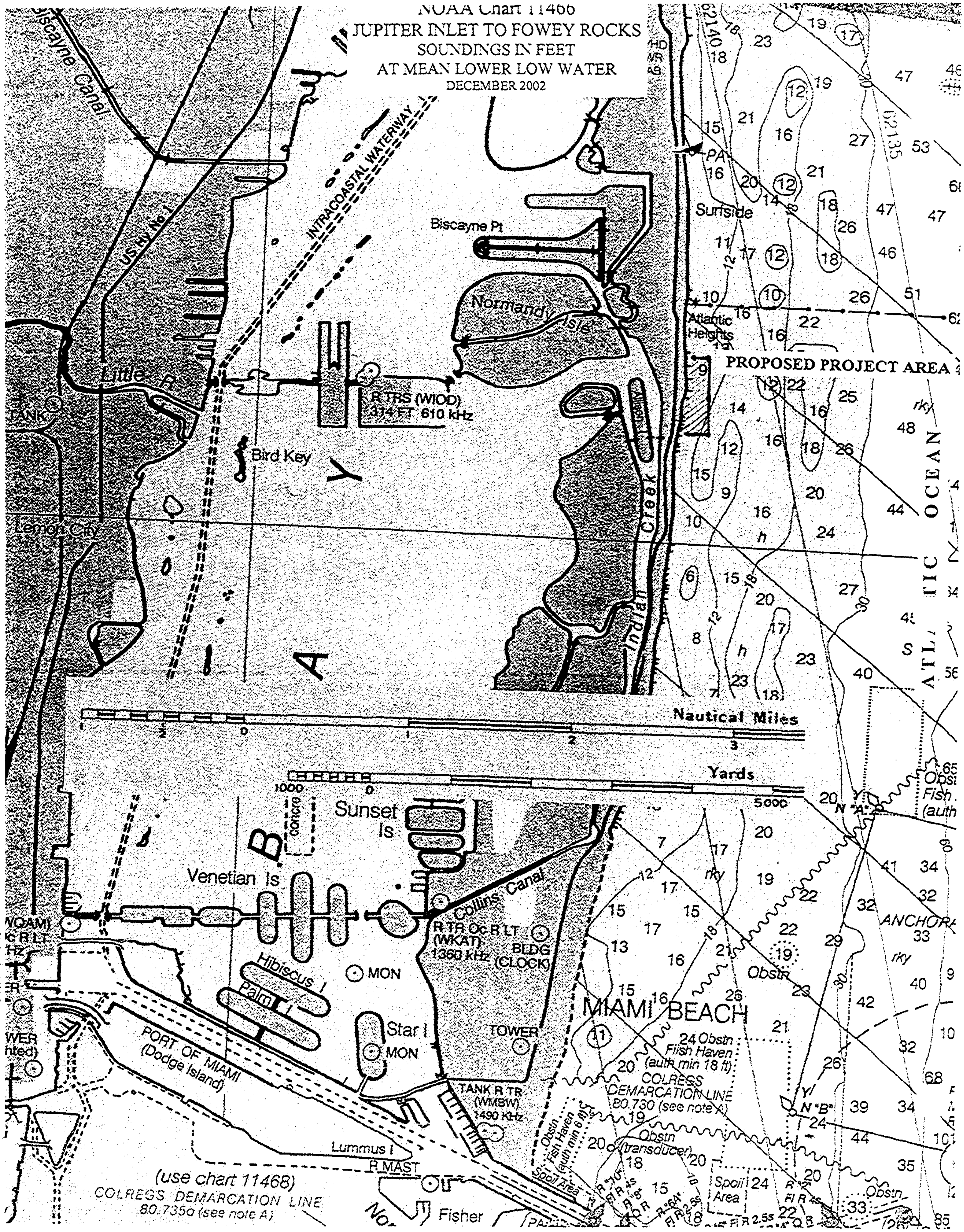
2000	35.3	10322	12021	4/17/00	9/11/00
2001	35.3	8207	8527	4/17/01	9/6/01
2002	35.3	6850	7099	4/17/02	8/29/02

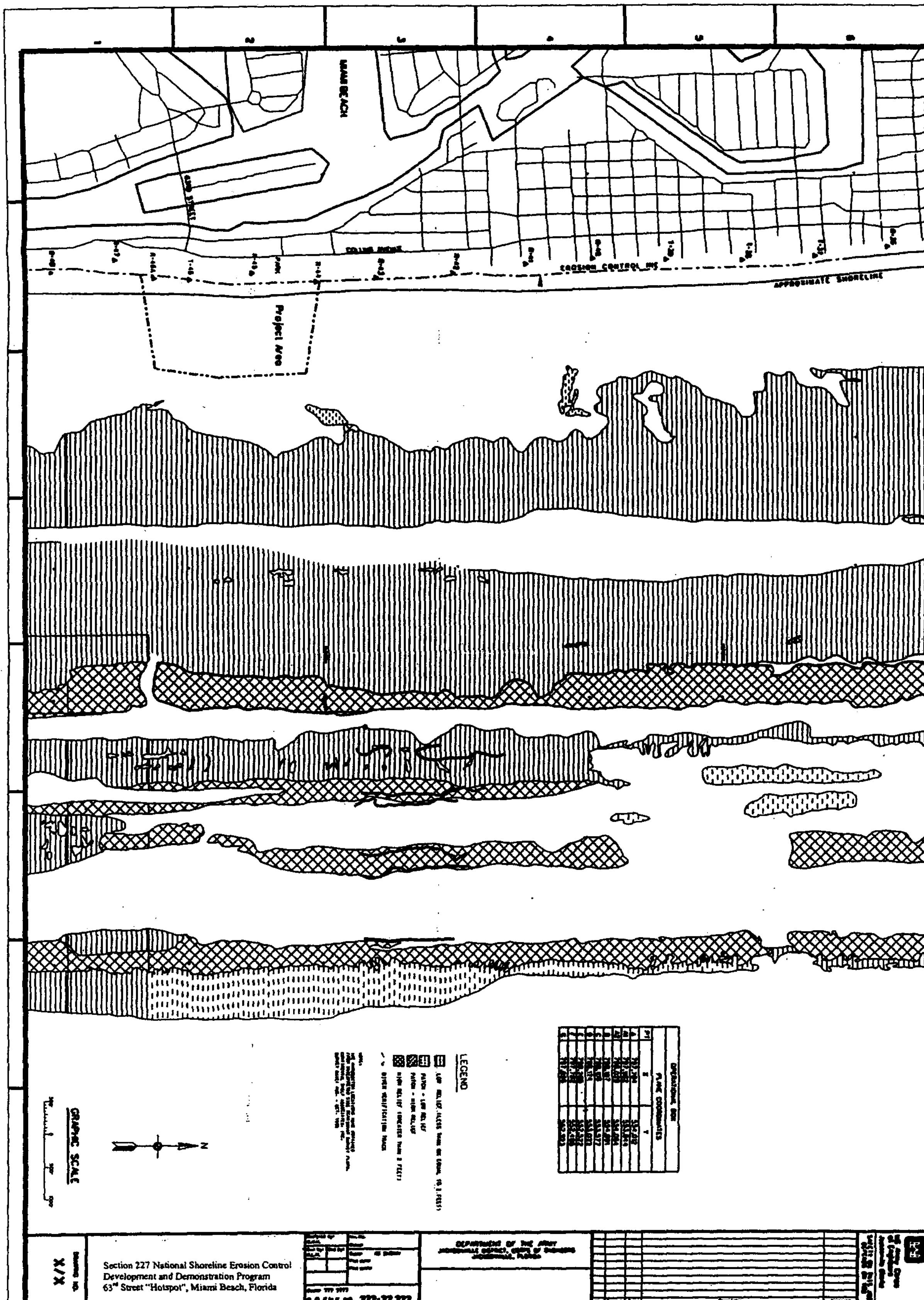
PALM BEACH					
Year	Beach Length (km)	Number of Nests	Number of Non-Nesting Emergences	Date of First Nest	Date of Last Nest
1988	46.2	5573	3484	4/21/88	10/1/88
1989	57.1	7830	4620	4/1589	9/20/89
1990	66.5	12394	8311	4/16/19/90	9/4/90
1991	64.1	11919	9369	4/12/91	9/19/91
1992	61.1	14357	9331	3/16/92	9/24/92
1993	47.6	9424	8030	4/24/93	9/9/93
1994	55.8	12606	12384	4/13/94	10/31/94
1995	48.8	14123	14274	4/15/95	9/8/95
1996	55.5	15284	12543	4/10/96	9/28/96
1997	59.9	11592	8999	4/4/97	9/11/97
1998	63.4	14056	15348	4/5/98	9/15/98
1999	63.6	13182	12927	4/1/99	8/30/99
2000	63.6	14187	16124	4/8/00	9/16/00
2001	63.6	13757	12957	4/15/01	9/23/01
2002	67.4	13032	12841	3/29/02	10/2/02

BROWARD					
Year	Beach Length (km)	Number of Nests	Number of Non-Nesting Emergences	Date of First Nest	Date of Last Nest
1998	38.4	1349	2509	5/1/88	8/28/88
1989	42.1	1791	1547	4/20/89	9/8/89
1990	38.3	2283	1928	4/22/90	9/12/90
1991	38.6	2033	1923	4/23/91	9/3/91
1992	41.3	2230	1978	4/23/92	9/2/92
1993	42.5	2267	2071	4/29/93	9/15/93
1994	42.5	2180	2306	4/23/94	9/4/94
1995	37.9	2567	2330	4/25/95	9/12/95
1996	38.6	2902	3235	4/23/96	9/7/96
1997	38.6	2216	2382	4/18/97	9/8/97
1998	38.6	2643	4065	4/23/98	9/13/98
1999	38.6	2584	3025	4/18/99	8/29/99
2000	38.6	2674	3121	4/18/00	9/9/00
2001	38.6	2321	2327	4/20/01	8/28/01
2002	38.6	2070	2361	4/12/02	9/10/02

MIAMI-DADE					
Year	Beach Length (km)	Number of Nests	Number of Non-Nesting Emergences	Date of First Nest	Date of Last Nest
1988	29.9	219	196	5/2/88	8/27/88
1989	29.9	325	407	4/17/89	8/12/89
1990	31.5	390	486	4/7/90	8/22/90
1991	30.7	439	510	4/25/91	8/28/91
1992	38.6	367	416	4/23/92	9/15/92
1993	38.9	392	401	4/28/93	10/3/93
1994	34.7	445	454	4/22/94	8/30/94
1995	37.4	470	595	4/29/95	8/27/95
1996	37.6	448	517	4/26/96	8/20/96
1997	38.1	415	599	4/23/97	8/14/97
1998	38.1	545	937	4/18/98	8/26/98
1999	37.8	516	565	4/10/99	8/18/99
2000	37.8	516	775	4/12/00	9/20/00
2001	37.8	496	564	4/19/01	8/21/01
2002	37.8	374	445	4/17/02	8/18/02

HEADQUARTERS:
Florida Marine Research Institute
100 Eighth Avenue SE
St. Petersburg, Florida 33701-50
PH: 727-896-8626


NOAA Chart 11466
JUPITER INLET TO FOWEY ROCKS
SOUNDINGS IN FEET
AT MEAN LOWER LOW WATER
DECEMBER 2002
PROPOSED PROJECT AREA
INTRACOASTAL WATERWAY
US Hy No 1
Biscayne Canal
Little R
Lemon City
Bird Key
Biscayne Pt
Normandy Isle
R TRS (WIOD)
314 FT 610 kHz
Surfside
Atlantic Heights
Indian Creek
ATLANTIC OCEAN
Nautical Miles
Yards
Sunset Is
Venetian Is
Collins Canal
R TR Oc R LT
(WKAT)
1360 kHz
BLDG
(CLOCK)
MON
Hibiscus I
Palm I
Star I
TOWER
MIAMI BEACH
PORT OF MIAMI
(Dodge Island)
TANK R TR
(WMBW)
1490 KHz
Lummus I
R MAST
Fisher
(use chart 11468)
COLREGS DEMARCATION LINE
80.735a (see note A)
COLREGS
DEMARCATION LINE
80.730 (see note A)
24 Obstn
Fish Haven
(auth min 18 ft)
Obstn
(transducer)
Spoil Area
ANCHORAGE
Obstn


MIAMI BEACH
COLLINS AVENUE
EROSION CONTROL LINE
APPROXIMATE SHORELINE
Project Area
LEGEND
GRAPHIC SCALE
DEPARTMENT OF THE ARMY
Section 227 National Shoreline Erosion Control
Development and Demonstration Program
63rd Street "Hotspot", Miami Beach, Florida
X/X

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

APR 0 9 2004

Mr. James J. Slack
US Fish and Wildlife Service
South Florida Ecological Services Office
1339 20th Street
Vero Beach, Florida 32960

Dear Mr. Slack:

Enclosed is a Biological Assessment prepared by the U.S. Army Corps of Engineers (Corps), Jacksonville District, under Section 7 of the Endangered Species Act of 1973 (ESA) as amended. The proposed project is the Section 227, National Shoreline Erosion Control Developmental and Demonstration Program, 63rd Street "Hotspot", SubMerged Artificial Reef Training (SMART) structure, at Miami Beach, Miami-Dade County, Florida.

The U.S. Fish and Wildlife Service (FWS) in coordination with the Corps identified the manatee as potentially occurring in the project area. Nesting sea turtles were also identified as a FWS concern.

Based on the enclosed Biological Assessment, the Corps has determined that the proposed action may affect, but is not likely to adversely affect the manatee or nesting sea turtles. The Corps requests your written concurrence on this determination.

We are incorporating by reference, the FWS, October 24, 1995 Biological Opinion for the Region III of the Coast of Florida Erosion and Storm Effects Study, "Reasonable and Prudent Measures" and "Terms and Conditions" (as updated by the March 1, 2001 FWS, Fish and Wildlife Coordination Act Report for the Corps' "Alternative Test Beach Renourishment Study, Miami-Dade County"). The Corps would also like to incorporate by reference the Miami Harbor Biological Assessment dated July 21, 2002 and the FWS June 17, 2003 Biological Opinion (#4-1-03-I-786).

The point of contact in is Mr. Paul Stevenson at 904-232-3747 or electronic mail at paul.c.stevenson@saj02.usace/army.mil.

Sincerely,

James C. Duck
Chief, Planning Division

Enclosure

BIOLOGICAL ASSESSMENT

Section 227, National Shoreline Erosion Control Developmental and Demonstration Program
63rd Street "Hotspot"
SubMerged Artificial Reef Training (SMART) Structure
Miami Beach, Miami-Dade County, Florida

1. Location. The site of the proposed action is State of Florida monuments R-44 to R-46A, in the vicinity of 63rd Street, Miami Beach, Miami-Dade County, Florida (Figure 1).

2. Identification of Listed Species and Critical Habitat in the Vicinity of the Proposed Action. The US Fish and Wildlife Service (USFWS) in coordination with the Corps identified the West Indian manatee (*Trichecus manatus*) and nesting sea turtles [loggerhead sea turtle, *(Caretta caretta)*, green turtles (*Chelonia mydas)*, leatherback turtles (*Dermochelys coriacea)*, hawksbill turtles (*Eretmochelys imbricate)*, Kemp's ridleys (*Lepidochelys kempii)* and olive Ridley (*Lepidochelys oliveaca*)] as potentially occurring within the project area of Miami Beach between State monuments R-44 and R-46A. No designated critical habitat is located in the project area.

3. Description of the Proposed Activity.
The objective of the National Shoreline Erosion Control Development and Demonstration Program, 63rd Street "Hotspot", Miami Beach, Dade County, Florida, proposed project, is to abate shoreline erosion and retain placed fill material along shorelines in the most cost-effective and environmentally friendly manner possible. The program strives to utilize research to develop innovative methods to meet objectives. Under the Water Resources Development Act (WRDA) of 1996, Section 227, the project can be altered or removed if it does not meet the stated objectives.

The Corps, in partnership with the Dade County Department of Environmental Resources Management (DERM), proposes to construct the SubMerged Artificial Reef Training (SMART) structure 400-foot from the mean shoreline in 7-foot of water. The SMART structure would be comprised of 6-foot tall hollow goliath reef balls and 4-foot tall solid bay balls, attached to an articulated concrete mat. Four goliath reef balls and one bay ball would comprise one 'segment', 42.8-foot long by 6-foot wide (Figure 2). The segments would be placed on the Atlantic Ocean floor by crane from a barge, perpendicular to the shoreline. The 30-ton segments would be placed next to each other for a total SMART structure length of 2,272-foot. The ends would be tapered to form an overall crescent shaped submerged breakwater (Figure 3). The SMART structure installation would be diver assisted for quality assurance. The SMART structure footprint would be approximately 2.1 acres.

4. Assessment of Potential Impacts on Listed Species. Based on the precautions listed in paragraph (5) below, the Corps has determined that the proposed action may affect, but is not likely to adversely affect listed species or critical habitat.

5. Efforts to Eliminate Potential Impacts to Listed Species or Critical Habitat.

a. Standard manatee protection measures (such as observers and no wake speeds for work vessels) would be implemented. A species observer would be present during the SMART structure construction. All SMART structure construction would be diver assisted to ensure construction quality and endangered species protection.

b. No SMART structure construction would be undertaken from the beach. All SMART structure construction would be conducted from the Atlantic Ocean via barge and crane.

c. If the SMART structure is constructed during the sea turtle nesting window, work lighting would be shielded and or focused only on work areas only to avoid disorienting nesting sea turtles or sea turtle hatchlings.

1. Any marine mammal(s) in the SMART structure construction zone would not be forced to move out of the zone by human intervention. Work would stop until the animal(s) move(s) out of the project construction zone on its own volition.

2. In the event a marine mammal or marine turtle is injured or killed during SMART structure construction, the Contractor would immediately notify the Contracting Officer as well as the following agencies:

Florida Marine Patrol "Manatee Hotline" 1-800-342-5367.

U.S. Fish and Wildlife Service, Vero Beach Field Office at 561-562-3909 for South Florida.

National Marine Fisheries SERO 727-570-5312.

6. Species Included in this Assessment

Of the listed species under USFWS jurisdiction occurring in the action area, the Corps believes that the nesting green turtle (*Chelonia mydas*) and loggerhead turtle (*Caretta caretta*), may be affected by the SMART structure. Additionally the hawksbill, kemps ridley, olive ridley and leatherback may also be found in the vicinity of the project. Daily sea turtle nesting surveys are conducted by Dade County Park and Recreation Department with a historically very successful relocation and hatch rate (pers. Comm., B. Flynn, Dade Co. DERM). Hardbottom resources outside of the proposed project area are not likely to be adversely affected.

The endangered West Indian manatee (*Trichecus manatus*) may also occur within the action area. Standard Manatee Construction Protection Measures will be implemented as done in the past with Corps projects where manatee are known to frequent the project area. The Corps has undertaken consultation with the National Marine Fisheries Service concerning the effects of the proposed action on jurisdictional species in January 2004. Their concurrence is anticipated and would be included in the EA package.

Sea Turtles

Dade County is within the normal nesting range of three species of sea turtles: the loggerhead (*Caretta caretta*), green turtle (*Chelonia mydas*) and leatherback turtle (*Dermochelys mydas*). The green sea turtle is listed under the U. S. Endangered Species Act, 1973 and Chapter 370, F.S. The loggerhead turtle is listed as a threatened species. The majority of sea turtle nesting activity occurred during the summer months of June, July and August, with nesting activity occurring as early as March and as late as September.

The waters offshore of Dade County are also habitat used for foraging and shelter for the three species listed above and the hawksbill turtle (*Eretmochelys imbricata*), and possibly the Kemp's Ridley turtle (*Lepidochelys kempii*)

(USACE, 2000) and olive Ridley (*Lepidochelys oliveaca*). Daily sea turtle nesting surveys are conducted by Dade County Park and Recreation Department with a historically very successful relocation and hatch rate (pers. Comm., B. Flynn, Dade Co. DERM). These turtles do occur in Atlantic Ocean and could nest on Dade County beaches, possibly within the proposed project area. Observers would be posted during construction operations to look for sea turtles and manatees that may wander into the proposed project area.

Hardbottom Resources

Hardbottom resources can be found offshore of the proposed SMART structure but not within the project area (Figure 4).

Other Threatened or Endangered Species

Other threatened or endangered species that may be found in the in the coastal waters off of Miami-Dade County during certain times of the year are the finback whale (*Balaenoptera physalus*), humpback whale (*Megaptera novaeangliae*), right whale (*Eubalaena glacialis*), sei whale, (*Balaenoptera borealis*) and the sperm whale (*Physeter macrocephalus catodon*). These are infrequent visitors to the area and are not likely to be impacted by project activities.

7. Effects of the Action on Protected Species.

As previously stated, the Corps believes that the loggerhead turtle and leatherback turtle, have the potential to be indirectly effected by the proposed National Shoreline Erosion Control Development and Demonstration Program, 63rd Street "Hotspot", Miami Beach, Dade County, Florida project.

The Corps acknowledges that the SMART structure may temporarily increase turbidity levels within the construction area, however, given the turbidity level fluctuation of the nearshore area, the Corps does not believe that there would be any additional adverse impacts to sea turtles. Modeling with Storm induced Beach Change (SBEACH) and General Neural Simulation System (GENESIS) has predicted some littoral sediment transport changes to the project area that would seek equilibrium before returning to historic conditions. The SMART structure may also provide an increase of forage habitat for sea turtles.

8. Effect Determination

The Corps has determined that the proposed construction of the SMART structure may affect, but would not adversely affect listed species within the action area and requests USFWS concur with this finding.

9. References

The Corps is incorporating by reference, the USFWS, October 24, 1995 Biological Opinion for the Region III of the Coast of Florida Erosion and Storm Effects Study, "Reasonable and Prudent Measures" and "Terms and Conditions" (as updated by the March 1, 2001 USFWS, Fish and Wildlife Coordination Act Report (CAR) for the Corps' "Alternative Test Beach Renourishment Study, Miami-Dade County"). The Corps would also like to incorporate by reference the Miami Harbor Biological Assessment dated July 21, 2002 and the USFWS June 17, 2003 Biological Opinion (#4-1-03-I-786).

10. Literature Cited

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

REPLY TO
ATTENTION OF

APR 20 2004

Planning Division
Environmental Branch

Mr. Frederick C. Sutter III
Deputy Regional Administrator
Habitat Conservation Division
National Marine Fisheries Service
9721 Executive Center Drive North
St. Petersburg, Florida 33702

Dear Mr. Sutter:

Thank you for the Essential Fish Habitat Conservation Recommendations in your May 27, 2003 letter (enclosed) for the Section 227 National Shoreline Erosion Control, Development and Demonstration Program, 63rd Street "Hotspot" project, Miami-Dade County, Florida. Section 227 of the Water Resources Development Act of 1996 directs the Secretary of the Army to conduct a program that implements innovative technologies in an environmentally friendly manner to abate shoreline erosion as cost-effectively as possible.

A detailed reply to the 6 EFH recommendations is enclosed. We intend to comply with the EFH recommendations that are within the Section 227 authority objectives (2,4,5,6). The remaining recommendations are not within our authority or are economically infeasible to implement. This letter constitutes our response to your conservation recommendations of May 27, 2003. Please inform this office if NMFS-HCD plans to elevate to the Department of Army Headquarters in accordance with 50 CFR 600.920(j)(2).

If you have any questions, please contact Paul Stevenson at 904 232-3747.

Sincerely,

James C. Duck
Chief, Planning Division

Enclosures

PROPOSED SUBMERGED ARTIFICIAL REEF TRAINING (SMART) STRUCTURE SECTION 227 NATONAL SHORELINE EROSION CONTROL DEVELOPMENT AND DEMONSTRATION PROGRAM FOR THE 63RD STREET "HOTSPOT", MIAMI BEACH MIAMI-DADE COUNTY, FLORIDA

Recommendation #1 - *Expected benefits to living marine resources should be demonstrated through the following: A) identification of the specific fishery resources, including life history stages, that would be enhanced by the proposed work, B) demonstration of a clear link between the structural design and the fishery resources the artificial reef will support.*

Response - The Jacksonville District, U.S. Army Corps of Engineers (Corps) would have to reject this conservation recommendation as the proposed Submerged Artificial Reef Training (SMART) structure is designed to be a submerged breakwater to abate wave energy, not an artificial reef. Subsequently, recommendation #1 is not within the authority of the Section 227 program and the Corps cannot fulfill this recommendation.

Recommendation #2 - *The Jacksonville District should demonstrate full consistency with the National Artificial Reef Plan (1985) and the draft plan revision (2001), including, but not limited to, the following provisions: A) Demonstrated consistency with the State of Florida's Artificial Reef Plan. Through this, the Jacksonville District should; 1) have a specific objective for fisheries management or other purpose stated in the goal of the statewide, or site-specific plan; 2) have biological justification relating to present and future fishery management needs; 3) have minimal negative effects on existing fisheries, and/or conflicts with other uses; 4) have minimal negative effects on other natural resources and their future use; 5) use materials that have long-term compatibility with the aquatic environment and; 6) conduct monitoring during and after construction to determine whether reefs meet permit terms and conditions and are functioning as anticipated.*

Response - The Corps has read the above referenced artificial reefs plans and consulted with federal and state points of contacts concerning artificial reef guidelines. The SMART structure would comply with the intent of the artificial reef plans. The SMART structure would be approximately 2,272-foot long by 6-foot wide, located 400-foot from the mean shoreline

(see Figure 1). The SMART structure would be perpendicular to the shoreline and form a crescent-shaped submerged breakwater, covering approximately 2.1 acres of sandy benthic habitat. The SMART structure would be made of concrete and secured with appropriate marine specific connections as per the American Society of Testing Materials (ASTM). It is designed to withstand wave forces of the site-specific environment to help control shoreline erosion (see Figure 2). The SMART structure would have minimal negative effects to fisheries, natural resources and their future use. Monitoring is proposed to inspect physical and biological aspects of the proposed project.
Recommendation #3 - *The Jacksonville District should ensure that the proposed artificial reef will not threatened the integrity of natural habitats in the area, including live/hard bottoms. Corals, sea grasses, and macro algae. NOAA Fisheries recommends a minimum of a 30-foot buffer between the proposed structure and natural habitats that occur within the project area.*

Response - The SMART structure is a submerged breakwater and will be located well shoreward of hard bottoms and corals (see Figure 3). No teargases are within the project area.

Recommendation #4 - *According to the information provided, it is expected SMART will provide coral growth substrate. Please identify the seed source or discuss coral relocation that is proposed for this reef.*

Response - The SMART structure would provide a substrate for coral seed sources to attach and adhere to if transported through the water column. There are no plans at this time to relocate coral to the SMART structure. However, it is expected that the SMART will provide a substrate for significant coral growth and, with time, a healthy and diversified reef environment would develop.

Recommendation #5 - *The Jacksonville District should demonstrate the capability of assuming long-term financial liability for the deployment, monitoring and maintenance of the project.*

Response - Under the Section 227 Program the Corps would cost share the proposed SMART project with the local sponsor, Miami-Dade County Department of Environmental Resources Management (DERM). After the SMART structure has been constructed DERM would be responsible for the monitoring and maintenance.

Recommendation #6 - *Please provide geotechnical information that documents the sand depth below the reef and supports the determination that the SMART will not subside.*

Response - Geotechnical information available from the Sunny Isles submerged breakwater project found sand, carbonate, fine to coarse, sand size shell and limestone fragments, trace shell (gravel size fragments) and trace silt deposits to depths of 6-foot. Average silt content of Sunny Isles core borings is 6.1 percent. Visual shell content ranged from 1 to 76 percent. The composite mean grain size of the sediment is approximately 0.44 mm. Tested samples showed 96 percent carbonate material. Rock fragments are estimated to range between 1 inch and 3 feet could comprise up to 10 percent of the project area. Core borings taken in the location of the Sunny Isles submerged breakwater revealed generally six feet of medium dense, gray, fine to medium grained shelly sand, overlying a hard gravelly clayey sand. It was summarized that the above conditions should provide a stable foundation for the proposed breakwater. These conditions are thought to be similar to the 63rd Street "Hotspot" project area. The SMART structure engineering consultant, URS Corporation, feels confident that the proposed submerged breakwater will not subside more than 3 inches.

FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION

KENNETH D. HADDAD, Executive Director
VICTOR J. HELLER, Assistant Executive Director

BRIAN S. BARNETT, INTERIM DIRECTO
OFFICE OF ENVIRONMENTAL SERVICE
(850)488-6661 TDD (850)488-954
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May 14, 2004

Ms. Lauren Milligan
Environmental Consultant
Florida State Clearinghouse
Department of Environmental Protection
3900 Commonwealth Blvd., MS 47
Tallahassee, FL 32399-3000

Re: SAI #FL200404135896C, Department of the Army, Jacksonville District Corps of Engineers, Scoping Notice – Removal and Replacement of Five Erosion Control Groins – Bal Harbour, Miami-Dade County, Florida

Dear Ms. Milligan:

Staff in the Florida Fish and Wildlife Conservation Commission (FWC) has reviewed the proposed project to remove five existing groins from Bal Harbour Beach and to replace them with short t-head groins (Groins #1 and 2) or with groins without t-heads (Groins 3, 4 and 5), and offers the following comments.

The beaches in this area are utilized for nesting by loggerhead, green, leatherback, and rarely hawksbill turtles. The use of t-head groins on an active sea turtle nesting beach might not be consistent with Florida laws concerning protection of sea turtles, their nests, hatchlings, and nesting habitat. Placement of a submerged or exposed t-head structure parallel to the shoreline between open water and the beach could interfere with adult female turtles attempting to nest. In Palm Beach County, t-head groins have interfered with sea turtle hatchlings attempting to leave the beach. The overall effect of the t-head structure could alter the amount of dry sandy beach available for sea turtle nesting landward of the structure. In the past, t-head groins have only been authorized by the state in those areas with little to no sea turtle nesting habitat remaining, such as armored shorelines.

The following potential impacts of t-head groins on sea turtles and their nesting habitat must be understood prior to placement of such structures on an active sea turtle nesting beach.

1. How will the t-head structure alter the proportion of dry sandy beach relative to sandy intertidal or subtidal beach landward of the structure?
2. How will the average depth of intertidal and subtidal habitat change after construction of the t-head groins?
3. How will the t-head structures alter typical on-shore sand transport processes?

Thank you for the opportunity to comment on this project. If you have any questions regarding these comments, please contact me, or Dr. Robbin Trindell at (850) 922-4330.

Sincerely,

Brian Barnett

Brian S. Barnett, Interim Director
Office of Environmental Services

bsb/mt
ENV 7-3
A:\sai 5896c.doc
cc: Ms. Trish Adams, FWS-Vero
Mr. Stephen Blair, DERM
Mr. Jim Hoover, MTP
Mr. Paul Stevenson, ACOE-Jax
Ms. Terri Jordan, ACOE-Jax
Mr. Marty Seeling, DEP

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 0 7 2004

Mr. David Bernhart
National Marine Fisheries Service
Southeast Regional Office
Protected Species Resources Division
9721 Executive Center Drive North
St. Petersburg, Florida 33702

Dear Mr. Bernhart:

Enclosed is a Biological Assessment (BA) prepared by the U.S. Army Corps of Engineers (Corps), Jacksonville District, under Section 7 of the Endangered Species Act of 1973 as amended. The proposed project is the Section 227, National Shoreline Erosion Control Development and Demonstration Program, 63rd Street "Hotspot", SubMerged Artificial Reef Training (SMART) Structure, Miami Beach, Dade County, Florida.

The Corps has identified six species of sea turtles [loggerhead sea turtle, *(Caretta caretta)*, green turtles *(Chelonia mydas)*, leatherback turtles *(Dermochelys coriacea)*, hawksbill turtles *(Eretmochelys imbricate)*, Kemp's ridley *(Lepidochelys kempii) and Kemp's olive (Lepidochelys olivacea)]* that may occur within the project area.

Enclosed please find the Corps' BA of the effects of the proposed project on listed species under the National Marine Fisheries Service's (NMFS) jurisdiction in the vicinity of the project area. A copy of the draft Environmental Assessment (EA) will be issued as soon as we receive the draft U.S. Fish and Wildlife Coordination Act Report. We request initiation of informal consultation under Section 7 of the Endangered Species Act of 1973 as amended, concerning the effects of the proposed activities listed species under NMFS' jurisdiction.

After reviewing the status of the species in the action area and the draft EA, we find that the proposed SMART structure may affect, but is not likely to adversely affect, listed species and would not adversely modify critical habitat in the action area. We are incorporating the Corps' Miami Harbor Biological Assessment, February 2003, and the NMFS' Biological Opinion (#F/SER/2002/01094) by reference, for sea turtles. We request your concurrence with our finding.

If you have any questions, please contact Mr. Paul Stevenson at 904-232-3747 or by email at paul.c.stevenson@saj02.usace.army.mil.

Sincerely,

James C. Duck
Chief, Planning Division

Enclosure

BIOLOGICAL ASSESSMENT
63rd STREET "HOTSPOT" MIAMI BEACH
DADE COUNTY, FLORIDA

1. Location. The site of the proposed action is between State of Florida monuments R-44 to R-46A, in the vicinity of 63rd Street, Miami Beach, Miami-Dade County, Florida (Figure 1).

2. Identification of Listed Species and Critical Habitat in the Vicinity of the Proposed Action. The Corps has identified the sea turtles [loggerhead sea turtle, *(Caretta caretta)*, green turtles (*Chelonia mydas)*, leatherback turtles (*Dermochelys coriacea)*, hawksbill turtles (*Eretmochelys imbricate)*, Kemp's ridleys (*Lepidochelys kempii)* and olive Ridley (*Lepidochelys oliveaca*)] as potentially occurring within the project area of Miami Beach between State monuments R-44 and R-46A. No designated critical habitat is located in the project area.

3. Description of the Proposed Action. The objective of the National Shoreline Erosion Control Development and Demonstration Program, 63rd Street "Hotspot", Miami Beach, Dade County, Florida, proposed project, is to abate shoreline erosion by attenuating wave energy in the most cost-effective and environmentally friendly manner possible. The program strives to utilize research to develop innovative methods to meet objectives. Under the Water Resources Development Act (WRDA) of 1996, Section 227, the project can be altered or removed if it does not meet the stated objectives within Appendix F - Physical and Biological Monitoring Program of the Environmental Assessment.

The Corps, in partnership with the Miami-Dade County Department of Environmental Resources Management (DERM), proposes to construct the SubMerged Artificial Reef Training (SMART) structure 400-foot from the mean shoreline in 7-foot of water. The SMART structure would be comprised of 6-foot tall hollow goliath reef balls, 3-foot tall reef balls and 3-foot tall solid bay balls, attached to an articulated concrete mat (Figure 2). Four goliath reef balls and one bay ball would comprise one 'segment' 42.8-foot long by 6-foot wide (Figure 3). 'Sea turtle lanes', proposed to address USFWS sea turtle access concerns, would be constructed for each 10th segment utilizing 3-foot tall reef balls (Figure 3). The segments would be placed on the

Atlantic Ocean floor by crane from a barge, perpendicular to the shoreline. The 30-ton segments would be placed next to each other for a total SMART structure length of 2,272-foot. The ends would be tapered to form an overall crescent shaped submerged breakwater (Figure 4). The SMART installation would be diver assisted for quality assurance. The SMART structure footprint would be approximately 2.1 acres.

4. Assessment of Potential Impacts on Listed Species. Based on the precautions listed in paragraph (5) below, the Corps has determined that the proposed action may affect, but is not likely to adversely affect listed species or critical habitat.

5. Protected Species Surveys within the project area.
Surveys specifically targeting protected species were not conducted in the action area. Literature reviews and previous consultations with NMFS and other resource agencies serve as the basis for this biological assessment and the determination of which listed and protected species under NMFS' jurisdiction are found in the project area.

6. Species Included in this Assessment
Of the listed species under NMFS jurisdiction occurring in the action area, the Corps believes that the green turtle (*Chelonia mydas*) and loggerhead turtle (*Caretta caretta*), may be affected by the SMART structure. Additionally the hawksbill, green, kemps ridley and olive ridley may also be found in the vicinity of the project. Hardbottom resources outside of the proposed project area are not likely to be adversely affected (see Figure 5).

The endangered Florida manatee (*Trichecus manatus*) also occurs within the action area and the Corps has undertaken consultation with the U.S. Fish and Wildlife Service concerning the effects of the proposed action on that species in January 2004. Their concurrence is anticipated and will be included in the Draft Fish and Wildlife Coordination Act Report included in the EA package.

Sea Turtles
Dade County is within the normal nesting range of three species of sea turtles: the loggerhead (*Caretta caretta*), green turtle (*Chelonia mydas*) and leatherback turtle (*Dermochelys mydas*). The green sea turtle is listed under the U. S. Endangered Species Act, 1973 and Chapter 370,

F.S. The loggerhead turtle is listed as a threatened species. The majority of sea turtle nesting activity occurred during the summer months of June, July and August, with nesting activity occurring as early as March and as late as September.

The waters offshore of Dade County are also habitat used for foraging and shelter for the three species listed above and the hawksbill turtle (*Eretmochelys imbricata*), and possibly the Kemp's Ridley turtle (*Lepidochelys kempii*) (USACE, 2000) and olive Ridley (*Lepidochelys oliveaca*). Daily sea turtle nesting surveys are conducted by Dade County Parks and Recreation Department with a historically very successful relocation and hatch rate (pers. Comm., B. Flynn, Dade Co. DERM). These turtles do occur in the Atlantic Ocean and nest on Dade County beaches, possibly within the proposed project area. Observers would be posted during construction operations to look for sea turtles (and manatees) that may wander into the project area.

Hardbottom Resources

Hardbottom resources can be found offshore of the proposed SMART structure but not within the project area (Figure 4).

Other Threatened or Endangered Species

Other threatened or endangered species that may be found in the in the coastal waters off of Miami-Dade County during certain times of the year are the finback whale (*Balaenoptera physalus*), humpback whale (*Megaptera novaeangliae*), right whale (*Eubalaena glacialis*), sei whale, (*Balaenoptera borealis*) and the sperm whale (*Physeter macrocephalus catodon*). These are infrequent visitors to the area and are not likely to be impacted by project activities. Bottlenose Dolphins are protected under the Marine Mammal Protection Act of 1972, as amended, and may be found within the project activity area.

7. Effects of the Action on Protected Species.

As previously stated, the Corps believes that the loggerhead turtle and green turtle, have the potential to be indirectly effected by the proposed National Shoreline Erosion Control Development and Demonstration Program, 63rd Street "Hotspot", Miami Beach, Dade County, Florida SMART project.

The Corps acknowledges that the SMART structure may temporarily increase turbidity levels within the construction area, however, given the turbidity level fluctuation of the nearshore area, the Corps does not believe that there would be any additional adverse impacts to sea turtles. Modeling with Storm induced Beach Change (SBEACH) and General Neural Simulation System (GENESIS) has predicted some littoral sediment transport changes to the project area that would seek equilibrium before returning to historic conditions. The SMART structure may also provide an increase of forage habitat for adult and juvenile sea turtles. .

8. Effect Determination

The Corps has determined that the proposed construction of the SMART structure may affect, but is not likely to adversely affect listed species within the action area and requests NMFS concur with this finding.

9. Literature Cited

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APPENDIX D – FISH & WILDLIFE COORDINATION ACT REPORT

United States Department of the Interior

FISH AND WILDLIFE SERVICE
South Florida Ecological Services Office
1339 20th Street
Vero Beach, Florida 32960

July 7, 2004

Colonel Robert M. Carpenter
District Engineer
U.S. Army Corps of Engineers
701 San Marco Boulevard, Room 372
Jacksonville, Florida 32207-8175

Service Log No.: 4-1-03-I-2890
Project : Section 227 SMART Structure
Sponsor: Miami-Dade County Department of Environmental Resources Management
County: Miami-Dade

Dear Colonel Carpenter:

In accordance with the Fiscal Year 2003 Transfer Fund Agreement between the Fish and Wildlife Service (Service) and the U.S. Army Corps of Engineers, enclosed is the draft Fish and Wildlife Coordination Act (FWCA) Report regarding the Section 227 National Shoreline Erosion Control Development and Demonstration Program, Submerged Artificial Reef Training Structure for the 63rd Street Hot Spot located in Miami Beach, Miami-Dade County, Florida. This draft report, provided in accordance with the FWCA of 1958, as amended (48 Stat.401; 16 U.S.C. 661 *et seq.*) and under the provisions of section 7 of the Endangered Species Act of 1973, as amended (87 Stat. 884; 16 U.S.C. 1531 *et seq.*), has been prepared to provide an evaluation of the environmental effects of the proposed experimental submerged breakwater structure.

By copy of this letter, the Service is soliciting comments within 30 days from the Florida Fish and Wildlife Conservation Commission and the National Marine Fisheries Service. Comments by both agencies will be considered by the Service in preparing the final FWCA report, and copies of the comments will be included as appendices to the final report, which will then constitute the Secretary of the Interior's views and recommendations for this project, in accordance with section 2(b) of the FWCA.

Thank you for your cooperation and effort in protecting fish and wildlife resources. Should you have any questions regarding the findings and recommendations contained in this report, please contact Trish Adams at 772-562-3909, extension 232.

Sincerely yours,

James J. Slack
Field Supervisor
South Florida Ecological Services Office

Enclosure

cc: w/enclosure
FWC, Bureau of Protected Species Management, Tallahassee, Florida (Robbin Trindell)
FWC, Vero Beach, Florida
FWC, West Palm Beach, Florida (Ricardo Zambrano)
NOAA, Habitat Conservation Division, Miami, Florida
NOAA, Protected Species Division, St. Petersburg, Florida (Eric Hark)

DRAFT

FISH AND WILDLIFE COORDINATION ACT REPORT

SECTION 227 NATIONAL SHORELINE EROSION CONTROL DEVELOPMENT AND DEMONSTRATION PROGRAM, SUBMERGED ARTIFICIAL REEF TRAINING STRUCTURE FOR THE 63RD STREET "HOT SPOT," MIAMI BEACH, MIAMI-DADE COUNTY, FLORIDA

Prepared for:
U.S. Army Corps of Engineers
Jacksonville District
701 San Marco Boulevard
Jacksonville, Florida 32207-8175

By the:
Fish and Wildlife Service
South Florida Ecological Services Office
1339 20th Street
Vero Beach, Florida 32960

July 7, 2004

EXECUTIVE SUMMARY

The U.S. Army Corps of Engineers (Corps), with Miami-Dade County Department of Environmental Resource Management (Miami-Dade DERM) as the local sponsor, proposes to construct an experimental 2,272-foot long submerged breakwater reef structure offshore of an erosional "hot spot" in the vicinity of 63rd Street, Miami Beach, Miami-Dade County, Florida (Figure 1). This Fish and Wildlife Coordination Act (FWCA) report evaluates the likely effects of the proposed breakwater structure on fish and wildlife resources and is submitted in accordance with the FWCA of 1958, as amended (48 Stat. 401; 16 U.S.C. 661 *et seq.*) and the Endangered Species Act (ESA) of 1973, as amended (87 Stat. 884; 16 U.S.C. 1531 *et seq.*).

The purpose of the Submerged Artificial Reef Training (SMART) structure is to attenuate wave energy and minimize the potential of accelerated beach erosion within the hot spot, thereby, extending the renourishment interval of the associated federally authorized Miami-Dade County Beach Erosion Control and Hurricane Protection (BEC&HP) beach renourishment project. Implementation of the BEC&HP project over the last 26 years has nearly depleted offshore sources of beach compatible sand along the Miami-Dade County shoreline. As a result, the Corps has begun to investigate alternative solutions, such as the proposed project, to address localized beach erosion and conserve beach-quality material.

The 63rd Street Hot Spot, Miami Beach is one of seven initial demonstration sites selected from around the nation for inclusion in the Corps' National Shoreline Erosion Control Development and Demonstration Program, which was authorized under Section 227 of the Water Resources Development Act (WRDA) of 1996. The goal of the Section 227 Program is to evaluate the function and structural performance of innovative or non-traditional methods of abating coastal erosion. The Corps states that the program is intended to advance the state-of-the-art shoreline erosion control technology, encourage the development of innovative solutions, and provide technical and public information designed to further the use of well-engineered alternative approaches.

The proposed project will permanently convert 2.1 acres of sandy ocean bottom habitat to artificial high-relief hardbottom reef habitat. Since the project is designed to disrupt the natural littoral movement of sand along the beach, the shoreline adjacent and downdrift may be adversely impacted. However, the Corps does not anticipate a net loss of shoreline as a result of the proposed project. Though adjacent natural hardbottom communities may experience periods of elevated turbidity and sedimentation during deployment of the structure, the Corps anticipates that impacts to reef organisms will be temporary, largely due to the distance of the nearest hardbottom (600 feet). Should the structure fail, nearby beaches and hardbottom habitat may be impacted. A concern of the Fish and Wildlife Service (Service) is that a plan for long-term monitoring and maintenance of the structure, which is expected to have a 50 year project life, has not been identified. The Service believes that the proposed 3 years of post-project monitoring is not sufficient to evaluate the affects of the structure. This report constitutes the draft report of the Secretary of the Interior as required by Section 2(b) of the FWCA.

TABLE OF CONTENTS

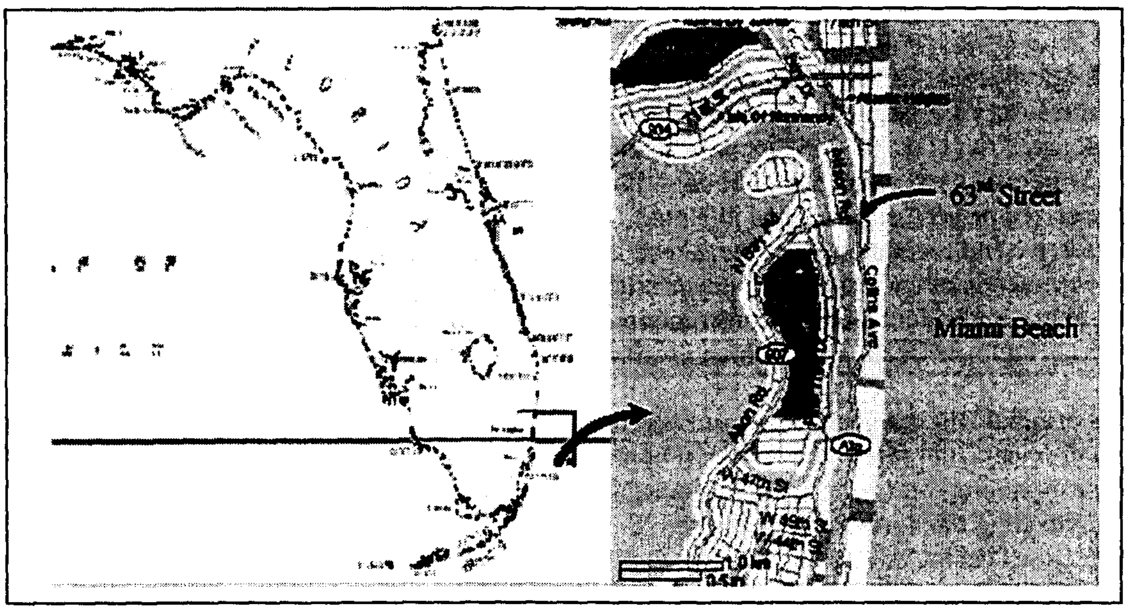
LIST OF ACRONYMS

ABM - Articulated Concrete Block Mat
BEC&HP - (Miami-Dade County) Beach Erosion Control and Hurricane Protection
Corps - U.S. Army Corps of Engineers
DEP - Florida Department of Environmental Protection
DERM - Miami-Dade County Department of Environmental Resources Management
EFH - Essential Fish Habitat
ESA - Endangered Species Act
FMP - Fishery Management Plan
FWCA - Fish and Wildlife Coordination Act
FWC - Florida Fish and Wildlife Conservation Commission
GENESIS - Generalized Model for Stimulating Shoreline Change
MMPA - Marine Mammal Protection Act
NOAA - National Marine Fisheries Service
SAFMC - South Atlantic Fishery Management Council
SMART - Submerged Artificial Reef Training structure
Service - Fish and Wildlife Service
WRDA - Water Resources Development Act

1.0 IDENTIFICATION OF PURPOSE, SCOPE, AND AUTHORITY

The U.S. Army Corps of Engineers (Corps), with Miami-Dade County Department of Environmental Resource Management (Miami-Dade County DERM) as the local sponsor, proposes to construct an experimental submerged breakwater reef structure offshore of a nodal point of erosion or "hot spot" in the vicinity of 63rd Street, Miami Beach, Miami-Dade County, Florida (Figure 1). The purpose of the Submerged Artificial Reef Training (SMART) structure is to absorb wave energy and minimize the potential of accelerated beach erosion within the hot spot, thereby, extending the renourishment interval of the associated federally authorized Miami-Dade County Beach Erosion Control and Hurricane Protection (BEC&HP) beach renourishment project. Implementation of the BEC&HP project over the last 26 years has nearly depleted offshore sources of beach compatible sand along the Miami-Dade County shoreline. As a result, the Corps has begun to investigate alternative solutions, such as the proposed project, to address beach erosion and conserve beach-quality material.

Figure 1. Project location (ARS Marine Consulting and Research 2003)



The 63rd Street Hot Spot, Miami Beach is one of seven initial demonstration sites selected from around the nation for inclusion in the Corps' National Shoreline Erosion Control Development and Demonstration Program, which was authorized under Section 227 of the Water Resources Development Act (WRDA) of 1996. The goal of the Section 227 Program is to evaluate the function and structural performance of innovative or non-traditional methods of abating coastal erosion. The Corps states that the program is intended to advance the state-of-the-art shoreline erosion control technology, encourage the development of innovative solutions, and provide technical and public information designed to further the use of well-engineered alternative approaches.

This Fish and Wildlife Coordination Act (FWCA) Report evaluates the likely effects of the proposed erosion control demonstration project on fish and wildlife resources and is submitted in accordance with provisions of the FWCA of 1958, as amended (48 Stat. 401; 16 U.S.C. 661 *et seq.*) and the Endangered Species Act (ESA) of 1973, as amended (87 Stat. 884; 16 U.S.C. 1531 *et seq.*).

2.0 PROJECT HISTORY AND SERVICE INVLOVEMENT

The creation and subsequent stabilization of the Bakers Haulover Inlet in northern Miami-Dade County disrupted the natural littoral movement of sediment to the south. As a result, erosion occurred along the beaches south of the inlet and was exacerbated by storm activity. During this period, heavy development of the barrier island by commercial and private interests occurred. In efforts to protect property, shoreline stabilization structures were constructed, but were ineffective, except to further exacerbate the effects erosion. To address the erosion along the barrier island and the loss of recreational beach between Bakers Haulover Inlet and Government Cut, the Corps initiated a study to evaluate the feasibility of a large-scale beach nourishment project.

The nourishment of the Atlantic shoreline of Miami-Dade County was authorized by the Flood Control Act of 1968, and referred to as the BEC&HP. In addition, Section 69 of the 1974 Water Resources Act (P.L. 93-251) included the initial construction by non-Federal interests of the 0.85-mile segment along Bal Harbour Village, immediately south of Bakers Haulover Inlet. The authorized project, as described in House Document 335/90/2, provided for the construction of a protective and recreational beach, as well as, a protective dune for 9.3 miles of shoreline between Government Cut and Bakers Haulover Inlet, which encompasses Miami Beach, Surfside, and Bal Harbour. It also included the construction of a protective beach along the 1.2 miles of shoreline within Haulover Beach Park, which is directly north of the Haulover Inlet.

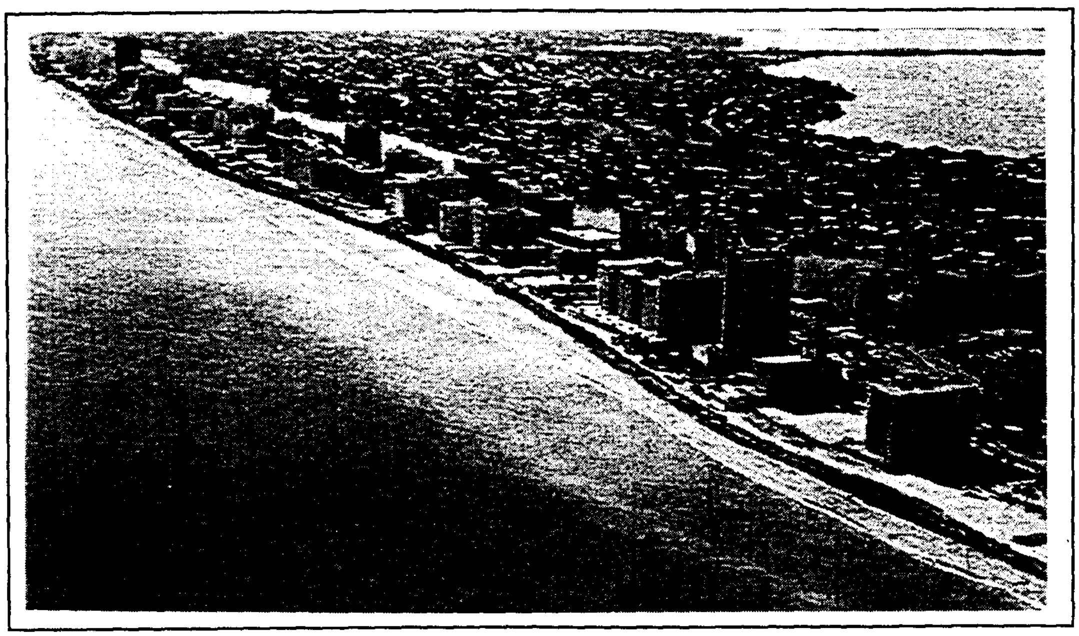
The original BEC&HP encompassed approximately 10.5 miles of shoreline extending from Government Cut north to the northern boundary of Haulover Beach Park. The Supplemental Appropriations Act of 1985, and the WRDA of 1986 (Public Law 99-662), provided authority for extending the northern limit of the 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 were initially nourished in 1978, renourished in 1980, 1987, 1994, and 1997 with beach compatible material obtained from offshore borrow sites, which are now nearly depleted. To address this issue, in 1997 the Corps investigated the use of oolitic aragonite obtained from the Bahamas as a potential source of renourishment material. In 1999, Congress rejected this proposal and the Corps began to investigate upland sand sources and other options.

As a result of storm activity in 2001, the beach at 63rd Street had experienced an accelerated rate of erosion in 2001. The Corps determined that the existing beach affected by the hot spot of erosion would not likely provide adequate hurricane and flood protection of public and private property until the next renourishment event. As an interim measure, the Corps renourished approximately 2,000 feet of shoreline at 63rd street in the spring of 2002. To address possible solutions to the long-term hot spot erosion potential in the vicinity of 63rd Street, the Corps submitted the site for inclusion in the Section 227 program.

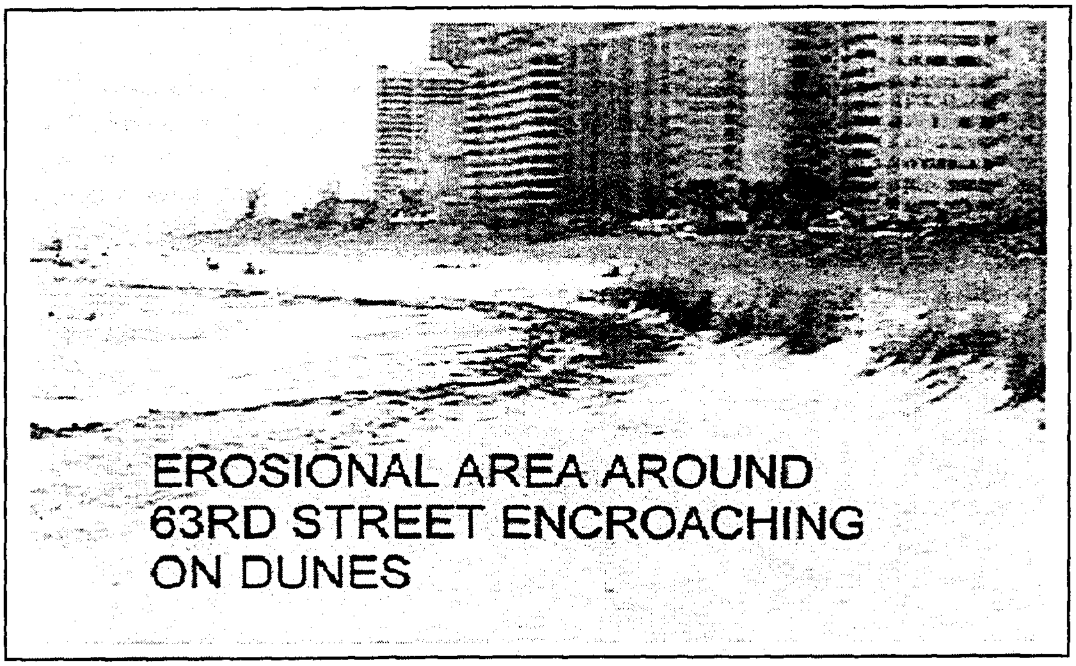
3.0 DESCRIPTION OF THE PROJECT AREA

The project is located on Florida's southeast coast within the Atlantic Ocean immediately offshore of the City of Miami Beach in the vicinity of 63rd Street, Miami-Dade County, Florida. The 9.3-mile barrier island segment between the Bakers Haulover Inlet and Government Cut ranges in width between 0.5 and 1.5 miles and has an average elevation of approximately 10 feet. The photo below taken in 1997 shows 63rd Street in the lower right corner and the adjacent beaches to the south or left portion of the photo (Coastal Systems International 1997) (ARS Marine Consulting and Research 2003). Miami Beach is heavily developed by private and commercial interests, and receives a tremendous volume of tourists each year, particularly during the winter months.



Offshore of Miami Beach, three shore-parallel reef tracts occur that support a highly diverse assemblage of vertebrate and invertebrate organisms. The continental shelf offshore of Miami-Dade County is much narrower than other areas along Florida's east coast with significant depths located within 2 miles of shore. These features provide opportunities for SCUBA diving and offshore fishing enthusiasts.

The Miami Beach shoreline between Florida Department of Environmental Protection (DEP) monuments R-44 to R-46.5 (63rd Street vicinity) has been determined by the Corps to be an "erosional hotspot" within the federally authorized BEC&HP project. Since its authorization, the project area has been the subject of multiple renourishment events with material obtained from offshore borrow sites, which are located between the reef tracts. Despite these efforts, the shoreline in the vicinity of 63rd Street has experienced erosion rates of 14 to 25 feet per year since the early 1980s, as shown in the photo below provided by Miami-Dade County DERM.



4.0 DESCRIPTION OF THE RECOMMENDED PLAN AND ALTERNATIVES

The Corps indicated that a number of design and material alternatives were originally considered, but were excluded primarily because they would not adequately attenuate wave energy or abate shoreline erosion within the hot spot. Two alternatives were analyzed in the Corps' Environmental Assessment, the "no action" alternative and the recommended plan as described below.

4.1 "No Action" Alternative

Under the Corps' "no action" alternative, the submerged breakwater would not be constructed. The Corps states that offshore or upland sand sources would be utilized for renourishment and accelerated erosion within the hot spot would continue, which would result in a more frequent renourishment interval and the National Economic Development objective may not be met.

4.2 Recommended Plan

The Corps proposes to construct a contiguous crescent-shaped submerged breakwater structure approximately 2,272 feet long and 42.8 feet wide oriented parallel to the shoreline in the vicinity of 63rd Street, Miami Beach, between DEP monuments R-46A and R-44. The SMART structure would be placed approximately 400 feet offshore of the mean shoreline within 7 feet of water. At mean low water, the structure is expected to remain submerged by minus 1-foot (Appendix A). The total footprint of the structure would cover 2.1 acres of sandy subtidal habitat. The proposed structure will be comprised of approximately 1,400 and 300 pre-fabricated concrete Goliath and Bay reef balls, respectively, which will be anchored to an articulated concrete block mat (ABM). The structure would be constructed and deployed from a barge in 6 foot by 6 foot segments, which include four Goliath reef ball and one Bay reef ball anchored to the ABM. Each segment will weigh approximately 30 tons. The Goliath reef ball unit is a hollow, porous dome-shaped structure that measures 5.9 feet in height by 5.9 feet in width and weighs 9,800 pounds. The smaller Bay reef ball is solid and measures 3 feet in height by 3 feet in width by 6 feet in length. Figures related to the reef ball and ABM dimensions are found in Appendix A. To achieve the crescent shape, the plans indicate that approximately 32 Goliath reef balls will be placed at the northern and southern terminus directly upon the seafloor at a 30 degree angle from the main structure (Appendix A, URS 2003). The structure will be placed approximately 600 feet west of the nearest natural hardbottom reef.

In total, the Corps anticipates that the structure would require 6 months of offsite segment fabrication and 8 weeks for deployment. The construction time-frame, location of the barge loading site, and the tug and barge travel route have yet to be determined.

In total, the Corps anticipates that 2.1 acres of unconsolidated benthic subtidal habitat would be directly impacted and converted to consolidated hardbottom reef habitat as a result of structure deployment. The species most likely to be directly affected by this activity include non-motile benthic organisms. During deployment of the reef segments, periods of elevated levels of turbidity may occur which may temporarily impact natural reefs in the vicinity of the project. Since the Corps has determined that direct impacts to native hardbottom reef habitat will be avoided, mitigation has not been proposed. However, if post-project biological monitoring indicates that unanticipated hardbottom reef impacts did occur, the Corps intends to mitigate for those impacts.

4.3 Proposed Protection Measures

To minimize the potential adverse impacts of the action on fish and wildlife resources, including hardbottom reef communities and listed species, the Corps has indicated that the following measures will be included in the contract specification:

1. Contractors and their personnel would be educated regarding potential presence of listed species in the project area, their protection status, and project implications.

2. The *Standard Manatee Construction Conditions* will be implemented upon all construction vessels, including support and crew transport vessels.
3. During sea turtle nesting season (March 1 through November 30) all work will cease if an adult or hatchling sea turtle occurs within 100 yards of the construction equipment or crew transport vessels.
4. If construction occurs at night within the sea turtle nesting season, appropriate light-shielding measures will be implemented upon work vessels to avoid sea turtle disorientation on the beach.
5. Turbidity monitoring will be implemented during construction to ensure DEP water quality standards are not exceeded, if so construction activities will be suspended until background levels are achieved.
6. Vessel transport corridors will be established within deep water to avoid potential impacts to hardbottom reef communities between the Haulover Inlet or Government Cut and the project site.
7. During deployment of the SMART structure segments, scuba divers will "micro-site" the installation of the segments to avoid potential impacts to hardbottom resources.
8. Storage of equipment, materials, or other construction activities related to the proposed project will not occur on the adjacent beach.
9. A biological and physical monitoring program will be implemented to assess the effects of the SMART structure on adjacent habitats and assess the performance of the structure.

5.0 FISH AND WILDLIFE RESOURCES

5.1 Biotic Communities

The primary habitats that occur in the project vicinity that may be affected by the proposed project include: the dry beach above mean-high-water (supralittoral zone); the beach between mean-high-water and mean-low-water (intertidal zone); the shallow sandy ocean bottom (subtidal zone); and hardbottom reefs. It is anticipated that direct impacts will be limited to the non-motile benthic organisms within the sandy subtidal habitat as a result of the installation of the proposed project. Indirect impacts may occur to natural hardbottom reef habitat and to beaches adjacent to the project site. However, the Corps believes that the results of the proposed biological and physical monitoring plans will demonstrate that the direct and indirect impacts are temporary in nature, or will not result in a net loss of the beach.

5.1.1 Supralittoral Zone

The supralittoral zone supports an abundant benthic infaunal assemblage of burrowing invertebrates that are well adapted to the relatively harsh conditions of the dry beach. The beaches of Miami-Dade County are typical of other Atlantic Coast beaches in Florida that are subject to the full force of ocean wave energy. Biological diversity is generally lower in this zone when compared to the intertidal and subtidal zones. It is populated with small, short-lived infauna with low species diversity but high species density and substantial reproductive potential and recruitment. Common species include talitrid and haustoriid amphipod species and decapod crustaceans. These beaches usually have low species diversity, but populations of individual species are often very large. Species such as ghost crabs (*Ocypode quadrata*) are highly specialized to survive in this environment.

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. Stabilized inlets and erosion control structures such as groins and jetties disrupt the southern littoral movements of sediments along the shoreline. As a result, beaches on the up-drift or north side of these inlets tend to accumulate sand, while those on the down-drift or southern side is deprived of this sand (Corps 1996).

Florida beaches vary in material composition and compaction depending on the physical characteristics of the beach material. In northern Florida, the beaches are primarily silica-based (quartz sand), with a lower percentage of carbonate material, and are a finer grain size than southern beaches. From Cape Canaveral south, the profile grades into a greater percentage of carbonates, which are primarily composed of shell and shell fragments. The shell and shell fragments are generally a mixture of clam species dominated by the coquina clam, *Donax* spp. This shell and shell hash sediment produces a less compacted, coarser grained beach. This gradation profile continues south into Miami- Dade County, where the beach profile is primarily carbonate and composed almost entirely of calcareous algae fragments, coral fragments, and sponge spicules. The Miami-Dade County beach profile can routinely produce turbid conditions from the reworking and resuspension of the calcareous algae and coral fragments from seasonal storm events and is generally a more compact beach. A more recent survey of the beach profiles of Miami-Dade County (Service 2002a) noted a beach composition change at Haulover Inlet, which is in north Miami-Dade County. Beach profiles north of the inlet were composed of a carbonate component that was primarily shell and shell hash, where as, beach profiles south of the inlet were composed primarily of calcareous algae fragments, coral fragments, and sponge spicules. Historical records suggest that the shell and shell hash beach profile extended further south to include central and southern portions of Miami-Dade County and that the existing profile is the result of renourishment actions (Service 2002a).

Florida's beaches function as nesting habitat for four species of federally listed sea turtles: the threatened loggerhead turtle (*Caretta caretta*), the endangered green turtle (*Chelonia mydas*), the endangered leatherback turtle (*Dermochelys coriacea*), and the endangered 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 disturbance that stems from extensive commercial and recreational development, as well as public use of the beaches. As a result, nesting densities and hatchling success are adversely affected. In 1987, Miami-Dade County initiated a sea turtle hatchery program that relocates nests to more isolated beaches to minimize some of these adverse affects.

The supralittoral zone also serves as important nesting habitat for state listed shorebird species. Ground-nesting shorebirds are particularly vulnerable to nest predation and disturbance associated with increased coastal development. As a result, the nests of both shorebirds and turtles may be inadvertently disturbed and/or destroyed by beachgoers or their pets. Historically, the available supralittoral habitat on Miami-Dade County beaches has undergone considerable variation, due to the natural and man-made alterations of the shoreline.

5.1.2 Intertidal Beach Zone

The intertidal beach zone is an important area for shorebird foraging and provides habitat for many invertebrates, including bivalves, decapod crustaceans, amphipods, and polycheates. Also, the intertidal zone must be traversed by nesting and hatchling sea turtles. Structures or persistent escarpments that restrict this movement have decreased the amount of shoreline available for nesting activities.

The species diversity in the zone between mean-high water and mean-low water is greater than the supralittoral zone. Typical macrofauna found within this zone include haustoriid amphipods, polychaetes, isopods, mollusks and some larger crustaceans, such as mole crabs (*Emerita spp.*) and burrowing shrimp (*Callianassa spp.*). This zone is an important forage area for multiple shorebird species.

5.1.3 Subtidal Zone

The nearshore subtidal zone east of this section of Miami Beach is comprised of softbottom habitats of sand, shell, and silt substrate with little or no rock, limestone, or hard coral structure. The biota that comprises the subtidal zone include benthic invertebrate assemblages, epifaunal invertebrates, macrophyte assemblages that form reef communities if hard substrate is present, and fish and motile crustacean species that utilize this habitat. The organisms associated with the nearshore surf zone and deeper subtidal sand bottom habitats are generally dominated by polychaetes, amphipods, isopods, decapods, mollusks, echinoderms, and a variety of other taxa. Though many of the dominant infaunal species are found both in the surf and offshore subtidal zones, the diversity and abundance is greater in the subtidal zone. Other frequent occupants of these habitats include benthic fishes (e.g., flounders), bivalves, decapod crustaceans, and certain shrimp species.

5.1.4 Hardbottom Reefs

The waters offshore of Florida support several reef types: subtropical coral reefs, hardbottom reefs, 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, particularly in the Florida Keys. Farther north, through Miami-Dade and Broward Counties on the east coast and Collier County on the west coast, as water clarity and temperature declines, the frequency of occurrence of reef-building corals. Continuing north, hard corals are fewer, and octocorals (soft corals) dominate.

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 within the project area can be classified as "live bottom" or hardbottom reef communities with scattered hard coral. These reef areas are populated by sponges, small (ahermatypic) hard corals, tunicates, bryozoans, algae, and sabellariid worms. Nearshore hardbottom communities typically, are also more common in or near the high energy surf zone. The South Atlantic Fishery Management Council (SAFMC) has developed a Fishery Management Plan (FMP) for Coral, Coral Reef, and Live/Hardbottom Habitats of the South Atlantic Region. Furthermore, damaging, harming, and killing of live rock are 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 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. 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 are typical of the classical reef profile described for southeast Florida. For instance, the nearshore high energy, 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 hardbottom biological assemblages along Florida's east coast has been detailed by many authors (Goldberg 1970, 1973; Marszalek and Taylor 1977; Continental Shelf Associates 1984, 1985, 1987, 1993).

Although the reefs in the project area and the reefs 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.

Many fish and motile invertebrates are attracted to hardbottom habitat by its structure. The numerous crevices, holes, and epibiotic structures provide these organisms with a refuge from larger predatory fish. Structures can also provide barriers 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 that are nurtured by sessile plant material.

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. Soft and hard corals occupy niches as both producers and consumers. 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.

Important recreational 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 are of value to divers and commercial and recreational fishermen. Many species are collected for aquariums, such as angelfish (Pomacanthidae), butterflyfish (Chaetodontidae), wrasses (Labridae), damselfish (Pomacentridae), and doctorfish (Acanthuridae).

Nearshore and offshore low-relief hardbottom are characterized by limestone, rock, or worn coral substrates that contain crevasses, holes, and low-lying ledges that create microhabitat diversity, and thereby can support higher species diversity than unvegetated, softbottom habitats. Low-relief hardbottom habitats are important for organisms such as crustaceans, notably, crabs, spiny lobster (*Panulirus argus*), and penaeid shrimp (*Penaeus* spp.), also numerous fishes, including species of the snapper-grouper complex. Several species utilize hardbottom as refugia during juvenile life-history stages, whereas adults of various predatory species use these areas as foraging grounds. Hardbottom fauna may be divided into sessile and motile components. The sessile component contains the primary producers, such as macroalgae; 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. Similar to hard corals, tunicates and sponges concentrate carbon that is typically fixed far offsite. These attached filter-feeding organisms contribute to the organic base by trapping nutrient-rich plankton as it is swept past by wave and wind generated currents. Tunicates, sponges, and hydroids add structure to the bottom, providing shelter from predation for many crustaceans and smaller fishes.

The spiny lobster 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, portunid crab (*Portunus* 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.

5.2 ESSENTIAL FISH HABITAT

The community types listed above, except the supralittoral and intertidal zones, are considered Essential Fish Habitat (EFH) as described in the Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267). EFH provisions support the management goals of sustainable fisheries. EFH that may be directly and indirectly impacted by the proposed project are likely to include the water column, littoral zone, sublittoral zone, hardbottom, and seagrass habitats. Specific aspects of EFH that may be adversely affected include spawning, foraging, predator/prey relationship, and refuge habitats for such managed species such as the snapper/grouper complex, penaeid shrimp, and spiny lobster. The National Marine Fisheries Service (NOAA Fisheries) is the lead agency responsible for the complete assessment of the possible adverse impacts of the proposed project to EFH.

The SAFMC (1998b) has designated mangrove, seagrass, nearshore hardbottom, and offshore reef areas within the study area as EFH. The nearshore bottom and offshore reef habitats of southeastern Florida have also been designated as Habitat Areas of Particular Concern (SAFMC 1998b). Managed species that commonly inhabit the study area include pink shrimp (*Farfantepenaeus duorarum*), and spiny lobster. These shellfish utilize both the inshore and offshore habitats within the study area, including macroalgae beds (*e.g.*, *Laurencia* spp.). Members of the 73-species snapper-grouper complex that commonly use the inshore habitats for part of their life cycle include blue stripe grunts (*Haemulon sciurus*), French grunts (*Haemulon flavolineatum*), mahogany snapper (*Lutjanus mahogoni*), yellowtail snapper (*Ocyurus chysurus*), and red grouper (*Epinephelus morio*). These species utilize the inshore habitats as juveniles and sub-adults and as adults utilize the hardbottom and reef communities offshore. In the offshore habitats, the number of species within the snapper-grouper complex that may be encountered increases. Other species of the snapper-grouper complex commonly seen offshore in the study area include gray triggerfish (*Balistes capriscus*), and hogfish (*Lachnolaimus maximus*). Coastal migratory pelagic species also commonly utilize the offshore area adjacent to the study area. In particular, king mackerel (*Scomberomorus cavalla*) and Spanish mackerel (*Scomberomorus maculatus*) are the most common. As many as 60 corals can occur off the coast of Florida (SAFMC 1998a and b), all of which fall under the protection of the management plan.

As described in the Magnuson-Stevens Fishery Conservation and Management Act of 1976, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), the EFH provisions of the act support the objective of maintaining sustainable fisheries. Mitigation would be required for direct hardbottom reef habitats.

The focus of NOAA Fisheries' mitigation policy is to conserve and enhance EFH and to avoid, minimize, and thereafter compensate for impacts to EFH due to development activities. Like other Federal agencies with regulatory responsibilities, the first priority of the NOAA Fisheries is to advocate avoidance of impacts to natural resources when presented with any development plan. However, when unavoidable impacts to EFH are proposed, NOAA Fisheries may recommend mitigation measures to compensate for any loss of resource value. Recommendations may include restoration of riparian and shallow coastal areas (*i.e.*, reestablishment of vegetation, restoration of hardbottom characteristics, removal of unsuitable material, and replacement of suitable substrate), upland habitat restoration, water quality improvement or protection, watershed planning, and habitat creation. The preferred type of mitigation is enhancement of existing habitat, followed by restoration, and finally creation of new habitat.

5.3 THREATENED AND ENDANGERED SPECIES

5.3.1 Sea Turtles

Miami-Dade County is within the nesting range of the federally threatened loggerhead sea turtle, endangered green sea turtle, and endangered leatherback sea turtle. On the 37.8 miles of beach surveyed within the Miami-Dade County, a total of 489 nests were found in 2003 (Florida Marine Research Institute 2003a, b, and c). Though some green and leather back sea turtles nest along Miami-Dade County beaches, the loggerhead sea turtle is the dominant species. The majority of sea turtle nesting activity occurred during the summer months of June, July, and August, with some nesting activity that occurs as early as March and as late as September (Florida Fish and Wildlife Conservation Commission [FWC] 2003). However, as a result of anthropogenic disturbance, such as beach front lighting, approximately 95 percent of all sea turtle nests are relocated to a hatchery located on dark beaches in the northern portion of Miami-Dade County (FWC 2002).

The waters offshore of Miami-Dade County are also used for foraging and shelter for the three species listed above as well as the endangered hawksbill sea turtle and possibly the endangered Kemp's ridley sea turtle (*Lepidochelys kempii*).

5.3.2 West Indian Manatee

The West Indian manatee (*Trichechus manatus*) is known from coastal areas of Beaufort, North Carolina through Florida and the Gulf of Mexico. Manatees frequently inhabit shallow areas where seagrasses are present and are commonly found in protected lagoons and freshwater systems. In winter they frequently move into areas where cool water temperatures are mitigated by spring-fed streams or power generation plan effluent. In general, very few manatees are present in the offshore waters from November through April. However, during the remainder of the year, manatees occasionally use open ocean passages to travel between favored habitats (Hartman 1979).

The manatee has been listed as a protected mammal in Florida since 1893, and is also protected under the Marine Mammal Protection Act (MMPA) of 1972 and the ESA of 1973. Florida provided further protection in 1978 by passing the Florida Marine Sanctuary Act designating the state as a manatee sanctuary, and providing signage and speed zones in Florida's waterways. All of Biscayne Bay has been designated as Critical Habitat under the ESA. In addition, a *No Entry* zone within the Bill Sadowski Critical Wildlife Area has been established for manatee conservation purposes.

Within Miami-Dade County there exist both permanent and transient populations of manatees. Surveys show that during the winter months when temperatures drop, manatees from north Florida and also Miami-Dade County will migrate to the Florida Power and Light's power plants at Port Everglades and Fort Lauderdale (U.S. Geological Survey 2000). During the summer months when the water warms, manatees return to the counties to the north and south to forage and reproduce. Telemetry and aerial surveys confirm manatees are present within Miami-Dade County all year (Miami-Dade County 1999, and U.S. Geological Survey 2000). Historical records regarding manatees in South Florida are sparse.

Manatees are mentioned in documents that are dated as early as the mid 1800s and early 1900s (O'Shea 1988). Moore (1951) indicated that manatees commonly used the New River and the Miami River. He also noted a 1943 anecdotal observation of more than 100 manatees killed during the deepening of the Miami River Channel and a reference to 195 manatees aggregating at the Miami power plant discharge in 1956. In general, the rivers, creeks, and canals that open into Northern Biscayne Bay were locations noted for their manatee abundance. These remain important habitats, particularly on a seasonal basis.

In freshwater environments in Miami-Dade County, within the upper reaches of canals, manatees are feeding primarily on the exotic hydrilla (*Hydrilla verticillata*). During cooler weather, manatees feed on extensive meadows of seagrasses in many parts of Biscayne Bay. The causes for manatee deaths in Miami-Dade County are varied. The highest number of manatee deaths in Miami-Dade County result from water control structures. Freshwater is often available at floodgates, and is typically slightly warmer than the ambient water. An example of this situation is the floodgate on the Little River in Miami-Dade County. This site is known to attract manatees in winter during mild weather. This location has a 1-degree Celsius higher water temperature than surrounding areas and freshwater is available (Deutsch 2000). Also, freshwater vegetation is often washed down from upriver and made available when the gates are opened. The second most frequent cause of manatee deaths in Miami-Dade County is boat-related injuries.

5.3.3 Smalltooth Sawfish

During 2002, the smalltooth sawfish (*Pristis pectinata*) was federally listed as an endangered species. This species of sawfish inhabits softbottom estuarine habitats in depths generally less than 30 feet. Its former range in United States waters extended from Texas through Maryland. Currently, few are observed outside peninsular Florida. At least one recorded observation has occurred in Biscayne Bay (NOAA 2000). Populations likely decreased due to a low intrinsic rate of natural increase; the long interval to time of reproduction; and human impacts, most notably overfishing, incidental take in nets due in part to its body size and unusual morphology, and habitat loss related to the development of the shoreline and nearshore habitats (NOAA 2000).

5.3.4 Whales and Dolphins

The Northern right whale (*Eubalaena glacialis*) is a federally listed endangered species and is protected under the MMPA. The current migratory population within the Atlantic Region is less than 350 animals. Right whales are highly migratory and summer in the Canadian Maritime Provinces. They migrate southward in winter to the eastern coast of Florida. The breeding and calving grounds for the right whale occur off of the coast of southern Georgia and north Florida. During these winter months right whales are routinely seen close to shore and have been sighted as far south as south Florida, with isolated sightings into the Gulf of Mexico.

Dolphins common to inshore waters of southeast Florida include the Atlantic spotted dolphin (*Stenella frontalis*), the spinner dolphin (*Stenella longirostris*), the spotted dolphin (*Stenella attenuata*), and the bottlenose dolphin (*Tursiops truncatus*), which is listed as *depleted* under MMPA. A resident population of bottlenose dolphins can be found in Biscayne Bay (Service 2003).

6.0 PROJECTED FISH AND WILDLIFE RESOURCES WITHOUT PROJECT

If the project is not constructed, the nodal point of erosion in the 63rd Street vicinity will likely continue to reduce the available habitat on the beach and threaten dune vegetation at its current rate. Frequent beach renourishment activities associated with the BEC&HP project will likely continue, which may adversely affect nesting sea turtles, hardbottom reef habitat, and infaunal benthic communities. These fish and wildlife resources may be impacted as a result of: (1) increased frequency of periods where sea turtle nesting habitat is subject to changes in the physical environment of the beach, which may affect nesting success; (2) increased frequency of events where hardbottom reef organisms are subject to prolonged periods of turbidity and sedimentation, which may lead to increased stress or mortality; (3) directs impacts to hardbottom reefs organisms as a result of the installation of the dredge pipeline, regardless if offshore borrow material or upland sand sources are utilized; and (4) direct loss of benthic habitat within offshore borrow sites, as a result of excavation.

After 26 years of dredging, beach compatible material located within nearshore borrow sites in Miami-Dade County are nearly exhausted. These geologic resources are finite and nonrenewable. As a result, the search for beach compatible material has extended to deep water areas offshore, foreign sand sources, such as aragonite from The Bahamas, and upland sand sources. High quality upland sand material in Florida is often mined from areas that were once ancient beaches or sand dunes, which exist today as scrub or similar habitat. These habitats support relic ecosystems rich in species diversity, including several threatened and endangered plant and animal species. As the demand for suitable material for beach renourishment increases, the pressure to mine finite resources within these important habitats will likely also increase.

7.0 EVALUATION OF THE RECOMMENDED PLAN

The evaluation of the Recommended Plan examines the potential adverse effects of project activities to fish and wildlife resources, listed species, and their associated habitats. Direct and indirect effects of the action on habitats within the project footprint and areas adjacent to the project are considered. Direct impacts may occur to adjacent hardbottom reef habitat as a result of construction activities related to deployment of the proposed breakwater structure. Indirect effects such as turbidity associated with installation of the breakwater structure may temporarily impact hardbottom reef habitat. In addition, sea turtle hatchlings may be indirectly and adversely affected as a result of increased predation by adult fish which are likely to inhabit the structure after construction.

The impacts to habitats within the project area are evaluated in the following section, while the potential effects of the action on important fish and wildlife taxa, such as listed and managed species, are discussed in subsequent sections.

7.1 Biotic Communities

7.1.1 Supralittoral and Intertidal Zones

Since the proposed breakwater structure will be constructed from a barge and placed approximately 400 feet from the mean shoreline, direct impacts to the beach as a result of project construction activities are not anticipated. After construction, the shoreline downdrift and adjacent to the project area may experience secondary impacts, such as erosion, as a result of the structure. If the structure fails or breaks apart, the beach and associated dune vegetation may be impacted as a result of debris dispersal and subsequent removal efforts.

Breakwaters are designed to attenuate wave energy which reduces the primary cause of erosion. Additionally, breakwaters modify wave patterns through diffraction. The combination of these factors on wave energy modifies the local littoral transport rates and may result in the accumulation of sand and minimization of erosion along the shoreline behind the breakwater. When properly designed, the shoreline forms a salient which ultimately achieves a state of equilibrium. A salient can form as sand accumulates prominently behind, but does not connect to the breakwater. Once equilibrium is achieved, sand transport past the structure resumes; thereby, minimizing the potential of adverse downdrift affects (Humiston and Moore 2001). The

Corps anticipates that the effects to the adjacent shoreline as a result of the proposed project will be temporary and the equilibrium is expected to be achieved within one year. Though the downdrift shoreline may be altered, the Corps' Generalized Model for Stimulating Shoreline Change (GENESIS) results indicate that a net loss of beach habitat is not anticipated (URS 2003).

Breakwaters may adversely affect the adjacent shoreline if they are not properly designed. They may form a tombolo, a term used to describe prominent sand accumulation behind and connected to the breakwater structure. This creates a situation where the breakwater acts as a headland (a prominent land feature) rather than an offshore feature. In this case, the breakwater functions as a barrier to the longshore transport of material in a manner similar to a conventional terminal groin, resulting in offshore sand movement and downdrift erosion.

The Corps states that the primary objective of the proposed project is to retain sand in the southern portion of the authorized beach project without significant impact to the adjacent or downdrift shoreline. The second objective is to design the structure to remain stable and intact when exposed to wave energy generated by tropical and winter storm events.

Since a breakwater constructed with reefballs is a relatively new technology, a limited amount of data is available regarding their hydraulic stability (URS 2003). Hydraulic wave tests and wind tunnel tests were conducted by Florida Institute of Technology, Melbourne, Florida, to determine stability of the reef ball units. The results of these tests were combined with an analytical Morison Equation approach to determine the forces and movements on the submerged structure (URS 2003).

Submerged structures have the potential to shift, roll or otherwise move when subject to wave energy or as a result of scour, which may create voids beneath the ABM. Based on the stability analyses of the reef balls, it was concluded that the resisting forces of the structure will prevent movement due to wave induced forces. Since the reef balls will be anchored either to the ABM or directly into the substrate, the 14-ton submerged weight of the total structure is anticipated to adequately resist sliding as a result of the estimated 6,000 pounds of frontal wave energy to which the structure will likely be subjected. The Corps has concluded that the structure will remain stable during the most severe wave conditions generated during a 20-year storm level (*e.g.*; 14.6 feet).

Based on these results, it appears that the structure will initially remain stable during storm events. The Service is concerned the integrity of the structure will decrease over time as the materials that connect the ABM together and connect the reef balls to the ABM corrode. The Corps Draft Environmental Assessment includes a 3-year post-project monitoring plan, which has been proposed to evaluate the performance of the proposed demonstration project. After storm events, the performance of the structure and the effects to the shoreline will be evaluated by the project sponsor, Miami-Dade County. However, the plan does not indicate that regular physical inspection of the structure will be conducted over the 50-year life of the project, nor does the plan include provisions in the event that maintenance to the structure is required.

7.1.2 Subtidal Zone

The proposed 2,272-foot long breakwater structure will permanently convert approximately 2 acres of sandy bottom habitat to hardbottom habitat that is occupied by benthic infaunal communities. The organisms that are most likely to be impacted as a result of the conversion include non-motile invertebrate infaunal species within the footprint of the breakwater such as by polychaetes, amphipods, isopods, decapods, mollusks, echinoderms, and a variety of other taxa.

7.1.3 Hardbottom Reef

To avoid direct impacts to adjacent hardbottom reef habitat, the proposed breakwater structure will be constructed approximately 600 feet east of the edge of the nearest hardbottom reef. Construction and support vessels transit routes will likely pass over reef habitat during construction. The Corps has indicated that travel corridors with adequate depth will be selected and discussed with the contractor to avoid potential impacts to hardbottom reefs by vessels. During construction and breakwater deployment, multiple anchors will be required to stabilize vessels, which may impact hardbottom habitat.

Turbidity and sedimentation may be generated during the deployment and installation of the breakwater structure that may cause short-term and temporary impacts to adjacent hardbottom reef organisms. The Corps has proposed to implement turbidity curtains or similar measures to minimize the effects of turbidity and sedimentation to hardbottom habitat.

In the event the breakwater structure fails or becomes destabilized, debris from the structure may impact reef organisms or portions of the structure may collide with the reef.

7.2 ESSENTIAL FISH HABITAT

The EFH that may be directly and indirectly impacted by the proposed project are likely to include the water column, subtidal zone, and hardbottom habitat. Specific aspects of EFH that may be adversely affected include spawning, foraging, and refuge habitats for managed species such as the snapper/grouper complex, penaeid shrimp, and spiny lobster. The NOAA Fisheries is the lead agency responsible for the assessment of the possible adverse impacts of the proposed project to EFH.

7.3 THREATENED AND ENDANGERED SPECIES

7.3.1 Sea Turtles

If construction activities occur at night during the sea turtle nesting season (March 1 through November 30), the presence of light and/or noise from construction vessels anchored offshore may adversely affect sea turtles. These factors may interrupt the movement of adult, nesting, female turtles swimming toward or away from nesting beaches, and may cause disorientation of hatchlings following emergence. However, all construction vessels will be required to adhere to best management practices, such as preventing lights from exposure to shore through use of shields. In view of this, the proposed project should not appreciably change the ambient conditions of nesting areas in the vicinity of the action.

As discussed in Section 5.1.1, the breakwater structure will likely interrupt the natural littoral movement of sand in the vicinity of the structure which may cause a deficit of sand to beaches downdrift of the structure. This may result in a loss of suitable sea turtle nesting habitat or create escarpments that may limit the sea turtle's ability to access nesting areas. Though the Corps anticipates that the shoreline in the project area may be affected during the 1-year period of equilibration, those effects are expected to be temporary as sand builds at the breakwater then bypasses the structure to the adjacent shoreline. As a result, a net loss of shoreline is not expected. If the breakwater is successful, the hot spot of erosion is expected to be ameliorated; thereby reducing the potential adverse affects of frequent beach renourishment to nesting sea turtles. It is argued that erosion control structures constructed in appropriate high erosion areas may benefit sea turtles by reestablishing nesting habitat where none currently exists or is diminished. However, caution should be exercised not to automatically assume that reestablishing nesting habitat will wholly benefit sea turtle populations without determining the extent that the erosion control structures may affect adult sea turtle and hatchling behavior, as well as risk of hatchling predation. Under natural conditions, it is known that hatchling predation in nearshore waters is high (Stancyk 1982, Wyneken and Salmon 1996, Gyuris 1994). There are many documented occurrences of nearshore predators captured with hatchlings found in their digestive tracts. Reef balls were originally designed for deployment as artificial reefs to attract adult fish for recreational purposes in generally deeper waters. Natural nearshore hardbottom habitat in the vicinity of the structure has an average relief of approximately 1 to 4 feet in height with features (*e.g.*, small holes and crevices) that serve to attract juvenile fish. The proposed structure will provide features that will likely attract and concentrate larger predatory fish typically found in deeper water further from shore. As a result of the conversion of unconsolidated sandy bottom habitat to an artificial hardbottom habitat conducive to adult fish populations, sea turtle hatching mortality may increase in the vicinity of the project due to fish predation. In addition, colonization of the structures by epibenthic macroalgae, invertebrates, and other organisms will change over time and will likely result in changes of fish assemblages as the structures mature and continue to concentrate predators in the future.

During email and phone conversations with the Corps, the Service suggested an alteration of reef ball design that included smaller holes to reduce the potential colonization by large predatory fish. In response, the Corps indicated the design could not be modified since the porosity of the unit provides optimal interaction with fluid flow, thereby, substantial absorption of wave energy can occur due to friction and turbulent eddy formation.

According to data provided by the FWC, Miami-Dade County accounts for approximately 0.6 percent of Florida's total sea turtle nesting population (Meylan et al. 1995). The loggerhead sea turtle constitutes by far the larger percentage of Miami-Dade County's total nesting activity with an average of 400 loggerhead nests constructed per year. Small numbers of green and leatherback sea turtle nests are also present On the Miami Beaches, a total of 385 sea turtle emergences (194 nests and 191 false crawls) were documented during the 2003 nesting season (FWC 2003).

As a result of anthropogenic disturbance along Miami Beach related to beach front lighting and heavy recreational use, Miami-Dade County initiated a sea turtle hatchery program that relocates approximately 95 percent of all sea turtle nests to a less disturbed segment within Haulover Beach Park. Sea turtle survey information along Miami-Beach between Government Cut and Haulover Inlet indicate the greatest proportion of sea turtle nesting occurs on South Beach (approximately 42 percent) and North Miami Beach. Nesting density is lowest within the mid-portion of Miami Beach (B. Ahern, Miami-Dade Parks, personal communication). In 2003, the FWC recommended that relocation of green and leatherback sea turtle nests should not continue since nest success of relocated nests are greatly reduced when compared to nests that remain *in situ* (R. Trindell, FWC, personal communication).

Within the 1.8-mile zone (Zone I) surveyed by Miami-Dade Park staff, which includes the project area, sea turtle nesting is considered sparse (B. Ahern, personal communication). This is largely attributed to the affects of development and beach front lighting. As shown in the table below, between 2001 and 2003, a total 36 loggerhead nests were found within zones H through J on Miami Beach and relocated to Haulover Beach Park (Miami-Dade County 2004). Nesting by green and leatherback sea turtles was not documented during this period. However, the overall sea turtle nesting trend in Miami-Dade County since the 1980s appears to be on the increase (B. Ahern, Miami-Dade Parks, personal communication).

Year	Loggerhead Nests	Loggerhead False crawls	Green Nests	Green False crawls	Leatherback Nests	Leatherback False crawls
2001	16	16	0	0	0	0
2002	7	12	0	0	0	0
2003	23	22	0	0	0	0

Though sea turtle nesting is generally low in the project area, the Service is concerned that adult gravid sea turtles may be obstructed by the structure as they attempt to reach the shoreline to nest. In addition, sea turtle hatchlings of nests that remained *in situ,* or were missed during the daily nest surveys, may experience an increase in predation as the hatchlings attempt to cross the proposed structure in their attempt to swim to offshore nursery grounds. The Service recommends the inclusion of an additional component to the proposed monitoring plan to determine whether hatchling mortality is increased as a result of the breakwater structure. To aid the Corps, the Service has included as Appendix C, the monitoring plan developed by Mote Marine Laboratory that will be initiated by Lee County in 2004 for the Gasparilla Island erosion control structure project.

7.3.2 West Indian Manatee

The West Indian manatee is present in the project area, particularly in the inshore estuarine waters in the vicinity of Government Cut and the Haulover Inlet. Since it is likely that the barge and support vessels will be loaded from an inshore location, the vessels will likely traverse habitats occupied by the manatee. To avoid and minimize potential adverse affects to the manatee during the proposed breakwater construction activities, the Corps has agreed to implement the *Standard Manatee Protection Conditions* for all construction and support vessels associated with the project (Service 2002b).

7.3.3 Smalltooth Sawfish

Though vessels associated with the proposed breakwater construction will operate within the habitat that may be occupied by the smalltooth sawfish, these activities are not expected to adversely affect inshore habitat, especially because population density of individuals in Miami-Dade County are low (NOAA Fisheries 2000).

7.3.4 Whales and Dolphins

Since the project will occur in the nearshore waters less than 20-feet deep, it is unlikely that endangered whale species, such as the fin whale (*Balaenoptera physalus)*, humpback whale (*Megaptera novaeangliae*), and sperm whale (*Physeter macrocephalus*) would be observed within the project boundaries. Dolphins are common to the nearshore waters of Miami-Dade County. Vessel traffic and noise generated during construction periods may alter the dolphin's natural travel patterns and feeding behavior in the project area. However, these potential adverse affects are expected to be temporary and limited to the periods of active construction.

8.0 RECOMMENDATIONS

In addition to the Corps' environmental commitments, the Service provides the following recommendations to further avoid and minimize impacts to fish and wildlife resources:

1. Within 3 months of deployment of the proposed breakwater structure, underwater surveys to determine the presence or absence of hardbottom within the project footprint should be conducted. If hardbottom is found, mitigation for those impacts should be provided in-kind at a 1:1 ratio.
2. To provide better access to sea turtles across the structure, consider a modification to the proposed design to replace a series of diagonal rows of Goliath reef balls with smaller reef balls or bay balls to allow gaps approximately every 60 feet along the length of the structure.
3. Develop and include a vessel anchoring plan, in addition to the vessel transit plan, to avoid potential impacts to hardbottom.

4. Increase the duration of the SMART reef Physical and Biological Monitoring Program from 3 years to 5 years to better evaluate the affects of the structure over-time.
5. Provide a comprehensive and detailed annual report of the results of the SMART reef Physical and Biological Monitoring Program to State and Federal agencies for review and comment.
6. If the post-project Physical Monitoring Plan indicates that the adverse affects to the downdrift or adjacent shoreline exceeds the level anticipated, reinitiation of consultation under section 7 of the ESA is recommended.
7. The post project biological monitoring plan should include an evaluation of the structure's affect on adult sea turtle nesting success in the project area.
8. Consultation under section 7 of the ESA should be initiated with NOAA Fisheries, Protected Species, to evaluate the potential adverse affects of the breakwater on swimming turtles.
9. Include an evaluation of the possible adverse cumulative affects of the proposed breakwater structure on swimming sea turtles, particularly the potential increase hatchling mortality related to predatory fish.
10. Develop a long-term maintenance plan to include provisions and annual inspections of the structural integrity of the breakwater, in addition to inspection of the structure after storm events. The plan should also identify the entity responsible, fiscally and otherwise, for the long-term repair and maintenance of the structure.
11. The Final EA should evaluate and discuss how the breakwater is expected to affect the BEC&HP with respect to the renourishment interval, potential downdrift affects, and the equilibrium toe of fill.
12. After construction, if it is determined that the structure has caused significant erosion of adjacent beaches, section 7 consultation should be reinitiated with the Service to determine if the structure should be modified or removed.

9.0 SUMMARY

The Service acknowledges that a paradigm shift has occurred in the approach that coastal engineers and scientist approach shoreline protection. The Service supports the Corps' efforts to investigate innovative and alternative methods to address shoreline erosion across the United States.

In relation to the proposed project, the primary concerns of the Service relate to the potential that the breakwater structure: (1) may adversely affect nesting sea turtles as a result of a significant alteration of adjacent and downdrift beaches; (2) adult sea turtles may be obstructed by the structure; and (3) sea turtle hatchlings may experience an increase in predation as the breakwater may attract and concentrate predatory fish. In addition, the Service is concerned that the proposed 3-year duration of the physical and biological monitoring plan may be insufficient to determine the affects of the structure on fish and wildlife resources. Since this is a long-term project, the Service recommends that a long-term monitoring and maintenance plan be developed to minimize the potential of structural failure and subsequent potential impacts to fish and wildlife resources.

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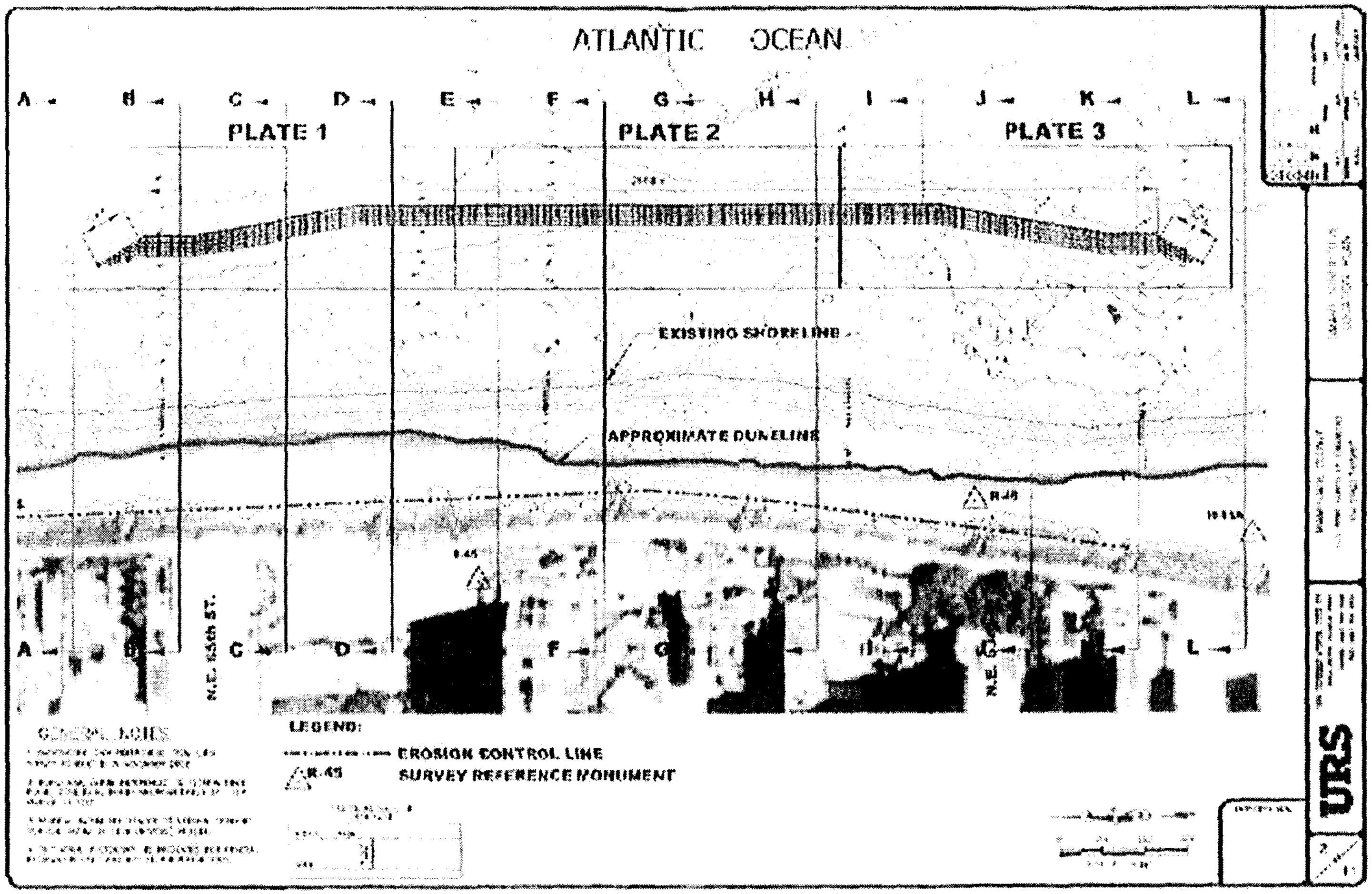
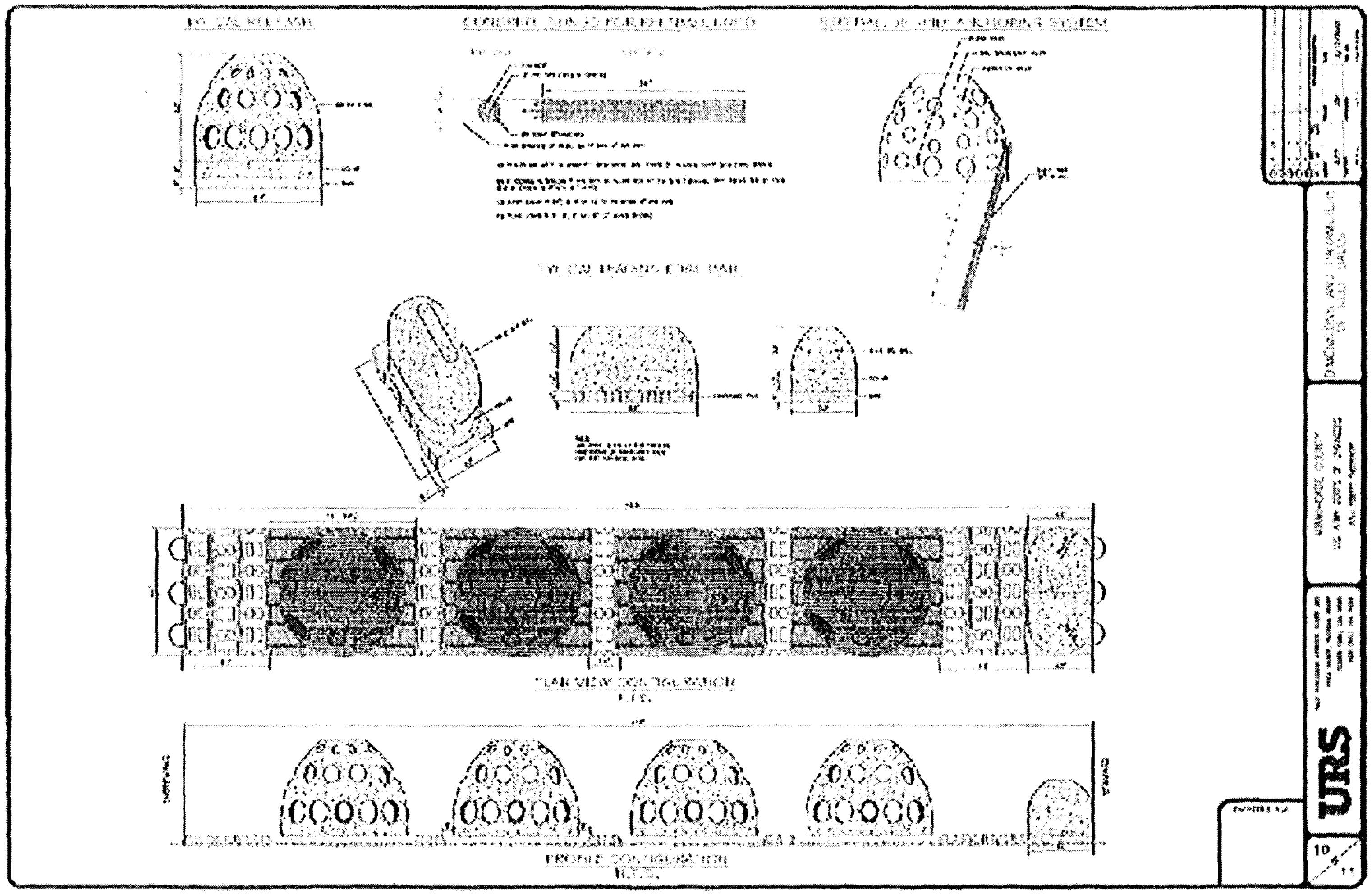
APPENDIX A

Project Plan Views (URS 2003)


ATLANTIC OCEAN
A B C D E F G H I J K L
PLATE 1
PLATE 2
PLATE 3
EXISTING SHORELINE
APPROXIMATE DUNELINE
R-45
R-46
N.E. 155th ST.
GENERAL NOTES
LEGEND:
EROSION CONTROL LINE
R-45
SURVEY REFERENCE MONUMENT
URS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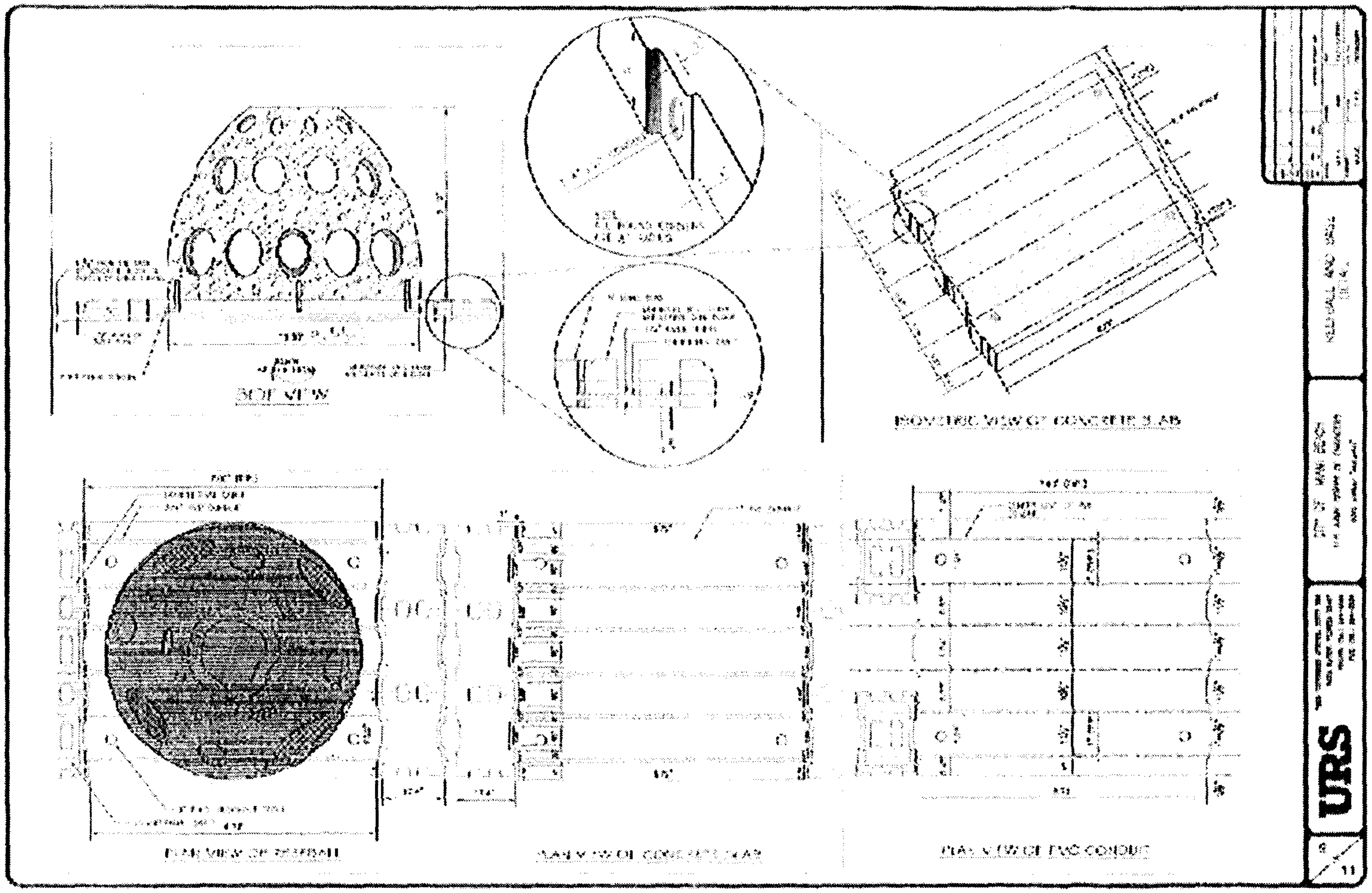
10


SIDE VIEW
ISOMETRIC VIEW OF CONCRETE SLAB
PLAN VIEW OF REEFBALL
PLAN VIEW OF CONCRETE SLAB
PLAN VIEW OF PVC CONDUIT
URS
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APPENDIX B

Corps' Proposed Post-Project Physical and Biological Monitoring Plan

SECTION 227 NATIONAL SHORELINE EROSION CONTROL DEVELOPMENT AND DEMONSTRATION PROGRAM
63RD STREET "HOTSPOT"
MIAMI BEACH, FLORIDA
MONITORING PROGRAM OUTLINE

1. INTRODUCTION and BACKGROUND

2. MEASURES OF SMART STRUCTURE PHYSICAL PERFORMANCE
   - 2.1 General
   - 2.2 Functional Performance of SMART structure
     - 2.2.1. Functional Parameters
       - 2.2.1.1. Volume Change
       - 2.2.1.2. Change in Beach Width
     - 2.2.2. Performance Metrics
   - 2.3 Structural Performance
     - 2.3.1. Parameters
       - 2.3.1.1 SMART Elevation Change
       - 2.3.1.2 Alongshore Integrity Change
       - 2.3.1.3 Scour
     - 2.3.2 Structural Performance Metrics

3. BIOLOGICAL MONITORING
   - **3.1 Topography and Bathymetric Surveys**
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     - **3.1.2. Survey Methodology**
     - **3.1.3. Profile Lines**
     - **3.1.4. Monuments**
     - **3.1.5. Pre & Post Installation Surveys**
     - **3.1.6. Beach Fill Surveys**
     - **3.1.7. Baseline Surveys**
     - **3.1.8. Storm Contingency Surveys**
     - **3.1.9. Structure elevation Surveys**
   - 3.2 Aerial Photography
   - 3.3 Scour Measurement
   - 3.4 Environmental Monitoring
     - 3.4.1 Sea Turtles
     - 3.4.2 Biological Communities
   - 3.5 Storm Contingency Plan
   - 3.6 Methods
     - 3.6.1. Underwater Surveys
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     - 3.6.3. Data Analysis

Section 1 – INTRODUCTION and BACKGROUND

The Miami-Dade County Department of Environmental Resources Management (DERM) and the US Army Corps of Engineers (CORPS), plan to install a 2,272-foot long SubMerged Artificial Reef Training (SMART) structure approximately 400-foot offshore of the mean low water (MLW), adjacent to the 63rd Street erosional "Hotspot" of Miami Beach, Florida. The SMART structure would be installed as an erosion control and wave attenuation measure and would be placed in approximately 7-foot of water (see Cross Section Figure 2). The U.S. Army Engineer Research and Development Center (ERDC) would also be involved with the proposed SMART structure monitoring effort.

The proposed project is authorized by the Water Resources Development Act (WRDA) of 1996, Section 227, National Shoreline Erosion Control Development and Demonstration Program. Under Section 227, innovative technologies are developed to demonstrate shoreline erosion abatement in a cost-effective and environmentally friendly manner. Performance metrics are developed to measure the successfulness of the demonstration project. The proposed structures can be modified or removed within the lifespan of authority.

A demonstration project has to demonstrate something. The monitoring program is the mechanism to "demonstrate" whether the SMART structure can provide a benefit (or are detrimental). This test plan establishes the criteria against which the performance of the SMART structure would be measured and evaluated. This could have implications on how the Miami-Dade County beaches are managed in the future (i.e., renourishment interval and treatment of "hot spots"). This in turn could have environmental impacts or benefits. The coastal engineering and environmental aspects of shore protection are inter-related.

The development and implementation of a monitoring plan is conducted to gather data and analyze it to provide a comprehensive and unbiased documentation of the performance of the proposed SMART structure. The application of this 3-year experimental test plan as prepared by the ERDC and reviewed by DERM would provide an unbiased evaluation of the performance of the SMART structure. ERDC develops innovative science and technology solutions to support warfighting, infrastructure, environmental, water resources and disaster operations. The local sponsor, DERM, would implement the following monitoring plan, which has been appropriately scaled to the proposed project and based on other coastal monitoring plans, research and conversations with scientists, biologists and engineers.

The monitoring program contains several elements designed to test the effectiveness of the SMART structure on the local coastal environment, including determinations of:
a). the functional ability of the SMART structure to retain sand and stabilize the shoreline as measured through shoreline change;
b). the structural stability of the SMART structure to include structural integrity, settlement and scour resistance;

c). the environmental effects of the SMART structure on sea turtle beach access for nesting, fish and fouling communities, interaction of juvenile sea turtles
d). storm event contingency monitoring plan to include nearshore and offshore surveys, structure elevation surveys and scour measurements.

Long-term research to address USFWS concerns of cumulative secondary affects would include site visits and visual inspections. Coordination of this information would be made available to interested resource agencies. Consideration of USFWS, NMFS and FDEP recommendations included in prior coastal reports (Coast of Florida, Region III, 1996, Sunny Isles Submerged Breakwater, 1997, Proposed Test Fill At Miami Beach, 2002).

2. MEASURES OF SMART PHYSICAL PERFORMANCE

2.1 General. The SMART offshore, segmented breakwater attenuates wave energy through processes of wave shoaling and breaking, increasing bottom friction and inducing turbulence, refraction, reflection and diffraction. Measures of performance are proposed to evaluate whether the project meets the intended objectives generally defined by the Section 227 Demonstration Program. These proposed measures focus on quantifying two categories of performance criteria:
• Functional - sand retention and stabilization of shoreline.
• Structural - stability of the reef, structural integrity, settlement and scour-resistance.
For each performance category, measurement parameters are defined, and performance criteria are suggested.

2.2 Functional Performance – Sand Retention and Shoreline Stabilization. Assessment of the functional performance of the SMART structure will be based on protecting the 63rd Street shoreline erosional "Hotspot" area. In the event the beach fill project is not completed, the SMART Reef will be assessed on how effective the site-specific shoreline is stabilized. However, it is assumed that the beach fill will take place. No net loss of beach shoreline is expected. Some shift of shoreline width may result in some net gain of beach.

Functional performance focuses on the degree to which the SMART structure retains sand and reduces sand loss from the shoreline. Sand loss may occur, to a lesser degree, to cross-shore processes (post-construction equilibration, seasonal beach profile change, and storm-induced beach erosion) and, to a greater degree, to longshore processes (natural gradients in longshore sand transport, and interruption of sand transport by structures). In order to predict performance, it has been assumed that cross-shore losses are negligible.

It is difficult, even in ideal conditions, to predict the long-term fate of the beach fill, either with or without the SMART structure. To this end, GENESIS numerical modeling was utilized to predict shoreline evolution for both cases: beach fill stabilization with and without the structure.

Inputs for the model include local shoreline positions obtained from LADS surveys (~2000), shoreline erosion rates from USACE reports (Martin 2001) and WIS hindcast data (Station 470, 1990-2000, including storms). Several assumptions concerning the beach fill must be made as the project has not yet been awarded and the sand source is unknown at the time of this writing. The median grain size, construction or design template, and the volume of fill/LF are all unknown. Some data has been provided, such as a probable design template; this data has been used, with the assumption that the as-built construction profile may vary significantly from the proposed fill profile. Analysis addressing the potential error generated from the differences in planned vs. constructed templates is offered.

Comparisons of numerical results of the GENESIS shoreline model will be made with data collected during post-construction monitoring (beach profile surveys, aerial photography, Argus data, etc.). Functional performance can then be evaluated following each beach profile survey, starting from initial construction and continuing throughout the monitoring program. Performance should be evaluated over both incremental (survey to survey) and cumulative time scales.

2.2.1. Functional Parameters:

2.2.1.1. Volume Change: Loss or gain of volume measured over time between the landward point of profile closure and to a distance offshore defined by the depth of closure (in absence of an offshore structure). The volumes will be determined from beach profile surveys.

2.2.1.2. Change in Dry Beach Width: Change in distance measured from the "R" markers to the berm crest. This will be determined from beach profile surveys and Argus video data. A standard mean "shoreline" would be determined for this study, either a datum-based line (i.e. MHW) to be measured off the profiles or a visual line (e.g. the wet/dry line) to be measured off the aerial photography. The lines are not the same, so some provision would need to be undertaken to determine a relationship between these lines.

2.2.2. Performance Metrics:

2.2.2.1 Difference in net volume change behind structure and north control site. *Evaluation Criterion: Structure is successful in retaining sand if volume loss is 30% or less than control site.*

2.2.2.2. Difference in net volume change between in-situ measurements and GENESIS and SBEACH output. *Evaluation Criterion: Actual structure sand retention is within +/-20% of model results.*

2.2.2.3. Difference in dry beach width change behind structure and north control site. *Evaluation Criterion: Structure is successful in retaining dry beach width if beach width loss is 30% or less than north control site.*

2.2.2.4. Difference in dry beach width change between in-situ measurements and GENESIS output. *Evaluation Criterion: If relative reduction in beach width loss is +/- 20% of model results.*

2.3. Structural Performance – Structure Stability

Structural performance measures focus on stability of the offshore structures. Objectives are that the structures maintain functionality over a design life consistent with that of a beachfill project (i.e., 50 years) while requiring minimal operation and maintenance. Structural performance should be evaluated throughout the duration of the monitoring program.

2.3.1. Parameters:

2.3.1.1. Change in Elevation of Mean Structure Crest: Decrease in elevation of mean structure crest due to settlement or translation. Determined from baseline elevation surveys along the crest of the structure immediately following construction.

2.3.1.2. Change in alongshore Structure Integrity: formation of gaps in structure due to separation of interlocking units or other structure failure resulting in loss of structural integrity and excessive water transmission. Determined from elevation surveys along structure.

2.3.1.3. Scour: Elevation of seabed adjacent to structure (seaward and landward sides) in comparison to initial elevation at time of structure placement. Excessive scour may result in failure of structure.

2.3.2. Structural Performance Metrics:

2.3.2.1. Evaluation of above parameters for SMART structure.

2.3.2.2. Evaluation Criteria:

- Successful if average lowering of crest elevation is < 1-foot and maximum lowering is < 2-foot.
- Successful if no gaps form that result in structural instability.
- Successful if no permanent voids have formed beneath the mats.

SECTION 3 – MEASURES OF SMART BIOLOGICAL PERFOMANCE

Field data collection would begin during the period immediately prior to installation and for three years following installation. Each of the elements and their role in accomplishing the objectives outlined in Chapter III of the test plan are described below.

3.0 Monitoring Plan - Field Data Collection Program

3.1. Activity 1 - Topographic and Bathymetric Surveys. Beach and nearshore surveys would be conducted to document the topographic and bathymetric changes that occur throughout the project test area during the three-year monitoring period. These surveys would be conducted immediately prior to the installation of the SMART structure, periodically as described below, throughout the three year monitoring, after a significant storm event, and after placement of any fill within the monitoring area.

3.1.1. The survey monitoring area would extend approximately 5,000-foot north and south of the SMART structure terminus. Thirty profile lines would be surveyed. Ten profile lines would be surveyed within the SMART structure limits at a spacing of approximately 200-foot and twenty profile lines (ten to the north and ten to the south) would be surveyed outside of the SMART structure limits with a spacing of approximately 500-foot. Tolerance of all surveys would meet the specifications summarized in this chapter.

3.1.2. Surveys would be accomplished through a combination of "wading depth" surveys to extend from landward terminus locations to seaward of the SMART structure and hydrographic surveys seaward of the SMART structure. Included in the "wading depth" surveys would be a SMART structure condition survey to document the settling of individual units. SHOALS surveys may also be used extending from inside of the SMART structure seaward, but are not required.

3.1.3. Location of profile lines for the beach and nearshore surveys would be with total station and rod off of Florida DNR Monuments R-46A through R-44 previously established in the area and would have an azimuth of N70E. Profile lines commencing at Florida DNR

3.1.4. Monuments would extend to 3,000-foot offshore or –30-foot depth (whichever is less). Intermediate profile lines not commencing at Florida DNR Monuments would be surveyed to 1,200-foot offshore on a quarterly basis, 3,000-foot on an annual basis and would have an azimuth of N70E. The profile lines would be displayed in an appropriate figure.

3.1.5 Pre- and Post-Installation Surveys. Pre- and post-installation beach and nearshore surveys would be conducted immediately prior to and within three weeks following the SMART structure installation. A comparison of these surveys would be used to document the changes resulting from SMART structure installation. The post-installation survey would be used as the baseline survey to compare with subsequent surveys. In addition, in the event that a significant change in the bathymetry occurs between the pre-installation and the post installation period, an additional post-installation survey would be undertaken. The pre- and post-installation surveys would survey all profile lines to the distance specified for an annual survey, as described above.

3.1.6. Beach Fill Surveys. A beach fill survey would be required in the event that DERM, City of Miami Beach, or private property owners place fill within the project area. The DERM would survey the fill area within one week prior to and following placement of the fill or the quantity and location of the material would be reviewed by a professional engineer or surveyor.

3.1.7. Baseline Surveys. Beach and nearshore surveys would be conducted just prior to and within three weeks of SMART structure and every three months for the first year, and then every 4 months for the remaining two years of the monitoring period. As stated above, all profile lines would extend to 3,500-foot for the annual surveys and the intermediate lines would extend to 1,200-foot for the quarterly surveys.

3.1.8. Storm Contingency Surveys. A storm contingency survey would also be performed as deemed necessary by ERDC and DERM. A courtesy copy would also be provided the FDEP. This survey would be performed immediately following a significant storm event, when wave conditions permit and a notice to proceed provided by the FDEP. The storm contingency survey would include 12 survey profile lines to the distance specified for an annual survey.

3.1.9 Structure Elevation Surveys. Structure elevation surveys would be conducted on a quarterly basis for the first year. The structure elevation would be measured by sighting the elevations of each end of each unit with a rod from a total station situated on land. The elevation surveys would include scraping the biological growth off the top of the structure so that a true reading of structure settlement can be ascertained. The scraping can be performed with a metal spatula, hammer, and wire brush.

3.2. Activity 2 - Aerial Photography.

Controlled aerial photography at a scale of approximately 1" = 600-foot would be obtained annually as part of an ongoing program with the State of Florida.

3.3. Activity 3 - Scour Measurements.

Scour measurements would be performed following SMART structure installation for a period of 2-years during the project life. Measurements would be performed following significant storm events to measure expected maximum scour. The post-installation scour survey would act as the baseline survey. Scour would be visually assessed on a quarterly basis. Any areas of significant scour would be quantified during bathymetric surveys.

3.4. Activity 4 - Environmental Monitoring.

3.4.1. Impacts to Marine Turtles. The objective of this investigation would be to determine if the SMART structure exerts an impact on the seaward orientation behavior of hatchling turtles emerging from nests located on the beach adjacent to the reef. Methods: input would be solicited from various experts before deciding upon a final experimental design. Following the deployment of the SMART structure, the structure would be monitored to determine its influence on the coastal system. Of crucial importance would be a determination of how long the SMART structure would be exposed above the ocean surface. This determination would have an important bearing regarding the eventual research design of this investigation.

Beginning in Mid-August following installation, a sample of Atlantic loggerhead, *Caretta caretta*, hatchlings (not to exceed 150 animals) would be released from the beach at various sites located in the vicinity of the SMART structure and from a nearby control area. A special attempt would be made to use turtles still manifesting their "frenzy" behavior. Upon release the hatchlings would be followed at a non-impact distance either by swimming with snorkeling gear and/or via a paddleboard or sea kayak. All turtles would be tracked at least 300 feet east of the SMART structure. During this investigation, both early morning and nocturnal releases would be conducted.

To facilitate night tracking, individual hatchlings would be tethered to a one to two gram pencil diameter float. The tether line would be approximately two meters in length and would consist of a 10-pound test monofilament line. The float would be wrapped in either reflective tape to permit observation using a night vision scope or alternatively would consist of a chemical light source with a foil-screening device to prevent being seen by the hatchling attached to the tether line. Tether attachment would be accomplished using a self-corroding, 'barbless' fish hook (#20) implanted into the hatchling's marginal, distal scute. Every attempt would be made to retrieve the turtle in order to remove the hook upon termination of the tracking episodes.

To provide documentation of the orientation behavior during the early morning releases, a number of subject animals would be photographed using an underwater video camera. This would be especially important during tracking episodes involving animals being released when the SMART structure is exposed above or closest to the surface.
If conditions permit, a statistical valid sample of animals would be released from a control site as well as from at least two SMART structure site. These subjects would be timed via stopwatch from the beach to a point approximately 100 feet seaward of the reef. An anchored buoy would be used to mark the precise distance. Every attempt would be made during these releases to control ocean related variables that might affect swimming speed and behavior (i.e. tidal state, long shore currents, sea state).

Once this timed experiment is completed, the three data sets would be statistically compared to determine if there is a significant difference in swimming speed between turtles released from the control and from the two SMART structure release sites. Although it would not be possible to systematically investigate hatchling predation rates, anecdotal observations would be made regarding the species of the predator as well as any other pertinent information deemed to be of significance.

Following the conclusion of the first season's tracking investigation, the results would be summarized in an interim report and then submitted to experts for their review and evaluation. From their comments and critiques, a more comprehensive tracking experimental design would be developed. During this time, it is anticipated that a larger sample of hatchlings would be involved so that a wider range of environmental and experimental conditions can be considered.

3.4.2. Impacts to Biological Communities. The proposed biological monitoring program provides a scientifically credible analysis of biological issues resulting from the installation of a SMART structure in the near shore of Miami Beach, Florida, while keeping monitoring costs to a minimum. The proposed monitoring program focuses on fish and fouling (hard substrate dwelling) communities associated with the reef modules. The monitoring would utilize quantitative scientific data to analyze the responses of fish and fouling organism communities that are attracted to the SMART structure modules. Collection of quantitative data would also be available to respond to the public in the event of any changes to near shore-fishing resources, which might be attributed to the presence of the reefs.

After installation, the SMART structure modules would presumably function as typical hard substrata and would develop a fouling community that would progressively increase in its abundance and diversity over time. Similarly, the physical structure provided by the reefs should provide an attractant for fishes. Studies on the development of the fouling and fish communities have not been done within the shallow, near shore region in the Miami Beach area. The precise nature of the development of these communities is important in several regards.

3.4.2.1. First, installation of the reef modules would involve the placement of reef modules on top of existing sand bottom areas with the consequent destruction of the natural communities at these locations. It is important to quantitatively document that the SMART structure modules themselves actually are providing habitat.

3.4.2.2. Secondly, the natural world is extremely variable. Changes in fish populations occur for natural reasons, and may occur during or after the project. It is always tempting to attribute change to an obvious factor such as the SMART structure, even if there is no functional relationship. Quantitative studies of fish populations would provide data to evaluate the potential role of the SMART structure versus natural factors should any major changes take place.

3.4.2.3. Third, fouling community development may be significant in terms of the long-term integrity of the SMART modules, which may be influenced by whether boring sponges, and urchins become established. Evaluation of bioerosion rates would assist in projections of project lifetime. A common near shore sponge species (*Cliona lampa*) can bioerode 3 kg per square meter per year on carbonate substrata in Bermuda (Rutzler, 1975).

3.4.2.4. Fourth, the interaction of sea turtles with the SMART structure is potentially important. Juvenile turtles are known to utilize near shore natural reefs as a food resource (Ehrhart, pers. comm.}, and local availability of benthic invertebrates for food may influence selection of nesting beaches for loggerheads (D. Nelson, 1988). Sharks, barracuda, snook, jacks, snapper, and other larger predatory species may potentially consume hatchling turtles (D. Nelson, 1988). While small artificial reefs located farther offshore in deeper water in the Miami Beach area did not develop large populations of predators over a two year period (Vose, 1990), the situation for large reef modules inshore may be quite different. Direct observation of predation events on sea turtles is extremely difficult, and therefore the best approach is to attempt to estimate the potential increase in predation pressure via estimation of changes in fish populations associated with reef installation.

3.5. Activity 5 - Storm Contingency Plan

Three monitoring elements would be performed in the event of a significant storm as deemed appropriate by DERM and FDEP. These three monitoring elements are: 1) nearshore/offshore surveys to 3,500 feet; 2) structure elevation surveys; and 3) scour measurements.

3.6. METHODS

3.6.1. Quarterly underwater surveys of reef modules would also be conducted to estimate coverage of encrusting and boring organisms. Benthic growth would be assessed using digital video transects using the protocols outlined in the Florida Marine Research Institutes "Standard Operating Procedures Field and Laboratory Operations: Florida Keys National marine Sanctuary Coral Reef/Hardbottom Monitoring Project" (http://www.cofc.edu/~coral/epacrmp/crmp.htm). Sponge coverage would be estimated as percent coverage. The quarterly sampling would evaluate changes in species, composition and numerical abundance, which occur in this community over time.

3.6.2. Fish Surveys

Quarterly daytime underwater fish surveys would be undertaken by SCUBA divers utilizing two census techniques. Transect surveys would be carried out along sections of the SMART structure and would provide primarily qualitative data on overall fish community composition. Stationary census data would be collected from fixed positions on the SMART structure to provide quantitative estimates of fish abundance.

3.6.3. Transect studies would consist of swimming the length of the SMART structure proceeding either along the inshore side and returning on the offshore side of the structure or vice versa. Three SMART nearshore and three SMART offshore survey points would be recorded for further data collection and comparison. During these surveys, additional effort would be made to survey crevices for cryptic species or for newly settled larval or juvenile fishes. Comparison would be made to three transects surveyed on randomly selected natural rock reefs offshore of the project area.

Data would be analyzed with two-way ANOVA (ANalysis Of VAriance between groups) to determine whether significant differences in the main factors of time and substrate type (natural versus SMART structure segments) occur.

3.6.4. Responsible Field Data Collection Tasks

As part of the monitoring plan, several parties would participate in various monitoring activities or be responsible for contracting of work associated with field data collection, data analyses and products including reports and presentations. Parties include DERM and FDEP.

3.6.5. Data Analysis

All data collected in accordance with this test plan would be completed in a form suitable for analysis, would be reduced by the data collector and provided to DERM within thirty days after each data collection effort. ASCII versions of the data are required in accordance with this test plan and would conform to DEP format. Periodic meetings would be held with all interested parties to discuss data and the interpretation of findings to date. Adjustments or refinements to the monitoring techniques may be proposed periodically. Any change to the monitoring plan would be approved by the FDEP.

3.6.6. Results would be documented in interim, annual and final reports. Interim reports would be submitted within thirty days following receipt of the field data by the parties listed above. Annual and Final reports would be submitted within forty-five (45) days upon receipt of the field data by the parties listed above. The analyses would focus on quantifying: 1) the effect of the SMART structure on waves and currents and its interaction with these hydrodynamic elements; 2) the effect of the SMART structure on sediment transport with special emphasis on the seasonal and annual cumulative volumetric changes and patterns of sediment trapped behind the SMART structure, and the seasonal and annual patterns of shoreline and volumetric changes adjacent to the SMART structure; 3) the character of any sediment which has accumulated shoreward of the SMART structure; 4) the effect of waves and currents on the structure with special reference to settlement or movement; 5) the effect of the SMART structure on storm wave activity; 6) the results of the colonization studies and fish censusing; and 7) the results of the marine turtle monitoring. In addition to the above, the annual reports would include a summary of wave, tide and current data (correlated to the above measurements).

3.6.7. DERM would oversee the collection of nearshore surveys (including structure elevation surveys) and make data available to CERC and FDEP in both ASCII and ISRP (Interactive Survey Reduction Program) format. DERM would also process data by producing line drawings of profile cross sections. Processing and reporting of data in reports would be performed by DERM. Information to be contained in these reports includes shoreline change maps associated with the nearshore surveys and structure change maps/diagrams associated with the structure elevation surveys, also to be provided by DERM.

Environmental monitoring data would be collected, processed and analyzed by Florida Institute of Technology and provided in quarterly and annual reports.

The collection of aerial photography data would be overseen by DERM. DERM would provide both hard copies and films of aerial images. ERDC would process and analyze the data sets and would generate aerial photograph and mapping/shoreline change maps for the annual and final reports. DERM would be responsible for the collection of data associated with the storm contingency plan (including nearshore surveys/structure elevation surveys; aerial photography; and scour measurements).

ERDC would generate a historical coastal trends/shoreline change report including information on littoral processes information, shoreline change maps/rates, wave information and sediment budget information. A literature review would be included in this effort. This information would be included in the first annual report.

APPENDIX C

Gasparilla Island Hatchling Monitoring Program
To be implemented for the SMART Structure

Gasparilla Island Beach Nourishment Project: Hatchling Marine Turtle Interaction with Erosion Control Structure Study.

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Introduction

The beaches along the central Gulf coast of Florida provide vital nesting habitat for loggerhead (*Caretta caretta*) and green (*Chelonia mydas*) sea turtles. In addition, these beaches have supported incidental nesting of the Kemp's ridley (*Lepidochelys kempi*) and the leatherback (*Dermochelys coriacea*) sea turtle. All four are listed as threatened or endangered, and are provided protection under the Federal Endangered Species Act of 1973, as well as the Marine Turtle Protection Act Chapter 370.12 (Florida Administrative Code).

Hatchling marine turtles emerge from eggs deposited in nests following an incubation period of 43 to 75 days (Mote Marine Laboratory, Sea Turtle Conservation & Research Program data). Typically, emergence from the nest occurs at night (Witherington, 1990) when lower sand temperatures elicit an increase in hatchling activity. Emergence occurs *en masse*, usually involving between 20 and 120 hatchlings (Lohmann et al., 1997). After emerging from the sand hatchlings crawl immediately to the surf using predominately visual cues to orient themselves (Witherington and Salmon, 1992, Lohmann et al., 1997). Upon reaching the water loggerhead and green sea turtle hatchlings orient themselves into waves (Witherington, 1991; Wyneken et al., 1990) and begin a period of hyperactive swimming activity, or swim frenzy, which lasts for approximately 24 hours (Salmon and Wyneken, 1987). The swim frenzy effectively moves the hatchling quickly away from shallow water, rich in predatory fish, and out to the relative safety of deeper water (Wyneken, 2000; Gyuris, 1994).

The first hour of a hatchling's life is precarious and predation is high but decreases as hatchlings distance themselves from the natal beach (Stancyk, 1982, Pilcher et al., 1999). Delays in hatchling migration (both on the beach and in the water) can cause added expenditures of energy and an increase of time spent in predator rich shallow water. Thus a delay in the offshore migration can cause increased predation of the hatchlings (Glenn, 1998; Gyuris, 1994; Witherington and Salmon, 1992).

Objectives

The southern shoreline of Gasparilla Island in Lee County has been designated as critically eroded by the Florida Department of Environmental Protection (FDEP). The Lee County Board of County Commissioners petitioned the FDEP (File No. 0174403-001-JC) to conduct beach restoration/renourishment during the year 2002. The restoration project shoreline is located at the southern end of Gasparilla Island adjacent to Gasparilla Island Pass. Sand placement is to occur between FDEP reference monuments R-10 and R-26 (Figure 1 and 2 taken from above referenced file#).

Figure 1

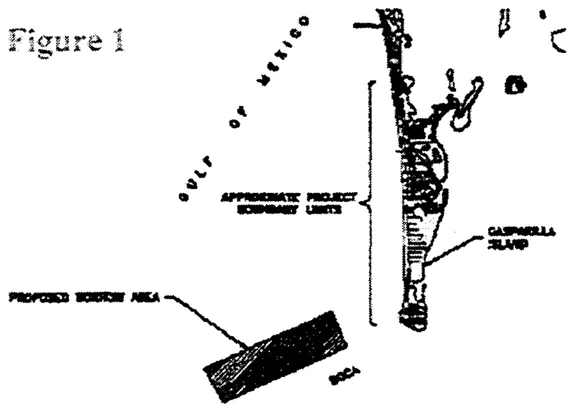
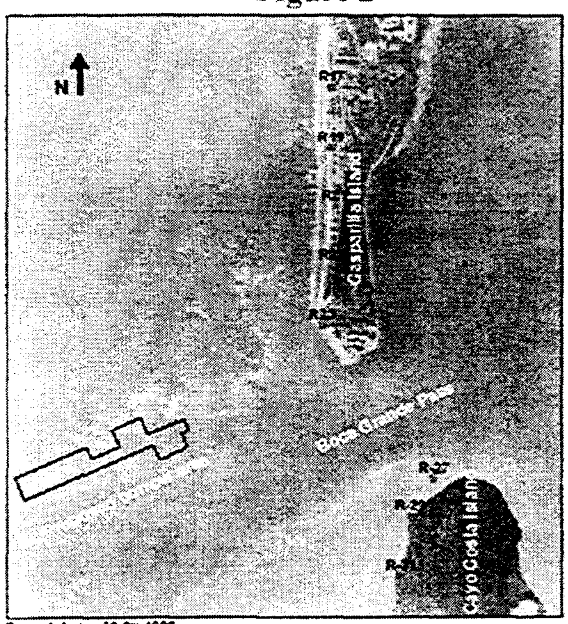


Figure 2



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In addition to the beach fill, a segmented emergent breakwater is to be constructed approximately 325 feet offshore from FDEP reference monument R-25 and two T-groins are to be constructed between R-25 and R-26.

Sea turtle nest monitoring, marking, protection and evaluation for the project shoreline is to be coordinated through a cooperative effort between the Florida Fish and Wildlife Conservation Commission (FWC), Lee County Natural Resources Department, Florida Park System and the Gasparilla Island Turtle Watch. Because sea turtles utilize the sandy beaches of Gasparilla Island for nesting and because no definitive studies have documented the effects that these structures have on sea turtle hatchlings, this scope of work is designed to 1) identify the behavior of sea turtle hatchlings upon encountering the structures, and 2) document incidents, if any, of predation from nearshore fish populations.

Erosion Control Structures

The offshore-segmented breakwater (emergent) to be constructed 325 feet offshore from FDEP reference monument R-25 consists of two segments with a small gap between. The breakwater is a rubble mound type structure with a total combined length of 550 feet and a crest elevation of +3 feet (NGVD). Two T-groins scheduled for the shoreline south of the breakwater are to be constructed of sheet piles with a rock apron in the seaward side of the T-groin segments. The length of the head of each T is to be 200 feet with a crest elevation of +2 feet (NGVD). The "T head" is shore parallel and the "body of the T" is shore perpendicular for a distance of 235 feet. Rocks averaging five tons each will form the breakwater armor and rocks averaging two tons each will form the T-groin aprons.

Problem Statement

Gasparilla Island provides vital nesting habitat for loggerhead (*Caretta caretta)* and green (*Chelonia mydas*) sea turtles both of which are protected under the U.S. Endangered Species Act of 1973 and the Marine Turtle Protection Act Chapter 370.12 (Florida Administrative Code). Florida Administrative Code includes in its definition of "take" significant habitat modification or degradation that kills or injures marine turtles by significantly impairing essential behavioral patterns. Under these regulations it is illegal for an unauthorized take of a sea turtle or any parts of a sea turtle, sea turtle eggs or hatchlings.

Historic data demonstrate a range of 76 to 289 loggerhead nests and 4 green turtle nests for the years 1997 through 2000 (FL FWC data for Lee County, Gasparilla Island; maps provided by Humiston & Moore Engineers). Although nest numbers within the erosion control project area (~R-23-R-6A) are few, 16 nests and 17 non-nesting emergences, or false crawls, were documented in 1999, and 19 nests and 12 non-nesting emergences were documented in 2000.

The erosion control structures are proposed to absorb wave energy and minimize sand scouring thus providing a sandy beach for humans, for property protection and for sea turtle nesting habitat. If the structures perform successfully and adequate sand remains within the project area it is probable that sea turtles will nest near the erosion control structures. To date there are few data available regarding sea turtle hatchling reactions/interactions with the offshore emergent breakwaters or shoreline T-groins. There are currently few similar structures along the West Florida shoreline. These Gulf coast structures can be found at 1) at Marco Island in Collier County, 2) in Naples, north of Gordon Pass, Collier County, and 3) at North Captiva Island, at the north side of Redfish Pass in Lee County. Monitoring has shown that the existing structures on the west coast have improved beach stability leading to additional nesting habitat (Ken Humiston, Humiston & Moore Engineers, personal communication). No adverse impacts have been documented although only limited nesting has occurred near the existing structures, additionally, there has been minimal monitoring effort to evaluate the failure or success of the hatchling migration from the shoreline to and/or beyond these structures. One T-groin of dissimilar design on the east Florida coast in Palm Beach County was found to cause a delay in the offshore migration of 13% of the hatchlings emerging from nests near the structures (Davis et al., 2000). It is currently unknown whether the emergent breakwater and/or the T-groins have potential for 1) obstructing the movement of sea turtles and/or hatchlings, or 2) causing increased predation of hatchlings as they swim near the structures.

Questions

1. How do hatchling sea turtles, after emerging from the nest, interact with T-groins and breakwater structures?
2. Can hatchlings get around/through the T-groins to achieve open Gulf waters?
3. Can hatchlings get past emergent, shore parallel breakwater structures?
4. Are hatchlings delayed in offshore migration by the structures, and if so, does the delay cause increased predation?
5. If there is a take, what are the possible predators?
6. If there is a take, what percentage is being taken? *(Or If there is a take is it significant?)*
7. Over time, the structures will be colonized by benthic, algal and fish species. Is there a possibility of increased predation near the structures in future years?
8. *If impacts from the structures are identified, do the benefits of restoring and stabilizing critically eroded shoreline outweigh the structure's impacts.*

Nearshore predation

Strong tidal currents along the south Gasparilla Island shoreline create hazardous conditions for navigation under present conditions. Although the shore protection design is intended to reduce currents in the vicinity of the structures, will this have an effect on the offshore navigation of the hatchlings? Predation on hatchlings in nearshore waters is high (Stancyk, 1982; Wyneken et al., 1996, Gyuris, 1994) There are many documented occurrences of nearshore predators captured with hatchlings found in their digestive tracts. Any impediment to sea turtle hatchlings rapid offshore migration could cause increased predation on the hatchlings and/or create a situation in which the swim frenzy is "used up" prior to the hatchlings getting away from the nearshore area.

During hatchling predation studies on the East Coast of Florida Jeanette Wyneken of Florida Atlantic University documented species of predatory fish targeting sea turtle hatchlings in nearshore habitat (Wyneken, 1996; Wyneken et al., 2000). The fish were captured and found to have hatchlings in their gastro-intestinal tract or they were observed eating hatchlings. The fish documented during these studies include: Tarpon (*Megalops atlanticus*), Mangrove Snapper (*Lutjanus griseus*), Great Barracuda (*Sphyraena barracuda*), Hardhead Catfish (*Arius felis*), Red

Grouper (*Epinephelus morio*), Crevalle Jack (*Caranx hippos*), Blue Runners (*Caranx crysos*) and Reef Squid (*Sepiateuthis sepiodea*). Small sharks were also observed feeding on hatchlings (Gyuris, 1994). Tarpon and Crevalle Jack are abundant in Charlotte Harbor (Williams et al., 1990) as well as bull (*Carcharhinus leucas*), great hammerhead (*Sphyrna mokarran*), nurse (*Ginglymostoma cirratum*), tiger (*Galeocerdo cuvier*), lemon (*Negaprion brevirostris*), blacktip (*Carcharhinus limbatus*), blacknose (*Carcharhinus acronotus*) and bonnethead (*Sphyrna tiburo*) sharks (Mote Marine Laboratory, Center for Shark Research data).

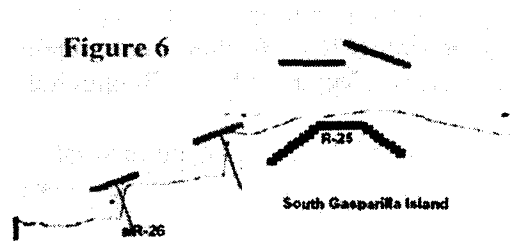
Exposed rock along beaches of Lee County provide substrate for the attachment of epibenthic macroalgae. The algae provide food for herbivorous fish, marine turtles, and invertebrates. In addition to the algal food, which grows on the reefs, fish and invertebrates are attracted to the basic structure of the reef and rapid rates of colonization occur. Because of the obvious potential for similar colonization of the submerged rocks on the breakwater and T-groin structures there is the potential for increased numbers of fish near the structures. Will hatchlings leaving the shoreline near the structures be slowed in their movement past or around the structures and thus be at increased risk of predation? Will the predation risk become higher as the colonization of the structures increases over time?

For comparative purposes, there are no naturally occurring habitats similar to these erosion control structures. Water at the breakwaters is projected to be approximately -14 feet for the entire 550 feet of breakwater structure and the base is wider than it is high. If predation does occur and there is evidence of increased predation at the structure as it is colonized, at what point does the loss of these animals create an overall disadvantage for the species? For example, the beach restoration and structures are engineered to build up sand where there currently is none. If the structures are successful and sand accumulates, there is a strong probability that turtles will begin nesting here thus increasing the number of hatchlings successfully entering the water. If hatchlings leaving the beach in the immediate vicinity of the structures are slowed by the structures in their offshore migration, there is a possibility that hatchling predation will increase over time. If this occurs, at what point might hatchling loss negate the positive aspects of the added shoreline habitat? When, instead of nesting habitat, the beach has receded to the point that the habitat is unsuitable for nesting, turtles would be unable to place nests and would nest elsewhere where there was adequate sandy habitat and no offshore structure. The actual hatchling survival rate could have the potential of being greater.

Materials and methods:

To assess the effects of the structures on hatchling orientation and behavior a series of trials is necessary for the project shoreline. The T-groins will be examined separately from the Breakwater with a control area for each. The approximate locations of the structures are observed in the figure below (Figure 6 from FDEP, File No. 0174403-001-JC).

Figure 6



It is proposed that there be an advisory committee for the project composed of representatives from U.S. Fish and Wildlife Service (FWS), the Florida Fish and Wildlife Conservation Commission (FWC), Mote Marine Laboratory (MML), Lee County Natural Resources Department, Humiston & Moore Engineers and the Gasparilla Island Sea Turtle Patrol. The advisory committee will decide the exact project parameters at the beginning of each season.

Background conditions at the proposed control and experimental sites are to be checked during field visits to ensure that there are no significant differences in the ambient lighting, current conditions, topography, human activity, and beach sediments at the selected locations prior to implementing the trials. A set of pre-project hatchling trials will be conducted at the project location during the 2002 marine turtle hatch season to obtain baseline data. The purpose of these trials will be to document marine turtle hatchling activity during offshore migrations prior to installation of the erosional control structures and sand placement. These trials will allow the Committee to determine the feasibility of this study in Boca Grand Pass, an area of strong tidal currents, and to clarify protocol based on the outcome of the pre-project trials. A minimum of 4 trials, utilizing 3 hatchlings each, will be completed during the summer of 2002.

Three trial areas (one control and two experimental sites) are identified for the T-groins and are listed below. These trial locations could be modified and/or located more precisely following the pre-trial field meeting by the project Advisory Committee. To insure that hatchlings will have a high probability of contact with the structures, hatchlings used in experimental trials will be released on the beach within close proximity to the structures. If a nest occurs naturally in the project area, it will be left in situ. Upon hatch the hatchlings will be monitored in their migration from the nest.

A. T-groin (1) - located at the northern T-groin, at approximately R-25.5.

B. T-groin (2) - located at the southern T-groin, at approximately R-26.

C. Control - the control area will be selected following inspection of the shoreline and upland development, a possibility for the control is between R-26.5 and R-26A. This location is adjacent to the south and east of the southern most T-groin and is located at the mouth of Gasparilla Island Pass.

Three trial areas (one control and two experimental sites) are identified for the segmented breakwater located at R-25. Here also the exact hatchling release location at each segment of the breakwater will be determined by the Advisory Committee following site inspection.

A. North segment of breakwater.

B. South segment of breakwater.

C. Control - a site between R-23 and R-24.5 which is approximately 1,000 to 1,500 feet north of the T-groins and is located on the west facing beach south of Gasparilla Island Pass

Trials for the T-groins are to be conducted concurrently at the three locations: T-groin (1), T-groin (2) and control, followed by concurrent trials at the emergent offshore breakwaters: N breakwater, S breakwater and control if/when hatchlings are available. In the event that 18 hatchlings are not available in a single night, trials for the two experimental locations will be held on different nights.

A maximum of 260 loggerhead hatchlings will be used for trials, three at each of the three trial areas for the two treatments (T-groin and breakwater), or a maximum of 18 hatchlings per night. This number of hatchlings represents approximately162 hatchlings to be used in trials at the two treatment locations during 8 nights at each treatment location. From 18 to 36 hatchlings will be used during daytime trials (just before sunset or immediately following sunrise) in order video document the hatchlings and to check trial methodology. The extra hatchlings represent those obtained for the trials to be used in the event any of the original 18 were not active when released. The remaining hatchlings will be released immediately following completion of the trial experiments. Only loggerhead hatchlings will be utilized.

Statistical analysis for hatchling speed, direction and distance traveled will be calculated using methodology chosen by Blair Witherington during his studies of hatchling orientation (Witherington, 1991). A straightness index (Batschelet, 1981) will be calculated for hatchling paths and defined as the ratio of (1) the straight distance between the release point and the end point (the point where the hatchling is captured and the trial terminated), and (2) the actual distance traveled. The average swimming velocity for each hatchling will be calculated as the distance traveled between release and end points, divided by time. Average directions of swimming hatchlings will be compared using statistics for circular distributions (Batschelet, 1981). If applicable, the Kruskal-Wallis test and associated nonparametric multiple comparison test (Gibbins, 1985) will be used to compare straightness indices, average velocities and average directions among groups.

The percentage of hatchlings taken by predators will be calculated from the total number of hatchlings utilized for the trials at both treatment locations. The location of the take will be documented utilizing GPS along with visual descriptions of the location where the hatchling was taken. Because the trials will be conducted primarily at night when it will be difficult if not impossible to identify the predatory species, species of predatory fish will only be documented when known.

Trials will be completed consistently at low tide, or at various tidal conditions, during the months of July through October. The decision to conduct the trials at low tide or various tidal conditions will be decided upon by the Advisory Committee prior to commencement of the project. Environmental factors that could influence hatchling behavior will be documented, and if possible, controlled. Such factors include beach topography, ambient lighting conditions, background activity, and nearshore hydrographic conditions. At each trial location, both immediately before and after the trials are completed, surface current speed and bearing will be measured by tracking a lighted drogue at points perpendicular to the shore landward of the breakwater, beyond the groin and at the control area. At these same locations, the wave height / direction and wind speed /direction are to be recorded. A release location at each of the trial sites can be determined dependent upon outcome of the above to ensure that the hatchlings will not be swept out of the breakwater or T-groin locations.

Hatchling Collection

Members of the Advisory Committee will coordinate with the Florida Parks System and the Gasparilla Island Turtle Patrol to insure that a maximum of 40 nests are verified and marked along the Charlotte and Lee County, Gasparilla Island shoreline. Nest verification and marking will be conducted according to Florida FWC, Nest Productivity Protocol as follows. On the morning following egg deposition, the clutch site will be verified by carefully digging into the sand by hand. Following location of the uppermost eggs a temporary mark is to be placed at the sand surface to indicate the clutch location. Following the placement of several handfuls of moist sub-surface sand, the area is to be packed by applying steady pressure with the fist. The excavated sand is to be replaced to the original height. The nest will be marked with redundant location indicators so that monitoring personnel can locate the clutch in approximately two months. A sample method for marking the nests is to place one nest marking stake two feet landward, and one stake two feet seaward of the clutch location. An optional method is to bury a crushed aluminum can two feet north of the clutch and one foot deep into the sand.

The selected nests will be monitored throughout incubation. The incubation data for the Gasparilla Island shoreline will be utilized to determine the approximate date of hatch. Nests due to hatch will be checked at sunrise for evidence of eminent hatchling emergence. A depression or cone in the sand over the nest cavity indicates that the hatchlings have pipped out of their egg shells and may be near the surface. A temporary restraining cage, monitored during the evening that hatchlings are expected, may be placed over the nest to collect hatchlings when they emerge, or, by carefully probing with fingers, hatchlings that are within 10 cm of the surface may be removed from the sand on the same evening that the tracking trials are to be completed. Depending upon the availability of hatchlings, from 18 to 27 (the 9 extra hatchlings are being collected as a precautionary measure to ensure that at least 18 are vigorous) will be removed from either the nest or restraining cage and will be placed immediately in a darkened container until released on the project or control beach. Any hatchlings not used during the evening trials will be released that same night. All efforts will be made to release hatchlings within one to three hours following emergence or removal from the nest. All information, including the number of hatchlings removed, location of the nest(s), and date and time of removal will be forwarded the following morning to the appropriate Principal Permit Holder.

Trials are to be carried out at dark (2100-0500h) and a target number of 18 hatchlings will be tracked at each of the trial locations for both treatments (T-groins and breakwater) per night. In order to record hatching actions on video and to check trial methodology, at least one hatchling release at each treatment location (n=18 hatchlings) will occur prior to sunset or just after sunrise. In the event that storm or tidal activity destroy the marked nests, hatchlings can be obtained from nests located on the northern, Charlotte County shoreline of Gasparilla Island, or the Sarasota and/or Charlotte County shoreline of Manasota Key.

Hatchling Tracking Methodology

The tracking method to be utilized was developed by Blair Witherington of the Florida Marine Research Institute (Witherington, 1991). A 0.5 cm square, 10 cm long balsa wood float (no greater than 2 g) with a lead keel is to be fitted with a small chemical light stick (Cyalume) or light reflective vinyl. This balsa float will be towed by tethering it to the hatchling. The total mass of the float rig should be no greater than 1.9 g, <10% of the weight of a loggerhead hatchling. The average swimming velocity of hatchlings towing these floats was found to be comparable with or slightly lower than velocities recorded for a sample set of loggerhead hatchlings swimming without floats (Witherington, 1991). The hatchlings will be observed using night-vision goggles and an infrared light source if the vinyl is used. Infrared light has been documented to have no visible effect on hatchlings, even at close range (1 m). The Wyneken method of tethering hatchlings is to be utilized. Two other methods of tethering hatchlings have also been utilized successfully in the past and are discussed below as alternative methods in the event that problems arise with the Wyneken method.

The <u>Wyneken method</u> of tethering utilizes a 1.5 to 2.0 m long light cotton thread which is also attached to the balsa wood float (Wyneken and Salmon, 1996). A slip knot is made in the opposite end which is then placed just behind the front flippers, between the flippers and the carapace.

The <u>Witherington method</u> of tethering the float to the hatchling (Witherington, 1991) utilizes a 2.0 m long piece of monofilament line (1- 5 kg test strength) attached to the float at an eyelet on one end. The opposite end attaches to a small (#20) wire hook. The hook is inserted into the soft pygal scutes at the posterior edge of the carapace of each loggerhead hatchling. The barb on the hook is flattened to allow the hook to be removed following the end of the trials and the hook is to be notched with a metal file to ensure that it corrodes rapidly if retrieval is not possible.

The <u>Pilcher method</u> of tethering (Pilcher et al.. 1999) utilizes a Lycra harness with a velcro attachment placed around the hatchling. The monofilament line is sewn into the Lycra harness and attaches at the opposite end to the float.

At the trial location the hatchling which is going to be used is to be removed from the darkened container, measured, and fitted with a balsa wood float (see options for attachment above). If hatchlings are released for T-groin trials and the distance from the sandy beach to the "head" of the T is less than 3 m the line attaching the float to the hatchling will be shortened accordingly. The hatchling will be placed on the sand by monitoring personnel dressed in dark clothing. The monitoring personnel will hold the float in hand and remain behind the hatchling while it crawls down the beach. The hatchling crawl orientation is to be documented using a hand held GPS. When the hatchling enters the water, it is to be allowed to begin swimming at which time the monitoring personnel will release the balsa float into the water behind the hatchling and alert the in-water observer. The observer will follow the float and hatchling in a kayak, or if the distance is less than 3 m, the hatchling will be followed by one observer on shore and one observer on the structure (T-groin) or in a kayak. Observers will use night-vision goggles and an infrared light source to watch the swimming hatchling while a driver maintains and records the boat position. Hatchling positions are to be recorded as GPS waypoints at two to five minute intervals or when the hatchling makes an abrupt change in direction or is taken by a predator. A constant offset of the observer from the hatchling will allow a calculation of turtle position from the observer position. The boat is to remain approximately 5-30 m from the hatchling and lateral to its direction of movement. In a previous hatchling tracking study, the presence of a similar, human propelled boat did not cause swimming hatchlings to alter their path (Witherington, 1991.) Hatchlings are to be followed for 30 minutes or until beyond the structures, whichever is shorter. Any hatchling that encounters either the T-groin or breakwater will be followed to determine the complete effects of the structure on the hatchling migration or until the hatchling is taken by a predator. Following completion of the trial at the control, T-groin or breakwater locations, the hatchlings will be retrieved, the tethering and float will be removed, and the hatchling will be released. Retrieval will not be possible if the hatchling has been taken by a predator, but the location and time of predation will be documented. The average swimming velocity for each hatchling can be calculated as the distance traveled between release and end points, divided by time.

Anticipated Results:
When documenting the effects, if any, of erosion control structures on hatching activity, it is necessary to project a multi-year study due to the seasonal changes in the shoreline over time. A 3 to 5 year study will allow the documentation of colonization of the erosion control structures and will provide information on whether hatchlings are taken near the structures or whether the structures have an impact on hatchling migration. Following completion of the study, data will be published and made available to aid regulators and engineers in the accurate determination of the effects of these erosion control structures (offshore emergent breakwater and T- groins) on sea turtle hatchling survival and migratory activity.

Equipment
(Attached spreadsheet)

Time line:

Target Date for Completion:	**Activity:**
July - October, 2002	Hatchling release for baseline data prior to construction of erosions control structures and sand placement.
April 1 (week of), 2003-2005	Meet with the Advisory Committee (FWS, FWC, Humiston & Moore Engineers, Gasparilla Island Turtle Watch and Lee County Natural Resources Dept.) for an on-site field visit to define release

	and control locations and any other project parameters.
April 15 (week of)	Coordinate with Gasparilla Island Turtle Watch, Little Gasparilla Island Turtle Patrol, and Manasota Key Principle Permit Holders regarding nest verification, marking and procedures.
May 15	Names and Permit #'s for all personnel forwarded to FWS and FWC
May 31	Update FWS, FWC, Lee County, Humiston & Moore Engineers (referred to as "all parties") verbal or written.
June 1	Confirm that the 2 T- groins and the segmented breakwater are performing as designed.
June 10	Coordinate release location at Control with FWS and FWC
June 15	Trial run (without hatchling) during daylight and/or after sunset
June 28	Begin hatchling trials and update all parties (verbal or written)
July 15	Trial run (prior to sunset or just after sunrise) with hatchlings (date may change dependent upon availability of hatchlings)
July 15	Maximum of 40 nests verified and marked with redundant location indicators
July 31	Update all parties (verbal or written)
August 30	Update all parties (verbal or written)
September 27	Update all parties (verbal or written)
October 15	Target date for completion of trials at both treatment locations.
October 31	Copies of nest information including date, time and # of hatchlings removed, hatchling orientation maps submitted to FWS and FWC
December 15	Target date for final report to be submitted to FWS, FWC, Lee County Natural Resources Dept. and Humiston and Moore Engineers

Budget: Budget will include 3 sets of equipment and 3 teams. (See attached Budget Spreadsheet)

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APPENDIX E – SUBMERGED ARTIFICIAL REEF TRAINING (SMART) STRUCTURE & ENVIRONMENTAL SPECIFICATIONS

SECTION 227 NATIONAL SHORELINE EROSION CONTROL DEVELOPMENT AND DEMONSTRATION PROGRAM
63RD STREET "HOTSPOT"
MIAMI BEACH, FLORIDA

THE FOLLOWING SPECIFIC INFORMATION IS PROVIDED TO ESTABLISH SMART STRUCTURE QUALITY ASSURANCES AND ENVIRONMENTAL PROTECTIONS.

SECTION 6 ENVIRONMENTAL PROTECTION.

6.1 GENERAL.

6.1.1 SCOPE OF WORK.

This Section covers prevention of environmental pollution and damage as the result of construction operations under this contract and for those measures set forth in other Sections of these specifications. For the purpose of this specification, environmental pollution and damage is defined as the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to man; or degrade the utility of the environment for aesthetic, cultural and historical purposes. The control of environmental pollution and damage requires consideration of air, water, and land, and includes management of visual aesthetics, noise, solid waste, radiant energy and radioactive materials, as well as other pollutants.

6.1.2 Quality Control.

The Contractor shall establish and maintain Quality Control for environmental protection of the items set forth herein. The Contractor shall record on daily reports, problems in complying with laws, regulations, and ordinances, and the corrective action taken.

6.1.3 Submittal.s

The Contractor shall submit an Environmental Protection Plan in accordance with provisions as herein specified.

6.1.3.1 Environmental Protection Plan.

Environmental Protection Plan shall include but not be limited to the following:

A. A list of governmental laws, regulations, and permits concerning environmental protection, pollution control and abatement that are applicable to the Contractor's proposed operations and the requirements imposed by those laws, regulations and permits.

B. Methods for Protection of Features to be preserved within authorized work areas. The Contractor shall prepare a listing of methods to protect resources needing protection, including landscape features, air and water quality, fish and wildlife, soil, historical, archeological, and cultural resources.

C. Procedures to be implemented to provide the required environmental protection and to comply with the applicable laws and regulations. The Contractor shall set out the procedures to be followed to correct pollution of the environment due to accidental or natural causes.

6.1.4 Implementation.
Within 15 days after receipt of Notice to Proceed, the Contractor shall submit in writing an Environmental Protection Plan. Approval of the Contractor's plan will not relieve the Contractor of its responsibility for adequate and continuing control of pollutants and other environmental protection measures.

6.1.5 Subcontractor.
Assurance of compliance with this Section by subcontractors will be the responsibility of the Contractor.

6.1.6 Notification of Non-Compliance.
The Project Manager will notify the Contractor in writing of observed non-compliance with the aforementioned governmental laws or regulations, permits and other elements of the Contractor's Environmental Protection Plan. The Contractor shall, after receipt of such notice, inform the Project Manager of proposed corrective action and take such action as may be approved. If the Contractor fails to comply promptly, the Project Manager may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No time extensions shall be granted or costs or damages allowed to the Contractor for such suspension.

6.1.7 Payment.
No separate payment or direct payment will be made for the cost of the work covered under this Section and the work will be considered a subsidiary obligation of the Contractor.

6.2 PRODUCTS (NOT APPLICABLE).

6.3 EXECUTION.

6.3.1 Protection of Environmental Resources.
The environmental resources within the project boundaries and those affected outside the limits of permanent work under this contract shall be protected during the entire period of this contract. The Contractor shall confine its activities to areas defined by the drawings and specifications. Environmental protection shall be as stated in the following subparagraphs.

6.3.1.1 Protection of Land Resources.
Prior to the beginning of construction, the Contractor shall identify the land resources to be preserved within the Contractor's work area. The Contractor shall not remove, cut, deface, injure, or destroy land resources without special permission from the Contracting Officer. Ropes, cables, or guys shall not be fastened to or attached to trees for anchorage unless specifically authorized. Where such special emergency use is permitted,

the Contractor shall provide effective protection for land and vegetation resources as defined in the following subparagraphs.

6.3.1.2 Protection of Landscape.
Landscape features identified by the Contracting Officer to be preserved for removal by others shall be clearly identified by marking, fencing, or wrapping with boards, or other approved techniques.

6.3.1.3 Location of Field Offices, Storage, and Other Contractor Facilities.
The Contractor's field offices, staging areas, stockpile storage, and temporary buildings shall be placed in approved areas. Temporary movement or relocation of Contractor facilities shall be made only on approval.

6.3.1.1 Temporary Excavations and Embankments.
Temporary Excavations and Embankments for plant or work areas shall be controlled to protect adjacent areas from despoilment.

6.3.1.4 Placement of Solid Wastes.
Solid wastes, excluding clearing debris, shall be placed in containers, which are emptied on a regular schedule. Handling and disposal shall be conducted to prevent contamination.

6.3.1.5 Placement of Discarded Materials.
Discarded materials, other than those, which can be included in the solid waste category, will be handled as directed.

6.3.1.6 Sanitation Facilities.
The Contractor shall provide and operate sanitation facilities that will adequately treat or dispose sanitary wastes in conformance with local health regulations.

6.3.2 Protection of Water Resources.
The Contractor shall keep construction activities under surveillance, management, and control to avoid pollution of surface and ground waters. The contractor shall investigate and comply with all applicable Federal, State, and local laws concerning pollution of surface and groundwater. Special management techniques, as set out below, shall be implemented to control water pollution by the listed construction activities, which are included in this contract.

6.3.3 Protection of Fish and Wildlife Resources.
The Contractor shall keep construction activities under surveillance, management, and control to minimize interference with, disturbance to, and damage of fish and wildlife. Species that require specific attention

along with measures for their protection will be listed by the Contractor prior to beginning of construction operations.

6.3.4 Protection of Air Resources.

The Contractor shall keep construction activities under surveillance, management, and control to minimize pollution of air resources. Activities, equipment, processes, and work operated or performed by the Contractor in accomplishing the specified construction shall be in strict accordance with emission and performance laws and standards. Ambient Air Quality Standards set by the Environmental Protection Agency shall be maintained for the construction operations and activities specified herein. Special management techniques as set out below shall be implemented to control air pollution by the construction activities included in the contract.

SECTION 7 SMART Structure.

7.1 GENERAL.

7.1.1 Scope.

The work covered by this section consists of furnishing all labor, materials, and equipment, and performing all operations required for construction of the SMART Structure as specified herein and shown on the drawings, including purchase, handling, transportation and placing of materials.

7.1.2 References.

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ACI 211.191	Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
ACI 304	Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete
ACI 305R 91	Hot Weather Concreting
ACI 306R 88	Cold Weather Concreting
ACI 308	Standard Practice for Curing Concrete
ASTM A 185	(1997) Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
ASTM A 416/A 416M	(1996) Steel Strand, Uncoated Seven-Wire for Prestressed Concrete
ASTM A 615/A 615M	(1996a) Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM C 33	(1999ae1) Concrete Aggregates
ASTM C 39	Standard Specifications for Compressive Testing
ASTM C 94	Ready Mix Concrete

ASTM C 127	(1988) Test Method for Specific Gravity and Adsorption of Coarse Aggregate
ASTM C 131	(1989) Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion in the Los Angeles Machine
ASTM C 150	(1999)Portland Cement
ASTM C 260	Standard Specifications for Air-Entraining Admixtures for Concrete
ASTM C 295	Recommended Practice for Petrographic Examination of Aggregates for Concrete
ASTM C 494-92	Standard Specifications for Chemical Admixtures for Concrete
ASTM C 535	(1996) Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 618	Fly Ash For Use As A Mineral Admixture in Portland Cement Concrete
ASTM C 1116	Standard Specifications for Fiber Reinforced Concrete or Shotcrete
ASTM C 1201-91	Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration
ASTM C 1240-93	Standard Specifications for Silica Fume Concrete
CRD-C-144	(1992) Standard Test Method for Resistance of Rock to Freezing and Thawing

CORPS OF ENGINEERS (COE)

EM 385-1-1	(Sep 1996) Safety and Health Requirements

7.1.3 SITE CONDITIONS.
The work area is subject to tidal action and wave forces and is therefore dynamic in nature. Consequently, the site conditions may have changed since the date of the surveys used for preparation of the contract drawings. The Contractor shall field verify existing conditions at the work site. The conditions at the work site require that a lifesaving skiff be manned and immediately available when working on water. All safety equipment shall be in accordance with the requirements of EM 385-1-1.

7.1.4 Access by Water.
The RBAM units and individual reefballs shall be place from the water only. There shall be no utilization of the beach area except for support services, i.e. surveys.

7.1.5 Submittals.
The following documents shall be submitted:

7.1.5.1 Work Plan.
The Contractor shall submit to the Contracting Officer for approval at least 14 days prior to the start of work his plan for purchasing, fabricating, handling, transportation, and storage of all materials. The Contractor shall include in this plan the details of the work methods, the personnel, and the equipment to be utilized in placing the RBAM units and individual reefballs in the approximate locations indicated in the contract drawings. Also, the Contractor shall include plans for diving to confirm the proper placement of the RBAMs and individual reefballs.

7.1.5.2 Diving Report.
The Contractor shall submit a diving report indicating the proper or improper placement of the RBAM units and individual reefballs. The report shall also describe distances between each of the RBAM units. Distances between each adjacent RBAM Unit shall be measured at three locations: western edge, midway, and eastern edge. The report shall refer to each RBAM units and individual reefball by its assigned number.

7.1.5.3 Surveyor Qualifications.
The Contractor shall submit qualifications of the licensed surveyor for land and hydrographic surveying.

7.1.5.4 Pre-Construction Condition Surveys.
The Contractor shall provide onshore-offshore survey cross-sections within 30 days after the Notice to Proceed.

7.1.5.5 Surveys of the SMART Structure.

The Contractor shall provide post-construction, as-built, plans of the Smart Structure, indicating the RBAM units and individual reefballs by number, their location, and their elevation.

7.1.5.6 Record Drawings.

The Contractor shall keep a careful record during the progress of the work of all changes and corrections from the layout shown on the contract drawings. The Contractor shall document such information on one set of record drawings promptly, but in no case less than on a weekly basis. The record drawings shall be submitted to the Project Manager at the conclusion of the contract period.

7.1.6 Testing.

All testing of material from a source which has no test and service records shall be performed by an approved, industry-recognized testing laboratory. Tests to which stone shall be subjected to are petrographic analysis (ASTM C 295), specific gravity (ASTM C 127), abrasion (ASTM C 535), absorption, wetting and drying, freezing and thawing (CRD C 144), and such other tests as may be considered necessary by the Project Manager to demonstrate the suitability of the material for use in the work. All testing shall be performed at no additional cost to URS and the test results shall be submitted for approval by the Project Manager no less than 7 days in advance of delivery of material to the work site.

7.2 PRODUCTS.

7.2.1 RBAM Units and Individual Reefball Units.

The RBAM Units shall be fabricated from reefballs and Articulating Block Mats (ABMs) as shown in the contract drawings. The concrete used in both the reefballs and the ABMs are shall have the following properties:

7.2.1.1 Concrete Strength Requirements.

Compressive strengths for reefballs shall be tested in accordance with ASTM C 39. Compressive strengths shall reach a minimum of the following table at the time of use of at least:

Super/Ultra/Reefball (psi)		**Pallet Ball (psi)**
Floating Deployment	8,500+	7,000+
Barge Deployment	7,000+	5,500+
To remove from mold	750+	750+
To lift from base	1,500+	1,200+

The blocks for the ABMs will be manufactured at a local block plant. The minimum 28-day compressive strength will be 4,000 psi.

7.2.1.2 Concrete Mix Design.

A typical baseline specification for trill mixture proportions is as follows:

A. Portland Cement: Shall be Type II and conform to ASTM C-150

B. Fly Ash: Shall meet requirements of ASTM C-618, Type F. And must be proven to be non-toxic as defined by the Army Corps of Engineers General Artificial Reef Permits. Fly Ash is not permitted in the State of Georgia and in most Atlantic States. (In October, 1991, The Atlantic States Marine Fisheries Commission adopted a resolution that opposes the use of fly ash in artificial reefs other than for experimental applications until the Army Corps of Engineers develop and adopt guidelines and standards for use.)

C. Water: Shall be potable and free from deleterious substances and shall not contain more that 1000 parts per million of chlorides or sulfates and shall not contain more than 5 parts per million of lead, copper or zinc salts and shall not contain more than 10 parts per million of phosphates.

D. Fine Aggregate: Shall be in compliance with ASTM C-33.

E. Coarse Aggregate: Shall be in compliance with ASTM C-33 #8 (pea gravel). (Up to 1 inch aggregate can be substituted with permission from the mold user.) Limestone aggregate is preferred if the finished modules are to be used in tropical waters.

F. Concrete Admixtures: Shall be in compliance with ASTM C-494.

G. Required Additives: The following additives shall be used in all concrete mix designs when producing the Reef Ball Development Group's product line:

1) High Range Water Reducer: Shall be ADVA Flow 120 or 140.

2) Silica Fume: Shall be Force 10,000 Densified in Concrete Ready Bags as manufactured by W.R. Grace. (ASTM C-1240-93)

3) Air-Entrainer: ONLY IF ADVA is not used: Shall be W.R. Grace Darex II (ASTM C-260)

4) Optional Additives: The following additives may be used in concrete mix designs when producing Reef Ball Development's product line:

a. Fibers. Shall be either Microfibers as manf. by W.R. Grace, or Fibermesh Fibers (1 1/2 inches or longer)

b. Accelerators: Any Non- Calcium Chloride or W.R. Grace Daracell (ASTM C-494 Type C or E)

c. Retarders: Shall be in compliance with ASTM-C-494-Type D as in W.R. Grace Daratard

d. Prohibited Admixtures: All other admixtures are prohibited.

7.2.1.3 Trial Mix Design

Sample concrete mix design for the reefballs and ABMs:

	One Cubic Yard	**One Cubic Meter**
Cement:	600 lbs. (Min.)	356 kg
Aggregate:	1800 lbs.	1068 kg
Sand:	1160 lbs	688 kg
Water:	240 1bs. (Max.)	142 kg
Force 10K:	50 lbs	30 kg
Grace Microfibers	.25 bag	.3 bag
Adva Flow 120 or Adva Flow 140	3.5-5 ounces per 100 lbs cement or 6-10 ounces per 100 lbs cement	1

7.2.1.4 Casting guidelines

For successful casting of dolosse units, the following guidelines are recommended:

1. Concrete is usually placed in formworks in lifts no more than 24 in.
2. Each lift should be vibrated to remove voids.
3. Armor Units with cold joints are to be rejected.
4. In general, forms should be stripped no sooner than 48 hours.
5. A curing agent should be applied as soon as the forms are stripped.
6. Steam curing is not acceptable.
7. The heat of hydration should never be allowed to exceed 75° C.

7.2.2 Geosynthetic Fabric

The RBAM units will require a geosynthetic filter fabric to prevent scour and the migration of sand through the openings the ABM. The fabric shall be attached to the ABM so that it is smooth and free of tension, stress, folds, wrinkles, or creases. Adjacent edges shall be joined with a seam.

The geosynthetic shall be a woven or non-woven pervious textile as defined by ASTM D 123. The geosynthetic fiber shall consist of a long-chain synthetic polymer composed of at least 85 percent by weight of propylene, ethylene, ester, amide, or vinylidenechloride, and shall contain stabilizers and/or inhibitors added to the base plastic if necessary to make the filaments resistant to deterioration due to ultraviolet and heat exposure. The geosynthetic shall be fixed so that the fibers will retain a stable matrix and their relative position with respect to each other. This stable matrix shall prevent movement of the fibers and the formation of any openings in the geosynthetic during handling and/or placement. The edges of the geosynthetic shall be finished to prevent the outer fibers from pulling away from the geosynthetic.

All numerical values represent MARV (minimum average roll value) with the exception of the AOS value, which is based on the average value. The geotextile properties represent the test result from as received material, which means unaged material.

The machine direction (MD) of the geotextile should be placed along the principle direction of the slope, which is the inshore/outshore direction of the breakwater. The geosynthetic shall be manufactured in a width not less than 12 feet and shall meet the physical requirements in the following table.

PHYSICAL REQUIREMENTS

Physical Property	**Test Procedure**	**Acceptable Test Results**
Tensile Strength (Unaged Geotextile)	ASTM D 4595	1800 pounds per inch minimum in the machine direction (MD) and 600 pounds per inch minimum in the cross-machine direction (XD).
Breaking Elongation (Unaged Geotextile)	ASTM D 4595	10 percent minimum in any principal direction
Bursting Strength (Unaged Geotextile)	ASTM D 3786	1200 pounds per square inch minimum
Puncture Strength (Unaged Geotextile)	ASTM D 4833	200 pounds minimum
Apparent Opening Size (AOS)	ASTM D 4751	U.S. Standard Sieve Nos. 40-70
Trapezoidal Tear Strength	ASTM D 4533	150 pounds minimum in any principal direction
Permittivity	ASTM D 4491	0.07 per sec minimum
UV Stability	ASTM D 4355	50% after 500 hours of exposure

The seams of the high strength geotextile shall be sewn with thread. Seams may be temporarily tack-bonded, prior to sewing, by approved thermal methods (e.g., wedge welding, hot air, hot plate, hot knife, ultrasonic devices, etc.). The thread type shall be polymeric with chemical and ultraviolet light resistant properties equal or greater than that of the geotextile itself. The color of the sewing thread shall contrast that of the color of the geotextile for ease in visual inspection. Seamed geotextile shall be joined with a folded seam using a single lock-type stitch seam or a double chain type stitch seam. The minimum distance from the geotextile edge to the stitch line nearest to that edge shall be 3 inches, unless otherwise recommended by the manufacturer. Patch seams shall have multiple stitch rows in accordance with the manufacturer's recommendations. Sewing may be done on-site or by the manufacturer. The thread at the end of each seam run shall be tied off to prevent unraveling. Seams shall be on the top of the geotextile to allow inspection. Seams shall be tested in accordance with method ASTM D 1683 4884., using 1-inch square jaws and 12 inches per minute constant rate of traverse. The strengths shall be not less than 300 pounds per inch.50 percent of the required tensile strength of the unaged geotextile in the machine direction.

7.2.2.1 Protection of Fabric
The fabric shall be protected at all times during construction. Any damage to the fabric during its installation or during placement of RBAM Units shall be repaired or replaced by the Contractor.

7.2.2.2 Repair of Fabric
The Contractor shall perform the following procedure when repairing damaged sections of the fabric during or following its installation:

a. The damaged section of the fabric shall be cut in a rectangular or square section and removed.
b. An undamaged piece of fabric shall be seamed over the original fabric so that its edges over-lap the cut area a minimum of 2 feet in all directions.

7.3 EXECUTION.

7.3.1 Access to Land.
The Contractor shall utilize berthing areas as directed by the Project, determined at "start-of-construction", for off-loading equipment, materials and labor. Other areas for off-loading require the prior approval of the Project Manager.

7.3.2 Construction Methods
Construction must be accomplished from the water. Equipment and/or materials may be staged on barges and/or on land. If equipment and/or materials are staged on land, they shall be staged in the areas specified by the Project.

7.3.3 Locating and Placing the RBAM Units
7.3.3.1 Determining the Alignment
7.3.3.1.1 Horizontal Alignment
The location for placement of the RBAM Units and individual reefballs, as shown on the contract drawings, is approximate and for bid purposes only. The exact alignment of the RBAM Units and individual reefballs will be determined and directed by the Project Manager after pre-construction surveys have been submitted and reviewed.

7.3.3.1.2 Vertical Alignment

The objective of the project is to place the RBAM units at the approximate elevation of -7.0 (mean low water) MLW. It may not be practical, however, to place the units along the -7.0 MLW contour. For bid purposes, the Contractor shall assume that the RBAM Units shall be placed at an elevation within plus or minus 1.0 feet of -7.0 MLW.

7.3.3.2 Placing the RBAM Units

RBAM Units must be handled carefully – excessive impact stresses can be generated from even moderate drop heights (<20 in.). If a unit is dropped it must be carefully inspected by the Project Manager or a qualified URS representative. If the unit is cracked it must be rejected. Once on site, if a unit is found to be cracked, it will not be placed. The RBAM Units shall be placed in a side-by-side pattern with a minimal space not to exceed 0.5 foot between adjacent units. The Contractor shall utilize divers to confirm the proper placement of each unit and to confirm that the units are properly placed within the required tolerances. All diving shall be in accordance with Section 5 DIVING SERVICES. The divers shall submit a report as specified in paragraph "SUBMITTALS," herein. Upon placement of one-half of all of the units to be placed, and, after confirmation of proper placement of those units by the divers, the Contractor shall immediately survey the crest of each placed unit to determine each unit's location and elevation. The Contractor shall submit a listing of each unit, by its number, indicating each unit's location and elevation. After approval of that survey information by the Project Manager, the Contractor shall proceed and continue to place the remaining units. The Contractor shall survey the crest of ALL placed units and submit a listing of each unit, by its number, indicating each unit's location and elevation.

7.3.4 General Survey Requirements

All land surveys shall be performed under the direction and supervision of a Professional Licensed Surveyor. All hydrographic surveys shall be conducted under the direction and supervision of a Surveyor certified by the American Congress on surveying and Mapping (ACSM) as an In-Shore Hydrographer, or by a Professional Licensed Surveyor with a minimum of 5 years documented experience in a hydrographic surveying environment similar in nature to the surveys required under this Contract. 7.3.4.1 Control Survey control will be established from the existing survey control description data provided in Section 00840 of these specifications. The Contractor shall utilize NAVD 1988 as the vertical datum for elevation and depth references for all cross sections, and shall be responsible for obtaining necessary ocean tide height measurements during the survey periods to assure that accurate adjustments are made to the observed depths to account for tidal variations in water level. The Contractor shall utilize Florida State Plane Coordinate System NAD 1983 as the horizontal reference datum. 6.3.6.2 Tolerances The landward portion of the profile lines shall be surveyed utilizing surveying procedures and methodology that meet or exceed accuracy tolerances of +/- 0.10 feet in the vertical and +/- 0.50 in the horizontal with a 95% confidence level. Hydrographic surveys will be conducted to meet requirements for Class 1, Contract Payment Surveys, as outlined in U.S. Army Corps of Engineers Hydrographic Surveying Manual (DRAFT) EM-1110-2-1003, dated 1 Jan 2001. Surveys will be performed by single transducer sounding techniques, multi-beam sweep type surveys or both. Bottom soundings will be obtained by the single beam survey fathometer operating at a frequency ranging from 194 to 206 Khz. When utilizing multi-beam technology, the operating frequency will range from 180 to 250 Khz. All fathometers will be calibrated following procedures outlined in the aforementioned EM and EC. All surveying procedures, methods and equipment for landward beach surveys, hydrographic surveys and tidal monitoring (if applicable), shall be reviewed and approved by the Government Survey Point of Contact prior to the conduct of any type of surveying work. This review process shall also include the review and acceptance of the Surveyor's Qualifications.

END OF SECTION

APPENDIX F – PHYSICAL AND BIOLOGICAL MONITORING PROGRAM

SECTION 227 NATIONAL SHORELINE EROSION CONTROL DEVELOPMENT AND DEMONSTRATION PROGRAM
63RD STREET "HOTSPOT"
MIAMI BEACH, FLORIDA
MONITORING PROGRAM OUTLINE

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Section 1 – INTRODUCTION and BACKGROUND

The Miami-Dade County Department of Environmental Resources Management (DERM) and the US Army Corps of Engineers (CORPS), plan to install a 2,272-foot long SubMerged Artificial Reef Training (SMART) structure approximately 400-foot offshore of the mean low water (MLW), adjacent to the 63rd Street erosional "Hotspot" of Miami Beach, Florida. The SMART structure would be installed as an erosion control and wave attenuation measure and would be placed in approximately 7-foot of water (see Cross Section Figure 2). The U.S. Army Engineer Research and Development Center (ERDC) would also be involved with the proposed SMART structure monitoring effort.

The proposed project is authorized by the Water Resources Development Act (WRDA) of 1996, Section 227, National Shoreline Erosion Control Development and Demonstration Program. Under Section 227, innovative technologies are developed to demonstrate shoreline erosion abatement in a cost-effective and environmentally friendly manner. Performance metrics are developed to measure the successfulness of the demonstration project. The proposed structures can be modified or removed within the lifespan of authority.

A demonstration project has to demonstrate something. The monitoring program is the mechanism to "demonstrate" whether the SMART structure can provide a benefit (or are detrimental). This test plan establishes the criteria against which the performance of the SMART structure would be measured and evaluated. This could have implications on how the Miami-Dade County beaches are managed in the future (i.e., renourishment interval and treatment of "hot spots"). This in turn could have environmental impacts or benefits. The coastal engineering and environmental aspects of shore protection are inter-related.

The development and implementation of a monitoring plan is conducted to gather data and analyze it to provide a comprehensive and unbiased documentation of the performance of the proposed SMART structure. The application of this 3-year experimental test plan as prepared by the ERDC and reviewed by DERM would provide an unbiased evaluation of the performance of the SMART structure. ERDC develops innovative science and technology solutions to support warfighting, infrastructure, environmental, water resources and disaster operations. The local sponsor, DERM, would implement the following monitoring plan, which has been appropriately scaled to the proposed project and based on other coastal monitoring plans, research and conversations with scientists, biologists and engineers.

The monitoring program contains several elements designed to test the effectiveness of the SMART structure on the local coastal environment, including determinations of:

a). the functional ability of the SMART structure to retain sand and stabilize the shoreline as measured through shoreline change;

b). the structural stability of the SMART structure to include structural integrity, settlement and scour resistance;

c). the environmental effects of the SMART structure on sea turtle beach access for nesting, fish and fouling communities, interaction of juvenile sea turtles
d). storm event contingency monitoring plan to include nearshore and offshore surveys, structure elevation surveys and scour measurements.

Long-term research to address USFWS concerns of cumulative secondary affects would include site visits and visual inspections. Coordination of this information would be made available to interested resource agencies. Consideration of USFWS, NMFS and FDEP recommendations included in prior coastal reports (Coast of Florida, Region III, 1996, Sunny Isles Submerged Breakwater, 1997, Proposed Test Fill At Miami Beach, 2002).

2. MEASURES OF SMART PHYSICAL PERFORMANCE

2.1 General. The SMART offshore, segmented breakwater attenuates wave energy through processes of wave shoaling and breaking, increasing bottom friction and inducing turbulence, refraction, reflection and diffraction. Measures of performance are proposed to evaluate whether the project meets the intended objectives generally defined by the Section 227 Demonstration Program. These proposed measures focus on quantifying two categories of performance criteria:

- Functional - sand retention and stabilization of shoreline.
- Structural - stability of the reef, structural integrity, settlement and scour-resistance.

For each performance category, measurement parameters are defined, and performance criteria are suggested.

2.2 Functional Performance – Sand Retention and Shoreline Stabilization. Assessment of the functional performance of the SMART structure will be based on protecting the 63rd Street shoreline erosional "Hotspot" area. In the event the beach fill project is not completed, the SMART Reef will be assessed on how effective the site-specific shoreline is stabilized. However, it is assumed that the beach fill will take place. No net loss of beach shoreline is expected. Some shift of shoreline width may result in some net gain of beach.

Functional performance focuses on the degree to which the SMART structure retains sand and reduces sand loss from the shoreline. Sand loss may occur, to a lesser degree, to cross-shore processes (post-construction equilibration, seasonal beach profile change, and storm-induced beach erosion) and, to a greater degree, to longshore processes (natural gradients in longshore sand transport, and interruption of sand transport by structures). In order to predict performance, it has been assumed that cross-shore losses are negligible.

It is difficult, even in ideal conditions, to predict the long-term fate of the beach fill, either with or without the SMART structure. To this end, GENESIS numerical modeling was utilized to predict shoreline evolution for both cases: beach fill stabilization with and without the structure.

Inputs for the model include local shoreline positions obtained from LADS surveys (~2000), shoreline erosion rates from USACE reports (Martin 2001) and WIS hindcast data (Station 470, 1990-2000, including storms). Several assumptions concerning the beach fill must be made as the project has not yet been awarded and the sand source is unknown at the time of this writing. The median grain size, construction or design template, and the volume of fill/LF are all unknown. Some data has been provided, such as a probable design template; this data has been used, with the assumption that the as-built construction profile may vary significantly from the proposed fill profile. Analysis addressing the potential error generated from the differences in planned vs. constructed templates is offered.

Comparisons of numerical results of the GENESIS shoreline model will be made with data collected during post-construction monitoring (beach profile surveys, aerial photography, Argus data, etc.). Functional performance can then be evaluated following each beach profile survey, starting from initial construction and continuing throughout the monitoring program. Performance should be evaluated over both incremental (survey to survey) and cumulative time scales.

2.2.1. Functional Parameters:

2.2.1.1. Volume Change: Loss or gain of volume measured over time between the landward point of profile closure and to a distance offshore defined by the depth of closure (in absence of an offshore structure). The volumes will be determined from beach profile surveys.

2.2.1.2. Change in Dry Beach Width: Change in distance measured from the "R" markers to the berm crest. This will be determined from beach profile surveys and Argus video data. A standard mean "shoreline" would be determined for this study, either a datum-based line (i.e. MHW) to be measured off the profiles or a visual line (e.g. the wet/dry line) to be measured off the aerial photography. The lines are not the same, so some provision would need to be undertaken to determine a relationship between these lines.

2.2.2. Performance Metrics:

2.2.2.1 Difference in net volume change behind structure and north control site. *Evaluation Criterion: Structure is successful in retaining sand if volume loss is 30% or less than control site.*

2.2.2.2. Difference in net volume change between in-situ measurements and GENESIS and SBEACH output. *Evaluation Criterion: Actual structure sand retention is within +/-20% of model results.*

2.2.2.3. Difference in dry beach width change behind structure and north control site. *Evaluation Criterion: Structure is successful in retaining dry beach width if beach width loss is 30% or less than north control site.*

2.2.2.4. Difference in dry beach width change between in-situ measurements and GENESIS output. *Evaluation Criterion: If relative reduction in beach width loss is +/- 20% of model results.*

2.3. Structural Performance – Structure Stability

Structural performance measures focus on stability of the offshore structures. Objectives are that the structures maintain functionality over a design life consistent with that of a beachfill project (i.e., 50 years) while requiring minimal operation and maintenance. Structural performance should be evaluated throughout the duration of the monitoring program.

2.3.1. Parameters:

2.3.1.1. Change in Elevation of Mean Structure Crest: Decrease in elevation of mean structure crest due to settlement or translation. Determined from baseline elevation surveys along the crest of the structure immediately following construction.

2.3.1.2. Change in alongshore Structure Integrity: formation of gaps in structure due to separation of interlocking units or other structure failure resulting in loss of structural integrity and excessive water transmission. Determined from elevation surveys along structure.

2.3.1.3. Scour: Elevation of seabed adjacent to structure (seaward and landward sides) in comparison to initial elevation at time of structure placement. Excessive scour may result in failure of structure.

2.3.2. Structural Performance Metrics:

2.3.2.1. Evaluation of above parameters for SMART structure.

2.3.2.2. Evaluation Criteria:

- Successful if average lowering of crest elevation is < 1-foot and maximum lowering is < 2-foot.
- Successful if no gaps form that result in structural instability.
- Successful if no permanent voids have formed beneath the mats.

SECTION 3 – MEASURES OF SMART BIOLOGICAL PERFOMANCE

Field data collection would begin during the period immediately prior to installation and for three years following installation. Each of the elements and their role in accomplishing the objectives outlined in Chapter III of the test plan are described below.

3.0 Monitoring Plan - Field Data Collection Program

3.1. Activity 1 - Topographic and Bathymetric Surveys. Beach and nearshore surveys would be conducted to document the topographic and bathymetric changes that occur throughout the project test area during the three-year monitoring period. These surveys would be conducted immediately prior to the installation of the SMART structure, periodically as described below, throughout the three year monitoring, after a significant storm event, and after placement of any fill within the monitoring area.

3.1.1. The survey monitoring area would extend approximately 5,000-foot north and south of the SMART structure terminus. Thirty profile lines would be surveyed. Ten profile lines would be surveyed within the SMART structure limits at a spacing of approximately 200-foot and twenty profile lines (ten to the north and ten to the south) would be surveyed outside of the SMART structure limits with a spacing of approximately 500-foot. Tolerance of all surveys would meet the specifications summarized in this chapter.

3.1.2. Surveys would be accomplished through a combination of "wading depth" surveys to extend from landward terminus locations to seaward of the SMART structure and hydrographic surveys seaward of the SMART structure. Included in the "wading depth" surveys would be a SMART structure condition survey to document the settling of individual units. SHOALS surveys may also be used extending from inside of the SMART structure seaward, but are not required.

3.1.3. Location of profile lines for the beach and nearshore surveys would be with total station and rod off of Florida DNR Monuments R-46A through R-44 previously established in the area and would have an azimuth of N70E. Profile lines commencing at Florida DNR

3.1.4. Monuments would extend to 3,000-foot offshore or –30-foot depth (whichever is less). Intermediate profile lines not commencing at Florida DNR Monuments would be surveyed to 1,200-foot offshore on a quarterly basis, 3,000-foot on an annual basis and would have an azimuth of N70E. The profile lines would be displayed in an appropriate figure.

3.1.5 Pre- and Post-Installation Surveys. Pre- and post-installation beach and nearshore surveys would be conducted immediately prior to and within three weeks following the SMART structure installation. A comparison of these surveys would be used to document the changes resulting from SMART structure installation. The post-installation survey would be used as the baseline survey to compare with subsequent surveys. In addition, in the event that a significant change in the bathymetry occurs between the pre-installation and the post installation period, an additional post-installation survey would be undertaken. The pre- and post-installation surveys would survey all profile lines to the distance specified for an annual survey, as described above.

3.1.6. Beach Fill Surveys. A beach fill survey would be required in the event that DERM, City of Miami Beach, or private property owners place fill within the project area. The DERM would survey the fill area within one week prior to and following placement of the fill or the quantity and location of the material would be reviewed by a professional engineer or surveyor.

3.1.7. Baseline Surveys. Beach and nearshore surveys would be conducted just prior to and within three weeks of SMART structure and every three months for the first year, and then every 4 months for the remaining two years of the monitoring period. As stated above, all profile lines would extend to 3,500-foot for the annual surveys and the intermediate lines would extend to 1,200-foot for the quarterly surveys.

3.1.8. Storm Contingency Surveys. A storm contingency survey would also be performed as deemed necessary by ERDC and DERM. A courtesy copy would also be provided the FDEP. This survey would be performed immediately following a significant storm event, when wave conditions permit and a notice to proceed provided by the FDEP. The storm contingency survey would include 12 survey profile lines to the distance specified for an annual survey.

3.1.9 Structure Elevation Surveys. Structure elevation surveys would be conducted on a quarterly basis for the first year. The structure elevation would be measured by sighting the elevations of each end of each unit with a rod from a total station situated on land. The elevation surveys would include scraping the biological growth off the top of the structure so that a true reading of structure settlement can be ascertained. The scraping can be performed with a metal spatula, hammer, and wire brush.

3.2. Activity 2 - Aerial Photography.

Controlled aerial photography at a scale of approximately 1" = 600-foot would be obtained annually as part of an ongoing program with the State of Florida.

3.3. Activity 3 - Scour Measurements.

Scour measurements would be performed following SMART structure installation for a period of 2-years during the project life. Measurements would be performed following significant storm events to measure expected maximum scour. The post-installation scour survey would act as the baseline survey. Scour would be visually assessed on a quarterly basis. Any areas of significant scour would be quantified during bathymetric surveys.

3.4. Activity 4 - Environmental Monitoring.

3.4.1. Impacts to Marine Turtles. The objective of this investigation would be to determine if the SMART structure exerts an impact on the seaward orientation behavior of hatchling turtles emerging from nests located on the beach adjacent to the reef. Methods: input would be solicited from various experts before deciding upon a final experimental design. Following the deployment of the SMART structure, the structure would be monitored to determine its influence on the coastal system. Of crucial importance would be a determination of how long the SMART structure would be exposed above the ocean surface. This determination would have an important bearing regarding the eventual research design of this investigation.

Beginning in Mid-August following installation, a sample of Atlantic loggerhead, *Caretta caretta*, hatchlings (not to exceed 150 animals) would be released from the beach at various sites located in the vicinity of the SMART structure and from a nearby control area. A special attempt would be made to use turtles still manifesting their "frenzy" behavior. Upon release the hatchlings would be followed at a non-impact distance either by swimming with snorkeling gear and/or via a paddleboard or sea kayak. All turtles would be tracked at least 300 feet east of the SMART structure. During this investigation, both early morning and nocturnal releases would be conducted.

To facilitate night tracking, individual hatchlings would be tethered to a one to two gram pencil diameter float. The tether line would be approximately two meters in length and would consist of a 10-pound test monofilament line. The float would be wrapped in either reflective tape to permit observation using a night vision scope or alternatively would consist of a chemical light source with a foil-screening device to prevent being seen by the hatchling attached to the tether line. Tether attachment would be accomplished using a self-corroding, 'barbless' fish hook (#20) implanted into the hatchling's marginal, distal scute. Every attempt would be made to retrieve the turtle in order to remove the hook upon termination of the tracking episodes.

To provide documentation of the orientation behavior during the early morning releases, a number of subject animals would be photographed using an underwater video camera. This would be especially important during tracking episodes involving animals being released when the SMART structure is exposed above or closest to the surface. If conditions permit, a statistical valid sample of animals would be released from a control site as well as from at least two SMART structure site. These subjects would be timed via stopwatch from the beach to a point approximately 100 feet seaward of the reef. An anchored buoy would be used to mark the precise distance. Every attempt would be made during these releases to control ocean related variables that might affect swimming speed and behavior (i.e. tidal state, long shore currents, sea state).

Once this timed experiment is completed, the three data sets would be statistically compared to determine if there is a significant difference in swimming speed between turtles released from the control and from the two SMART structure release sites. Although it would not be possible to systematically investigate hatchling predation rates, anecdotal observations would be made regarding the species of the predator as well as any other pertinent information deemed to be of significance.

Following the conclusion of the first season's tracking investigation, the results would be summarized in an interim report and then submitted to experts for their review and evaluation. From their comments and critiques, a more comprehensive tracking experimental design would be developed. During this time, it is anticipated that a larger sample of hatchlings would be involved so that a wider range of environmental and experimental conditions can be considered.

3.4.2. Impacts to Biological Communities. The proposed biological monitoring program provides a scientifically credible analysis of biological issues resulting from the installation of a SMART structure in the near shore of Miami Beach, Florida, while keeping monitoring costs to a minimum. The proposed monitoring program focuses on fish and fouling (hard substrate dwelling) communities associated with the reef modules. The monitoring would utilize quantitative scientific data to analyze the responses of fish and fouling organism communities that are attracted to the SMART structure modules. Collection of quantitative data would also be available to respond to the public in the event of any changes to near shore-fishing resources, which might be attributed to the presence of the reefs.

After installation, the SMART structure modules would presumably function as typical hard substrata and would develop a fouling community that would progressively increase in its abundance and diversity over time. Similarly, the physical structure provided by the reefs should provide an attractant for fishes. Studies on the development of the fouling and fish communities have not been done within the shallow, near shore region in the Miami Beach area. The precise nature of the development of these communities is important in several regards.

3.4.2.1. First, installation of the reef modules would involve the placement of reef modules on top of existing sand bottom areas with the consequent destruction of the natural communities at these locations. It is important to quantitatively document that the SMART structure modules themselves actually are providing habitat.

3.4.2.2. Secondly, the natural world is extremely variable. Changes in fish populations occur for natural reasons, and may occur during or after the project. It is always tempting to attribute change to an obvious factor such as the SMART structure, even if there is no functional relationship. Quantitative studies of fish populations would provide data to evaluate the potential role of the SMART structure versus natural factors should any major changes take place.

3.4.2.3. Third, fouling community development may be significant in terms of the long-term integrity of the SMART modules, which may be influenced by whether boring sponges, and urchins become established. Evaluation of bioerosion rates would assist in projections of project lifetime. A common near shore sponge species (*Cliona lampa*) can bioerode 3 kg per square meter per year on carbonate substrata in Bermuda (Rutzler, 1975).

3.4.2.4. Fourth, the interaction of sea turtles with the SMART structure is potentially important. Juvenile turtles are known to utilize near shore natural reefs as a food resource (Ehrhart, pers. comm.}, and local availability of benthic invertebrates for food may influence selection of nesting beaches for loggerheads (D. Nelson, 1988). Sharks, barracuda, snook, jacks, snapper, and other larger predatory species may potentially consume hatchling turtles (D. Nelson, 1988). While small artificial reefs located farther offshore in deeper water in the Miami Beach area did not develop large populations of predators over a two year period (Vose, 1990), the situation for large reef modules inshore may be quite different. Direct observation of predation events on sea turtles is extremely difficult, and therefore the best approach is to attempt to estimate the potential increase in predation pressure via estimation of changes in fish populations associated with reef installation.

3.5. Activity 5 - Storm Contingency Plan
Three monitoring elements would be performed in the event of a significant storm as deemed appropriate by DERM and FDEP. These three monitoring elements are: 1) nearshore/offshore surveys to 3,500 feet; 2) structure elevation surveys; and 3) scour measurements.

3.6. METHODS

3.6.1. Quarterly underwater surveys of reef modules would also be conducted to estimate coverage of encrusting and boring organisms. Benthic growth would be assessed using digital video transects using the protocols outlined in the Florida Marine Research Institutes "Standard Operating Procedures Field and Laboratory Operations: Florida Keys National marine Sanctuary Coral Reef/Hardbottom Monitoring Project" (http://www.cofc.edu/~coral/epacrmp/crmp.htm). Sponge coverage would be estimated as percent coverage. The quarterly sampling would evaluate changes in species, composition and numerical abundance, which occur in this community over time.

3.6.2. Fish Surveys
Quarterly daytime underwater fish surveys would be undertaken by SCUBA divers utilizing two census techniques. Transect surveys would be carried out along sections of the SMART structure and would provide primarily qualitative data on overall fish community composition. Stationary census data would be collected from fixed positions on the SMART structure to provide quantitative estimates of fish abundance.

3.6.3. Transect studies would consist of swimming the length of the SMART structure proceeding either along the inshore side and returning on the offshore side of the structure or vice versa. Three SMART nearshore and three SMART offshore survey points would be recorded for further data collection and comparison. During these surveys, additional effort would be made to survey crevices for cryptic species or for newly settled larval or juvenile fishes. Comparison would be made to three transects surveyed on randomly selected natural rock reefs offshore of the project area.

Data would be analyzed with two-way ANOVA (ANalysis Of VAriance between groups) to determine whether significant differences in the main factors of time and substrate type (natural versus SMART structure segments) occur.

3.6.4. Responsible Field Data Collection Tasks
As part of the monitoring plan, several parties would participate in various monitoring activities or be responsible for contracting of work associated with field data collection, data analyses and products including reports and presentations. Parties include DERM and FDEP.

3.6.5. Data Analysis

All data collected in accordance with this test plan would be completed in a form suitable for analysis, would be reduced by the data collector and provided to DERM within thirty days after each data collection effort. ASCII versions of the data are required in accordance with this test plan and would conform to DEP format. Periodic meetings would be held with all interested parties to discuss data and the interpretation of findings to date. Adjustments or refinements to the monitoring techniques may be proposed periodically. Any change to the monitoring plan would be approved by the FDEP.

3.6.6. Results would be documented in interim, annual and final reports. Interim reports would be submitted within thirty days following receipt of the field data by the parties listed above. Annual and Final reports would be submitted within forty-five (45) days upon receipt of the field data by the parties listed above. The analyses would focus on quantifying: 1) the effect of the SMART structure on waves and currents and its interaction with these hydrodynamic elements; 2) the effect of the SMART structure on sediment transport with special emphasis on the seasonal and annual cumulative volumetric changes and patterns of sediment trapped behind the SMART structure, and the seasonal and annual patterns of shoreline and volumetric changes adjacent to the SMART structure; 3) the character of any sediment which has accumulated shoreward of the SMART structure; 4) the effect of waves and currents on the structure with special reference to settlement or movement; 5) the effect of the SMART structure on storm wave activity; 6) the results of the colonization studies and fish censusing; and 7) the results of the marine turtle monitoring. In addition to the above, the annual reports would include a summary of wave, tide and current data (correlated to the above measurements).

3.6.7. DERM would oversee the collection of nearshore surveys (including structure elevation surveys) and make data available to CERC and FDEP in both ASCII and ISRP (Interactive Survey Reduction Program) format. DERM would also process data by producing line drawings of profile cross sections. Processing and reporting of data in reports would be performed by DERM. Information to be contained in these reports includes shoreline change maps associated with the nearshore surveys and structure change maps/diagrams associated with the structure elevation surveys, also to be provided by DERM.

Environmental monitoring data would be collected, processed and analyzed by Florida Institute of Technology and provided in quarterly and annual reports.

The collection of aerial photography data would be overseen by DERM. DERM would provide both hard copies and films of aerial images. ERDC would process and analyze the data sets and would generate aerial photograph and mapping/shoreline change maps for the annual and final reports. DERM would be responsible for the collection of data associated with the storm contingency plan (including nearshore surveys/structure elevation surveys; aerial photography; and scour measurements).

ERDC would generate a historical coastal trends/shoreline change report including information on littoral processes information, shoreline change maps/rates, wave information and sediment budget information. A literature review would be included in this effort. This information would be included in the first annual report.

APPENDIX G – MANATEE PROTECTION MEASURES

STANDARD MANATEE PROTECTION CONSTRUCTION CONDITIONS FOR AQUATIC-RELATED ACTIVITIES

The US Army Corps of Engineers and the Miami-Dade Department of Environmental Resources Protection (Corps/DERM) would ensure that:

1. The contractor instructs all personnel associated with the project of the potential presence of manatees and the need to avoid collisions with manatees. All construction personnel are responsible for observing water-related activities for the presence of manatee(s), and would implement appropriate precautions to ensure protection of the manatee(s).

2. All construction personnel are advised that there are civil and criminal penalties for harming, harassing, or killing manatees, which are protected under the Marine Mammal Protection Act of 1972, the Endangered Species Act of 1973, and the Florida Manatee Sanctuary Act. The Corps/DERM and/or contractor may be held responsible for any manatee harmed, harassed, or killed as a result of construction activities.

3. Prior to commencement of construction, the prime contractor involved in the construction activities shall construct and display at least two temporary signs (placard) concerning manatees. For all vessels, a temporary sign (at least 8½" x 11") reading "Manatee Habitat/Idle Speed In Construction Area" would be placed in a prominent location visible to employees operating the vessels. In the absence of a vessel, a temporary sign (at least 2' x 2') reading "Warning: Manatee Habitat" would be posted in a location prominently visible to land-based, water-related construction crews.

   A second temporary sign (at least 8½" x 11") reading "Warning, Manatee Habitat: Operation of any equipment closer than 50 feet to a manatee would necessitate immediate shutdown of that equipment. Any collision with and/or injury to a manatee shall be reported immediately to the Florida Marine Patrol at 1-888-404-FWCC" would be located prominently adjacent to the displayed issued construction permit. Temporary notices are to be removed by the Corps/DERM upon completion of construction.

4. Siltation barriers are properly secured so that manatees cannot become entangled, and are monitored at least daily to avoid manatee entrapment. Barriers must not block manatee entry to or exit from essential habitat.

5. All vessels associated with the project operate at "idle speed/no wake" at all times while in the construction area and while in waters where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels would follow routes of deep water, whenever possible.

6. If manatees are seen within 100 yards of the active daily construction/dredging operation, all appropriate precautions would be implemented to ensure protection of

the manatee. These precautions would include the operation of all moving equipment no closer than 50 feet of a manatee. Operation of any equipment closer than 50 feet to a manatee would necessitate immediate shutdown of that equipment.

7. Any collision with and/or injury to a manatee would be reported immediately to the Florida Marine Patrol (1-888-404-FWCC) and to the Florida Fish and Wildlife Conservation Commission, Protected Species Management at (850) 922-4330.

8. The contractor maintains a log detailing sightings, collisions, or injuries to manatees should they occur during the contract period. A report summarizing incidents and sightings shall be submitted to the Florida Fish and Wildlife Conservation Commission, Protected Species Management, 620 South Meridian Street, Tallahassee, Florida 32399, and to the U.S. Fish and Wildlife Service, 6620 Southpoint Drive South # 310, Jacksonville, Florida 32216-0912. This report must be submitted annually or following the completion of the project, if the contract period is less than a year.