ENVIRONMENTAL ASSESSMENT SUPPLEMENT

FOR

FLEET SUPPORT AND INFRASTRUCTURE IMPROVEMENTS

NAVAL AIR STATION KEY WEST

JULY 2003

UNITED STATES NAVY

TABLE OF CONTENTS

LIST OF ACRONYMS AND ABBREVIATIONS

ac	acre
C	Celsius
CEQ	Council on Environmental Quality
CTD	conductivity and temperature and depth
cy	cubic yards
°	degrees
DO	dissolved oxygen
DON	Department of the Navy
EA	Environmental Assessment
EAS	Environmental Assessment Supplement
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
FDEP	Florida Department of Environmental Protection
FFWCC	Florida Fish and Wildlife Conservation Commission
FMP	Fishery Management Plans
FKNMS	Florida Keys National Marine Sanctuary
FNAI	Florida Natural Areas Inventory
FONSI	Finding of No Significant Impact
ft	feet/foot
GMFMC	Gulf of Mexico Fishery Management Council
HAPC	Habitat Areas of Particular Concern
m	meters
mg/L	milligrams per liter
MLW	Mean Low Water
MMPA	Marine Mammal Protection Act
NAS	Naval Air Station
NAVY	United States Navy
NEPA	National Environmental Policy Act
NGVD	National Geodetic Vertical Datum
NHPA	National Historic Preservation Act
nm	nautical mile
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRHP	National Register of Historic Places
ODMDS	Offshore Dredged Material Disposal Site
OPNAVINST	Naval Operations Instruction
ppt	parts per thousand
SAFMC	South Atlantic Fishery Management Council
SHPO	State Historic Preservation Officer
USACOE	United States Army Corps of Engineers

LIST OF TABLES

LIST OF ILLUSTRATIONS

CHAPTER 1

INTRODUCTION

The National Environmental Policy Act (NEPA) requires that Federal agencies consider potential environmental consequences of Proposed Actions and Alternatives in their decision-making process. The intent of NEPA is to protect, restore, or enhance the environment through well-informed Federal decisions. The Council on Environmental Quality (CEQ) was established under NEPA for the purpose of implementing and overseeing Federal policies as they relate to this process. In 1978, the CEQ issued *Regulations for Implementing the Procedural Provisions of the NEPA* (40 CFR § 1500-1508). These regulations specify that an Environmental Assessment be prepared to:

- briefly provide sufficient analysis and evidence for determining whether to prepare an Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FONSI);
- aid in an agency's compliance with NEPA when an EIS is deemed unnecessary; and
- facilitate EIS preparation when one is necessary.

The United States Navy (NAVY) completed an Environmental Assessment for Fleet Support and Infrastructure Improvements (EA) at the Naval Air Station Key West (NAS Key West) in April 2003. The EA was prepared to present the Proposed Action, Purpose and Need, and Alternatives for Fleet shore infrastructure support upgrades and improvements at NAS Key West. The EA evaluated the potential impacts of alternatives to achieve the Proposed Action. The Proposed Action, in part, included dredging of the main Key West Ship Channel, outer turning basin, and Truman Harbor, providing for dredge spoil placement at upland and submerged locations on Rockland Key. Subsequent to the Navy authorizing a FONSI on 14 April 2003 and an addendum thereto on 23 April 2003, new information was gained regarding the feasibility of pipeline transport of dredged material over the 15 mile distance to Rockland Key (Figure 1-1, General Location Map). Funding and engineering constraints, including insufficient availability and capability of booster pumps to perform the transport, now prohibit the disposal portion of the Proposed Action as it was described in the original EA.

NEPA 40CFR15029[C][1], requires a Federal agency to prepare a supplement to a Draft or Final environmental document if the Federal agency makes substantial changes in the Proposed Action that are relevant to its environmental effects or there are significant new circumstances or information relevant to the environmental concerns that bear on the proposed action or its impacts. This Environmental Assessment Supplement (EAS) presents significant new circumstances and information bearing on the proposed dredging and its impacts.

This document is intended to describe and evaluate alternatives to the disposal portion of the proposed dredging discussed in the original EA. The EAS evaluates an expanded set of alternatives for dredge material placement described in the original EA and incorporated by reference.

This EAS has been prepared in accordance with the CEQ Regulations and Naval Operations Instruction (OPNAVINST) 5090.1B Change 3, *Environmental and Natural Resources Training Manual*. The EAS will be reviewed to make a determination as to whether a FONSI or an EIS is appropriate.

1.1 BACKGROUND

The need to discuss new dredge disposal alternatives is a result of revised construction cost estimates provided recently by the U.S. Army Corps of Engineers (USACOE). Those cost estimates indicate that placement of dredged material at Rockland Key is prohibitively expensive. The excessive costs are a result of the distance (15 miles) and type of materials that would be pumped to Rockland Key.

These factors would require a set of equipment that most, perhaps all, contractors would be unable to assemble and operate.

The previous EA evaluated a maintenance dredge to a depth of -34 Mean Low Water (MLW) plus 3 feet (ft) advance maintenance plus 1 ft allowable overdepth in the entire dredge footprint, producing approximately 1,400,000 cubic yards (cy) of material. The maintenance dredge proposed would be to a depth of -34 MLW plus 2 ft advance maintenance plus 1 ft allowable overdepth in the Main Ship Channel and all cuts; Truman Harbor maintenance dredge depths would be -34 MLW plus 1 ft advance maintenance plus 1 ft allowable overdepth. The resulting dredge material volume would be approximately 819,000 cy. The material to be dredged consists of varying proportions of rock rubble, gravel, silt, and sand. Federal Acquisition Regulations generally preclude stipulating the type of equipment to be used for a dredging contract to ensure that a company bidding on the project is free to select their most cost efficient means of performing. This EAS evaluates only dredge material disposal alternatives.

0 6000 12000

SCALE IN FEET

FIGURE 1-1

GENERAL LOCATION MAP

ENVIRONMENTAL ASSESSMENT SUPPLEMENT FOR FLEET SUPPORT AND INFRASTRUCTURE IMPROVEMENTS NAS KEY WEST

FILE: 1917.01/EA-SUPPLEMENT/COLORAER.DWG DATE: 07/03/03

CHAPTER 2

DESCRIPTION OF THE PROPOSED ACTION AND OTHER ALTERNATIVES

2.1 DESCRIPTION OF THE PROPOSED ACTION

The Proposed Action in the original EA was to modernize and update infrastructure and facilities to provide improved or additional capability essential to support modern transient units visiting NAS Key West. Infrastructure and facilities improvements to support aviation and surface units would include new construction as well as adapting or upgrading existing structures for more modern combatants. The updating, upgrading, maintenance, and construction will insure facilities are able to provide optimum support capability for modern Naval assets. This EAS makes no change to the Proposed Action described in the original EA.

The issues addressed in this EAS are limited to the disposal of dredged material resulting from the proposed dredging at Key West. Because the action of dredging was discussed as a part of the Proposed Action in the original EA, the dredging itself is not discussed further in this document. No other components of the Proposed Action discussed in the original EA will be discussed in this document either.

2.2 ALTERNATIVES

The Navy considered a number of dredged material disposal options and placement sites for suitability and availability. The following options were considered for dredged material placement:

2.2.1 Split Disposal Between Fleming Key and Offshore Dredged Material Disposal Site (ODMDS) Alternative

An approximately 37 acre (ac) upland site on Fleming Key was considered. The EA earlier considered, but rejected an 18 acre vegetated site on the southwest part of the island. The property, owned by the Navy, is a disturbed and managed site, and the silt fraction of the dredged material would be placed entirely on upland within containment dikes. The material would remain on site.

An offshore site was considered for placement of clean rock, gravel, and sandy sediments. The ODMDS, approximately centered within a 2 nautical mile (nm) x 2 nm square of intensively surveyed sandy bottom, is a 0.5 nm x 0.5 nm square situated on sandy bottom in about 740 ft of water, approximately 14 nm south of Key West (Figure 2-1).

2.2.2 All Material to Fleming Key Alternative

An upland site on Fleming Key was considered. The site, owned by the Navy, is a disturbed and managed site, and dredged material would be placed entirely on upland within containment dikes. The material would remain on site. The project area is defined on Figure 2-1 and would include a permit conditioned mixing zone in the outer turning basin of Key West Bight defined at mid-depth, no more than 150 meters (m) downcurrent from the discharge point or at the edge of any seagrass beds or coral communities (whichever is closer) within the densest portion of any visible turbidity plume. A variance application that would extend the mixing zone from 150 to 1,500 meters has been submitted, but not yet issued.

2.2.3 No-Action Alternative

This Alternative would continue current levels of ship and aircraft support at NAS Key West, without the dredging related activities described in the EA. The No-Action Alternative would provide less support over time as fewer ships are able to make port calls to Key West. This Alternative would not support the Navy's readiness requirement. NAS Key West supports unit readiness by providing vital host port support to visiting units. The No-Action Alternative (no dredging and, therefore, no disposal) is carried through the EAS to provide a baseline to which potential dredged material impacts of the various alternatives can be compared.

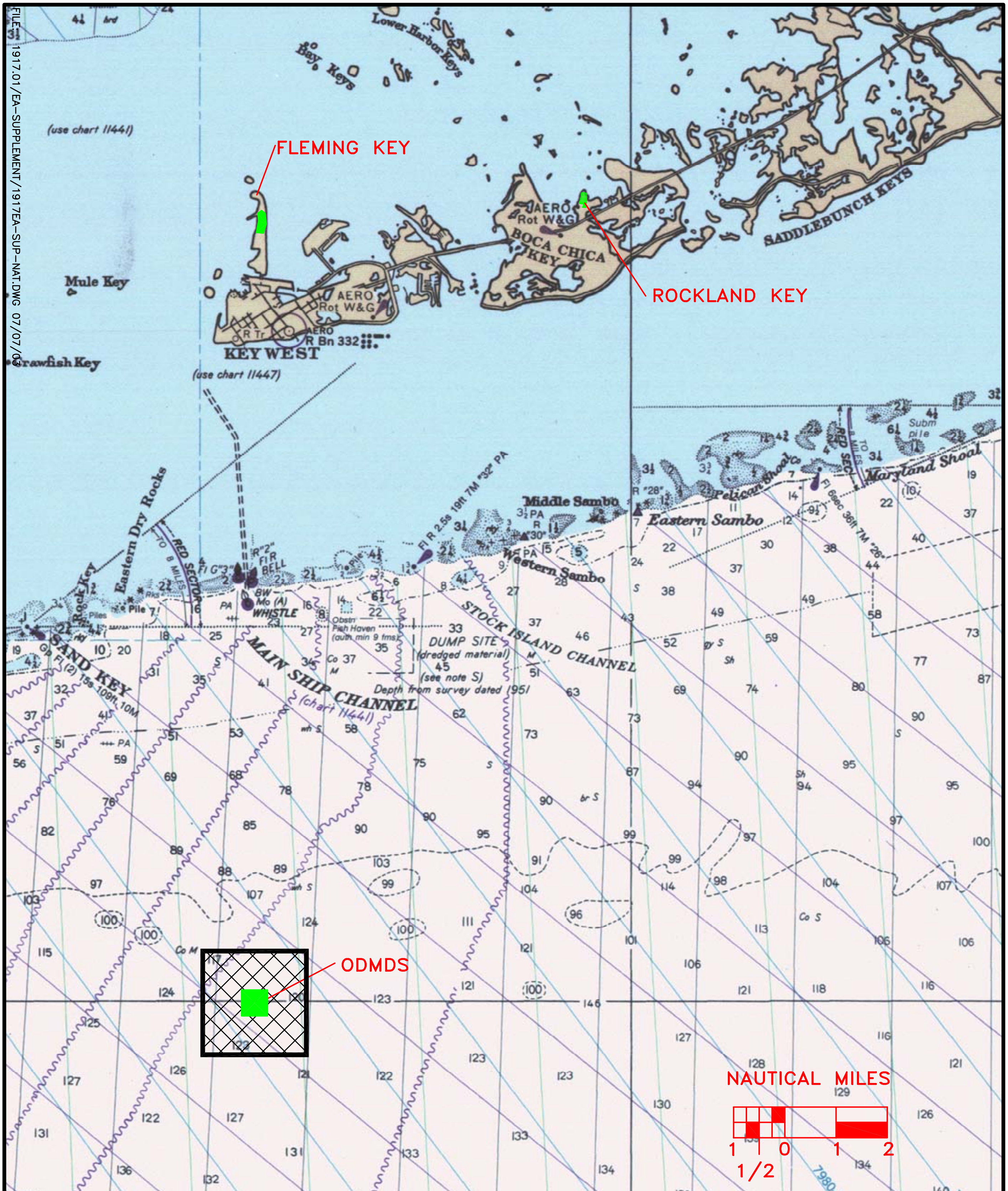
2.3 ALTERNATIVES CONSIDERED BUT REJECTED

2.3.1 All Material to ODMDS Alternative

An offshore site was considered for placement of all rock, gravel, silt, and sandy sediments. The ODMDS is situated on sandy bottom about 14 nm south of Key West in about 740 ft of water (Figure 2-1). This Alternative was rejected because the Navy would not be authorized to place the portion of dredged material consisting of silt in the ODMDS.

2.3.2 All Material to Rockland Key Alternative

A privately owned site on Rockland Key was considered as a suitable location for upland containment of dredge material and marine beneficial use (Figure 2-1). The site contains quarry pits, one of which is connected to tidal waters suitable for placement of material to an elevation of -6 ft to -8 ft MLW to allow colonization of seagrasses in the resultant shallow waters. The site was large enough to accommodate the dredged material; however, the cost of pumping the dredged material some 15 miles would be prohibitive. The site includes the dredge pipeline location as described in the original EA. This Alternative was rejected because, subsequent to the EA, it was determined that it would not be economically practicable.



MAGNETIC NORTH

FIGURE 2–1

DREDGED MATERIAL PLACEMENT SITE ALTERNATIVES CONSIDERED

ENVIRONMENTAL ASSESSMENT SUPLEMENT FOR FLEET SUPPORT AND INFRASTRUCTURE IMPROVEMENTS NAS KEY WEST

CHAPTER 3

AFFECTED ENVIRONMENT

3.1 GEOLOGY, SOILS, TOPOGRAPHY, AND MARINE SEDIMENTS

3.1.1 Definition of Resource

Definitions of resources were presented in the EA.

3.1.2 Existing Conditions –Landside -- Fleming Key

3.1.2.1 Geology

General descriptions of geology in the Florida Keys were provided in the EA. Fleming Key is a man-made island constructed of spoil material placed over shallow bottom, likely rock-reef material.

3.1.2.2 Soils

Soils of Fleming Key are sandy soil deposits. A solid waste disposal area in the southwestern area of the key is closed for operation and capped by fill soil. Soil borings taken by the U.S. Army Corps of Engineers (USACOE 2003) record gravel-sized limestone fill 4 to 11 ft deep and variable lens of sand and silt, then hard oolitic limestone at approximately 12 to 13 ft below the surface.

3.1.2.3 Topography

The United States Geological Survey Key West Topographic quadrangle identifies elevations on Fleming Key primarily at + 5 ft National Geodetic Vertical Datum (NGVD). Nine earthen munitions magazines occur with a top elevation of approximately + 17 ft NGVD.

3.1.3 Existing Conditions – Marine Environs of Fleming Key

3.1.3.1 Bathymetry

Water depths along survey transects ranged from 2 to 31 ft. The areas surveyed included nearshore waters off Fleming Key, the Key West Bight turning basin, Man of War Harbor, and Fleming Key Cut.

3.1.3.2 Sediment Quality

Sediment quality was described in the EA, reflecting extensive testing. Since the dredged materials do not contain contaminant levels of concern, all were determined to be exempt from further testing in disposal operations.

3.1.4 Existing Conditions – ODMDS

3.1.4.1 Geology

The Pourtales Terrace is an arcuate segment of the Florida carbonate platform that crops out at a depth of 600 to 1,200 ft in the southern Florida Straits (Figure 3-1). The terrace is bounded on the north by a relatively gradual sediment slope leading up to the Florida reef tract and on the south by steep cliffs and slopes dropping off into the deeper portions of the Florida Straits. A relatively thin layer of sediments buries the rocky surface of the terrace itself. The Florida Current traverses most of this area and may be responsible for limiting the accumulation of modern sediments (Gomberg 1976) and generating the well-sorted sediment ribbons and large sand waves observed during the Resource Survey of the proposed ODMDS (Continental Shelf Associates, Inc. 2003a).

The area of the Pourtales Terrace surveyed by Continental Shelf Associates, Inc. (2003a) for a potential ODMDS extended from approximately 10 to 19 nm off Key West at the western end of the terrace (Figure 3-1). This portion of the terrace is characterized as exhibiting classic karst topography, indicative of aerial weathering in the shallower (northern) portions. Farther south is a gradual sediment-covered slope extending into deeper water. Jordan et al. (1964) ran a topographic profile across the Pourtales Terrace slightly to the west of the proposed dredged material placement site and survey data indicated the terrace in the area of the ODMDS is essentially a smooth sloping plain. They characterized the area as exhibiting "giant sand waves, ridges and terraces, and sink holes."

The Continental Shelf Associates, Inc. (2003a) resource survey of the area proposed for an ODMDS consisted of the side-scan sonar and video habitat evaluation of a north–south oriented, 2 nm by 9 nm block (Figure 3-2) beginning approximately 10 nm from shore (Key West Harbor) in 450 ft of water and extending southward to a depth of slightly over 1,000 ft in its southwestern corner. Site selection criteria for an actual 0.5 nm by 0.5 nm ODMDS were as follows:

1. Evaluation of the entire 18 square nm area shown in Figure 3-2 using side-scan sonar transects spaced 2,400 ft apart;
2. Groundtruthing of selected habitat signatures using an underwater video and still camera system;
3. Selection of a 2 nm by 2 nm area exhibiting as little hard bottom as possible to serve as a buffer zone protecting major reef trends and EFH resources; and
4. Detailed (100 percent coverage) side-scan sonar habitat mapping of the entire 2 nm by 2 nm buffer zone area in order to locate an appropriate 0.5 nm by 0.5 nm area to serve as the actual ODMDS.

Total mapping of the 2 nm by 2 nm area was required in order to ensure the location of the actual 0.5 nm by 0.5 nm ODMDS was as far as possible from any detected reef or hard ground resources.

Side-scan sonar data of the 18 square nm area shown in Figure 3-2 were collected. An evaluation of these data indicated a gently sloping soft bottom shelf extending from the northern edge of the survey area in 450 ft of water southward to a depth of approximately 600 ft. At a distance of 1.5 nm from the northern edge of the survey area, an extensive and continuous deep reef trend was encountered in 600 ft of water. This area was characterized by hard ground ridges and valleys showing considerable vertical relief. This type of reef habitat continued to a water depth of 650 ft at a distance of 2.5 nm from the northern edge of the survey block. At this water depth, the high vertical relief habitat began to grade out into an area characterized by low relief hard bottom, rubble, and giant sand waves or "sediment ribbons." These results were similar to those described by Jordan et al. (1964) and Gomberg (1976). This low relief/rubble habitat ended at a depth of 720 to 730 ft, where the Terrace leveled out into a wide flat area characterized primarily by soft, smooth sediments that extended to the southern (offshore) edge of the survey area (Figure 3-3).

The area from 730 ft water depth to the southern edge of the survey block (about 1,160 ft) is primarily a soft bottom or sand-covered habitat. Throughout much of this area, the sediment cover appears to be thin. Outcroppings of low relief hard bottom are occasionally observed, and there appears to be one major, high-relief hard bottom mound on the eastern side of the 2 nm by 2 nm survey area in 730 ft of water. This mound, which rises approximately 20 ft above the seafloor, appeared to have a definite hard bottom or "reef" type crest (Continental Shelf Associates, Inc. 2003a).

Another unique feature noted in the 18 square nm area of the initial side-scan sonar survey was a large sinkhole located in the approximate center of the 2 nm by 9 nm survey block (Figure 3-2). This sinkhole is approximately 3,000 ft in diameter and drops from an ambient seafloor depth of 750 to 925 ft. Several short, diagonal side-scan tows were conducted across this feature to determine its true size and shape and the nature of the sediments around the rim. Sediments at the lip of the sinkhole appeared to be soft before falling off dramatically into its depths. Considering the geology of the Pourtales Terrace, some limestone outcropping would be expected inside the rim and along the walls of this feature, but Continental Shelf Associates (2003a) did not confirm this during the survey.

3.1.4.2 Soils

Sediments on the Pourtales Terrace consist of mixtures of benthic skeletal, pelagic skeletal, and relic grains and clast. The proportions of these sediment types depend upon the relative biogenic productivity, availability of relic materials, and the intensity of current winnowing. Corroded, bored, and stained benthic skeletal grains, mostly from mollusks, dominate in sediment samples (Gomberg 1976).

3.1.4.3 Bathymetry

Bathymetry in the areas surveyed for the ODMDS ranged from a shallow depth of 466 ft out to a maximum depth of 1,163 ft at the southwestern corner of the surveyed 2 nm by 9 nm block (Figure 3-3). The bathymetry of the potential 0.5 nm by 0.5 nm designated dredged material placement site ranged from approximately 740 ft on the shoreward (northern) side to 760 ft on the offshore (southern) side. Bathymetric contours across this designated area showed a smooth, gentle slope to seaward (Continental Shelf Associates, Inc. 2003a).

3.1.4.4 Sediment Quality

No direct sediment samples were taken from the proposed ODMDS. Gomberg (1976) conducted an extensive sediment survey and characterization of the Pourtales Terrace. He found the miocene limestone sediments of the shallower portions of the terrace located in depths similar to the proposed ODMDS to be lightly phosphatized with abundant aragonite skeletal material.

During the video survey conducted by Continental Shelf Associates, Inc. (2003a), a considerable amount of manmade debris was observed on the bottom. This debris was fairly common in the 600 to 650 ft deep reef trend observed across the northern portion of the 2 nm by 9 nm survey block and appeared to be rope and trap lines consistent with commercial fishing activities. No shipwrecks, drums, or other type of contaminated debris were observed either on the side-scan sonar or during video groundtruthing (Continental Shelf Associates, Inc. 2003a; Lydecker, A. 2003).

3.2 BIOLOGICAL RESOURCES

3.2.1 Definition of Resource

A description of biological resources in the project area was provided in the EA.

3.2.2 Existing Conditions – Landside – Fleming Key

3.2.2.1 Vegetation

The current vegetation on Fleming Key consists largely of planted Bahia grass in and around the munitions storage magazines. The grass is mowed frequently. The sole remaining woody species within the fenced enclosure is an approximately one-acre area of Australian pine (*Casuarina* spp.).

There is a larger area of Australian pine in the southwest portion of the island. This is a solid waste disposal site with large pieces of concrete and piles of old tires exposed above the fill material. Although the Australian pines cover about 90 percent of the area, there are also small inclusions of other exotic/invasive plant species, including Brazilian pepper (*Schinus terebinthifolius*), torpedo grass (*Panicum repens*), and woman's tongue (*Albizia lebbeck*). There is a similar area of vegetation assemblage on the western point of the island.

3.2.2.2 Wetlands

Tidal wetlands occur along the fringe of the majority of Fleming Key. The vegetation consists of an approximately 30 ft wide edge of red (*Rhizophora mangle*) and black (*Avicennia germinans*) mangrove, with very small quantities of Bay cedar (*Suriana maritima*) and buttonwood (*Conocarpus erectus*). These plants are growing on the rocky shoreline around the perimeter of the island. No freshwater wetlands occur on Fleming Key (Figure 3-4).

3.2.2.3 Wildlife

Descriptions of wildlife associated with various natural habitats are found in the EA.

Fleming Key is devoid of native terrestrial communities supporting wildlife habitat. Ubiquitous wildlife common to the Lower Florida Keys may be found occasioning the managed lands, such as the raccoon and passerine birds.

3.2.2.4 Threatened or Endangered Species

Descriptions of protected species and their habitats within the project area are found in the EA. Although Fleming Key falls within the ranges and potential habitats of several listed species described in the EA, no occurrences have been reported in the literature for the project site (Florida Natural Areas Inventory [FNAI] 1994 and Department of the Navy [DON] 2002).

3.2.3 Existing Conditions – Marine Resource

3.2.3.1 Benthic Biological Resources

Descriptions of marine benthic biological resources were presented in the EA.

3.2.3.1.1 Fleming Key Environs

A biological resource survey was conducted by Continental Shelf Associates, Inc. (2003b) to assess the seafloor substrate and benthic biological communities along potential dredged material pipeline access routes to Fleming Key. The resource survey was conducted in the nearshore waters off Fleming Key, the Key West Bight turning basin, Man of War Harbor, and Fleming Key Cut (Figure 3-5). Four potential dredged material pipeline routes were surveyed - the preferred route, Alternative A, Alternative B, and Alternative C. A perimeter line also was surveyed in the nearshore waters around the middle and southern two-thirds of Fleming Key. The perimeter survey line was oriented adjacent to the potential dredged material placement areas on Fleming Key. Scientist divers were towed and conducted bounce dives along survey lines traversing the potential dredged material pipeline routes. Scientist divers characterized the seafloor substrate and benthic biological communities in the vicinity of the project area. The preferred route was selected because it would cause the least amount of impacts to sensitive marine resources. Three benthic biological communities were identified from video data collected along the survey lines. These are described as follows:

Seagrass

The seagrasses observed during this survey included manatee grass, shoal grass, turtle grass, and paddle grass. Table 3-1 presents a list of biota observed during the Fleming Key resource survey. These seagrass beds were generally found from intertidal depths out to approximately 30 ft. The seagrass beds appeared to be healthier and more dense in the somewhat protected waters adjacent to Fleming Key and along portions of the survey lines on the east side of Christmas Tree Island. The seagrasses observed during the resource survey were most often found on soft or unconsolidated sediments such as calcareous sand or mud. Various densities of macroalgae also were observed intermixed with the seagrass. Paddle grass occasionally was observed in areas with sand-veneered hard bottom. Some seagrasses occurring in very shallow nearshore water (1 to 2 ft) off the west side of Fleming Key appeared to have been bleached, possibly from exposure to intense sunlight or high water temperatures. Seagrasses on the west side of Fleming Key appeared to be more silt-covered than those occurring on the east side.

Table 3-1. Biota Observed in the Project Area During the Fleming Key Resource Survey.

Scientific Name	Common Name
ALGAE	
Acetabularia sp.	mermaid's wine glass
Caulerpa racemosa	green grape alga
C. sertularioides	green feather alga
C. mexicana	green flat feather alga
C. prolifera	oval-blade alga
Udotea sp.	mermaid's fan
Halimeda spp.	leaf alga
Avrainvillea sp.	paddle blade alga
Penicillus pyriformis	flat-top bristle brush
Penicillus dumetosus	bristle ball brush
Dictyota sp.	strap alga
Padina sp.	leafy rolled-blade alga
Sargassum sp.	sargassum alga
Rhodophyta	unidentified coralline alga
SEAGRASS	
Halophila decipiens	paddle grass
Thalassia testudinum	turtle grass
Syringodium filiformes	manatee grass
Halodule wrightii	shoal grass
PORIFERA	
Verongula gigantea	netted barrel sponge
Spheciospongia vesparium	loggerhead sponge
Aplysina spp.	rope sponge
Cliona sp.	encrusting sponge
Ircinia spp.	ball sponge
CNIDARIA	
Hydroida	unidentified Hydroida
Pterogorgia spp.	whip coral
Pseudopterogorgia sp.	sea plume
Oculina diffusa	diffuse ivory bush coral
Siderastrea siderea	massive starlet coral
S. radians	lesser starlet coral
Porites astreoides	mustard hill coral
Stephanocoenia michilini	blushing star coral
Montastrea annularis	boulder star coral
M. cavernosa	great star coral
Solenastrea bournoni	smooth star coral
Dichocoenia stokesii	Elliptical star coral
Favia fragum	golfball coral
Diploria strigosa	symmetrical brain coral
D. labyrinthiformes	grooved brain coral

Scientific Name	Common Name
Meandrina meandrites	maze coral
Colpophyllia natans	boulder brain coral
Agaricia agaricites	lettuce coral
Mycetophyllia sp.	cactus coral
Isophyllia sinuosa	sinuos cactus coral
Phyllangia americana	hidden cup coral
Palythoa caribaeorum	encrusting zoanthid
ANNELIDA	
Hermodice carunculata	bristle worm
MOLLUSCA	
Aplysia dactylomela	spotted sea hare
Strombus alatus	Florida fighting conch
ARTHROPODA	
Menippe mercenaria	Florida stone crab
Panulirus argus	spiny lobster
ECHINODERMATA	
Diadema antillarum	long-spined urchin
Eucidaris tribuloides	slate-pencil urchin
Meoma ventricosa	red heart urchin
Tripneustes ventricosus	west indian sea egg

Macroalgae

The most frequently observed macroalgae in the survey area included *Udotea* spp., *Halimeda* spp., *Caulerpa sertularioides*, *C. prolifera*, *C. racemosa*, *C. mexicana*, *Avrainvillea* sp., *Penicillus* spp., and *Acetabularia* sp. Macroalgae occurred at all depths surveyed and were distributed within seagrass beds as well as in areas with sponges, octocorals, and small stony (scleractinian) corals. Macroalgae occurred on both soft unconsolidated substrates and exposed hard bottom substrates. Dense patches of *Halimeda* spp. were observed in turtle grass beds and on exposed hard bottom, particularly in the eastern portion of Fleming Key Cut.

Sponge/octocoral/algae

This benthic biological community included sponges (encrusting, barrel, ball, rope, and vase growth forms), octocorals, algae (primarily calcareous green algae), and occasionally stony (scleractinian) corals. This biological community was observed on exposed hard bottom with different levels of relief, patchy and sand-veneered low relief hard bottom, and in areas with sand and rock rubble.

Some areas along the survey lines appeared to be devoid of benthic communities. The substrate observed in these areas was typically medium to coarse sand, and these locations usually were associated with strong tidal flow. In the areas where tidal currents were strong, sand waves usually were present. Benthic communities also were absent or very sparse in areas of heavy siltation, in waterway navigation channels, and on seafloor sediments in relatively deep backwater areas (20 to 30 ft depth).

3.2.3.1.1.1 <u>Preferred Pipeline Route</u>

Water depths recorded along the preferred pipeline route survey line ranged from 6.6 to 31 ft. The seafloor substrate observed along the preferred route survey line included soft or unconsolidated sediment communities such as calcareous sand or mud, areas with sand and rock rubble, patchy and sand-veneered low relief hard bottom, and exposed hard bottom with different levels of relief. The benthic biological communities observed along the preferred pipeline route survey line included seagrass, macroalgae, and sponge/octocoral/algae.

The southernmost portion of the preferred pipeline route survey line transited along the west side of the Key West Bight turning basin, traversing along the base of a vertical rock wall/cut, which was likely a product of the previous dredging activities (Figure 3-5). A narrow shallow water hard bottom platform was observed along the upper edge of the rock wall. Portions of this platform were covered with sponges, octocorals, macroalgae, and stony (scleractinian) corals. Some areas along the upper edge of the rock wall were covered with a thin veneer of sand and occasionally included patches of seagrass. More dense seagrass beds were observed west of the rock wall. The rock wall ranged from 2 to 18 ft in height. Biota observed on the rock wall included sponges, octocorals, hydroids, macroalgae, bryozoans, and stony (scleractinian) corals. Along the bottom edge of the rock wall, the seafloor substrate was predominantly sand with occasional rock and rubble ranging from <1 inch to 4 ft diameter.

Along the north side of the Key West Bight turning basin, the seafloor substrate included sand with rock and rubble ranging from <1 inch to 1 ft diameter. Scattered patches of paddle grass were observed along portions of the survey line in this area. Patches of seagrass also were observed along the northwest end of Fleming Key Cut. Exposed hard bottom substrate was observed near the fixed bridge over Fleming Key Cut. Sponges, octocorals, macroalgae, and stony (scleractinian) corals were observed in this area, with the stony corals ranging from 0.2 to 3.3 ft diameter. On the east side of the fixed bridge over Fleming Key Cut, the substrate became more rocky with an increase of macroalgal cover (predominantly *Halimeda* spp.). Dense seagrass communities were observed along the southeast side of Fleming Key.

3.2.3.1.1.2 Alternative A

The Alternative A survey line traversed along the bottom and approximately through the center of Man of War Harbor before making landfall near the communications antenna on the northwest side of Fleming Key (Figure 3-5). Water depths recorded along the Alternative A survey line ranged from 2 to 25 ft. The seafloor substrate along the center of Man of War Harbor was primarily sand with patches of rock rubble and occasionally with some exposed hard bottom in the troughs of sand waves. Calcareous sand or mud was observed along some areas of the survey line where water flow was minimal. The predominant benthic biological community along the center of Man of War Harbor was sponge/octocoral/algae. The biotic cover was usually low and patches of seagrass (shoal and paddle grass) were observed along these portions of the survey lines. Along the eastern side of Man of War Harbor in shallower water, moderate to dense seagrass (turtle and manatee grass) with patches of macroalgae were observed. Some siltation was observed on these seagrasses. Seagrasses observed in 3 to 10 ft of water appeared to be dense and healthy. Seagrasses observed adjacent to the communications antenna on the northwest side of Fleming Key and in <2 ft water depth appeared to be bleached. Upsidedown jellyfish (*Cassiopea* sp.) were observed on the seafloor in areas where water flow was minimal.

3.2.3.1.1.3 Alternative B

The Alternative B survey line briefly traversed a portion of Man of War Harbor, crossed a dense patch of seagrass, then entered the gunnery basin on the west side of Fleming Key (Figure 3-5). Water depths recorded along the Alternative B survey line were approximately 12 to 25 ft. The seafloor substrate observed along the Alternative B survey line included soft or unconsolidated sediment such as calcareous sand or mud, particularly in the gunnery basin where water flow was minimal. Some areas in Man of War Harbor included sand and rock rubble and patchy and sand-veneered low relief hard bottom. The benthic biological community in Man of War Harbor was sponge/octocoral/algae. Biotic cover was usually low. Dense seagrass (turtle and manatee grass) patches were observed along portions of the survey line between Man of War Harbor and the gunnery basin. Inside the gunnery basin, the predominant biological community was macroalgae. Infrequent patches of seagrass ranging in size from 1 to 4 ft diameter also were observed in the gunnery basin. Upsidedown jellyfish (Cassiopea sp.) were abundant on the seafloor of the gunnery basin.

3.2.3.1.1.4 Alternative C

The Alternative C survey line briefly traversed a portion of Man of War Harbor, then crossed a dense patch of seagrass before making landfall at the spoil area on the southwest corner of Fleming Key (Figure 3-5). Water depths along the Alternative C survey line were approximately 4 to 25 ft. The seafloor substrate observed along the Alternative C survey line included sand and rock rubble and patchy and sand-veneered low relief hard bottom in Man of War Harbor. Off the southwest side of Fleming Key, the seafloor substrate was soft or unconsolidated sediment such as calcareous sand or mud. The predominant benthic biological community in Man of War Harbor was sponge/octocoral/algae. Dense seagrass (turtle and manatee grass) patches were observed along portions of the survey line between Man of War Harbor and Fleming Key. Inside the gunnery basin, the predominant biological community was macroalgae.

3.2.3.1.1.5 Perimeter Survey Line

The perimeter survey line extended south along the west side of Fleming Key, curved to the east through Fleming Key Cut, and passed under the bridge, then extended north along the east side of Fleming Key (Figure 3-5). Water depths along the perimeter survey line were approximately 12 to 25 ft. The seafloor substrate observed along the west and east sides of Fleming Key was calcareous sand and mud. The substrate in Fleming Key Cut included sand, rock rubble, and low to medium relief (<1 to 6.6 ft) exposed hard bottom. The rock rubble ranged in size from 2 to 20 inches diameter. A clay slope, with a relief of approximately 3.3 ft, was observed along the boundary between the seagrass and the north side of the channel through Fleming Key Cut. Dense seagrass (turtle and manatee grass) patches were observed along the survey line on the west and east sides and on the south side of Fleming Key adjacent to Fleming Key Cut. Large loggerhead sponges approximately 2.0 to 3.3 ft diameter were observed on the east side of Fleming Key. Patches of macroalgae were observed periodically along the perimeter survey line. Seagrasses on the west side of Fleming Key appeared to be more silt-covered than those occurring on the east side. Seagrasses on the east side generally appeared healthier than those on the west side of Fleming Key.

The bulkhead on the south side of Fleming Key Cut also was surveyed. The substrate at the base of the bulkhead was rock rubble from west to east and exposed hard bottom with a relief of 1 to 6.6 ft near the fixed bridge over Fleming Key Cut. A considerable quantity of anthropogenic debris was observed at the base of the bulkhead. Small stony (scleractinian) corals were observed on pieces of debris. Near the fixed bridge, more stony (scleractinian) corals were observed on exposed hard bottom substrate.

3.2.3.2 Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. § 1801-1882) established regional Fishery Management Councils and mandated that Fishery Management Plans (FMPs) be developed to responsibly manage exploited fish and invertebrate species in Federal waters of the United States. When Congress reauthorized this act in 1996 as the Sustainable Fisheries Act, several reforms and changes were made. One change was to charge the National Marine Fisheries Service (NMFS) with designating and conserving Essential Fish Habitat (EFH) for species managed under existing FMPs. This was intended to minimize, to the extent practicable, any adverse effects on habitat caused by fishing or non-fishing activities, and to identify other actions that encourage conservation and enhancement of such habitat.

EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity" [16 U.S.C. § 1801(10)]. The EFH Final Rule summarizing EFH regulations (50 CFR Part 600) outlines additional interpretation of the EFH definition. "Waters", as used previously, include "aquatic areas and their associated physical, chemical, and biological properties that are used by fish, and may include aquatic areas historically used by fish where appropriate." "Substrate" includes "sediment, hard bottom, structures underlying the waters, and associated biological communities."

"Necessary" is defined as "the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem." "Fish" includes "finfish, mollusks, crustaceans, and all other forms of marine animal and plant life other than marine mammals and birds," while "spawning, breeding, feeding or growth to maturity" cover the complete life cycle of those species of interest.

The South Atlantic Fishery Management Council (SAFMC) is the management council that has jurisdiction over fisheries in Federal waters of the Key West project area. The SAFMC has produced several FMPs for single and mixed species groups that include *Sargassum* algae, invertebrates, and fishes. All of these FMPs, including those for shrimps, spiny lobster, and corals, coral reefs and live/hard bottom, reef fishes, and coastal migratory pelagics, were recently amended in a single document (SAFMC 1998a) to address EFH. A separate FMP describing EFH for pelagic *Sargassum* in the South Atlantic was prepared in late 1998 (SAFMC 1998b). Another invertebrate, the stone crab, was included in the EFH description below because of its importance to local fisheries. The SAFMC has not produced a separate FMP for stone crab because the primary fishing areas are in Gulf of Mexico waters (Florida Bay and along Florida's southwest coast). The Gulf of Mexico Fishery Management Council (GMFMC) included stone crab in it's EFH amendment (GMFMC 1998). An EFH description for golden crab is provided by the SAFMC (1998a), but no FMP has been developed for this species. In addition to the FMPs prepared by the SAFMC, a FMP covering Highly Migratory Species (tunas, billfishes, sharks, and swordfish) was prepared by the Highly Migratory Species Management Unit, Office of Sustainable Fisheries, National Marine Fisheries Service (NMFS 1999a). This FMP includes descriptions of EFH for sharks, swordfish, and tunas (NMFS 1999a) whereas another FMP for Atlantic billfish was amended to include EFH designations (NMFS 1999b). Two additional highly migratory species, wahoo and dolphin, have been recently covered in a separate draft FMP (SAFMC 2001).

The queen conch (*Strombus gigas)* is not managed by the SAFMC or the GMFMC; however, the Florida Fish and Wildlife Conservation Commission (FFWCC) is managing its recovery in the waters of the Florida Keys. Commercial harvest of queen conch was closed in 1975 followed by recreational closure in 1985, and in 1986, the ban was extended to include Federal waters. There is no formal EFH description applicable for queen conch to Florida Keys waters. Nevertheless, because of the importance of queen conch recovery in the project area, it is included in the following EFH assessment along with the Federally managed species.

Within EFH designated for some species or species groups, Habitat Areas of Particular Concern (HAPC) also are identified. HAPCs either play important roles in the life history (e.g., spawning) of Federally managed fish species or are especially vulnerable to degradation from fishing or other human activities. In many cases HAPCs represent areas where detailed structure and function information is available within the larger EFH. Descriptions of EFH and HAPCs for the aforementioned FMPs and key managed species or species groups are given below.

3.2.3.2.1 <u>Fishery Resources</u>

Fishery resources in the Key West area for which EFH has been described are discussed in this section. EFH summaries presented below were tabulated for key Federally managed species based on information in the previously mentioned FMPs as well as general review documents by Alevizon and Bannerot (1990), Chiappone and Sluka (1996), and the National Oceanic and Atmospheric Administration (NOAA) (1996). HAPCs for managed species are identified where applicable based on FMP information. Species or species groups with EFH in the project area are as follows:

- *Sargassum*
- Corals, Coral Reefs, and Live/Hard Bottom
- Queen Conch
- Penaeid and Rock Shrimps
- Spiny Lobster
- Stone Crab
- Golden Crab

- Reef Fishes (Snapper-Grouper Management Unit)
- Highly Migratory Fishes
- Coastal Pelagic Fishes

Sargassum

The brown alga *Sargassum* floats at the sea surface, often forming large mats. These accumulations attract numerous small fishes and invertebrates that form mobile epipelagic assemblages (Dooley 1972). Large fishes, particularly billfishes, dolphin, tunas, and wahoo, associate with *Sargassum* mats in search of prey and shelter (SAFMC 1998a,b). EFH for *Sargassum* is simply shelf waters and the Gulf Stream. No table entry was made for *Sargassum*. Drifting mats of the alga will certainly occur in the Ship Channel, turning basin, and Truman Harbor depending on prevailing winds and water currents.

Coral, Coral Reefs, and Live/Hard Bottom

EFH for reef building stony corals reach peak cover along the Florida reef tract that borders the Florida Keys (SAFMC 1998a). This area extends from nearshore areas to 30 m water depths in areas where salinity is consistently above 30 parts per thousand (ppt) and water temperatures range from 15 to 35 degrees (º) Celsius (C). Coral, coral reefs, and live/hard bottom habitats were not included in the EFH tables.

Soft corals under this category include Antipatharia (black corals), octocorals (sea fans), and Pennatulacea (sea pens and sea pansies). EFH for Antipatharia includes rough, hard, exposed, stable substrate offshore in high salinity (30 to 35 ppt) waters in depths exceeding 18 m not restricted by light penetration. EFH for octocorals includes rough, hard, exposed, stable substrate in subtidal to outer shelf depths within a wide range of salinity and light penetration throughout the project area. Octocorals occur on hard bottom throughout the Ship Channel, turning basin, Boca Chica Channel, and Truman Harbor. EFH for Pennatulacea includes muddy, silty bottoms in subtidal to outer shelf depths within a range of salinity and light penetration.

Habitat Areas of Particular Concern

HAPCs for coral, coral reefs, and live/hard bottom habitats of the Florida Keys include the Florida Reef Tract and Hawk Channel.

Queen Conch

Queen conch primarily inhabit back-reef zones, shallow hard bottom, seagrass, and coarse sedimentary habitats of the Florida Keys (Glazer and Kidney 2003). Several spawning populations exist in the Keys, and a large concentration of spawning adults is found in the back reef and hard bottom areas from Eastern Dry Rocks to Looe Key reef. Conch are distributed in two zones: one inshore and one offshore. The inshore group rarely reproduces, whereas the offshore group is reproductively active. Spawning occurs from March through October with peak activity from April to July. Planktonic larvae are retained by local circulation, and the populations are primarily self-recruiting (Glazer 2001).

Habitat Areas of Particular Concern

HAPCs for queen conch exist in two areas relative to the proposed project vicinity: the hard bottom areas adjacent to Ship Channel Entrance, and off the Fort and Boca Chica. Of the estimated 28,000 conch in the spawning stock that occurs from Eastern Dry Rocks to Looe Key during 2001, about 18,000 were found in the region extending from Eastern Dry Rocks to Eastern Sambo. This region, by far, represents the greatest reproductive output of Florida's conch population, and any project-related impacts, particularly elevated turbidity, could impact planktonic larvae and newly settled individuals (Robert Glazer, FFWCC, pers. comm. 2003). The southern portion of the Ship Channel would be close to intersecting this area. In addition, juvenile and non-reproducing adult conch are common in the hard bottom areas from the Fort through Boca Chica and to the other side of Key West Harbor (Robert Glazer, FFWCC pers. comm. 2003).

Penaeid and Rock Shrimps

The only commercial penaeid shrimp known to occur in the lower Florida Keys is the pink shrimp (*Penaeus duorarum*) (SAFMC 1998a). EFH for pink shrimp includes seagrass and soft bottom habitats. Offshore soft bottom habitats where spawning and growth to maturity take place are important as EFH (Table 3-2). The most productive pink shrimp area in the region is the Tortugas shrimp grounds north of Dry Tortugas.

Rock shrimp (*Sicyonia brevirostris*) EFH consists of offshore terrigeneous and biogenic soft bottoms in water depths ranging from 18 to 182 m with maximum occurrence and abundance between 34 and 55 m. The Gulf Stream current is considered important in transporting rock shrimp larvae (SAFMC 1998a). Table 3-2 provides a description of EFH for rock shrimp in the Key West area. Adults would only be expected to occur, whereas planktonic larvae may be found in the water column throughout the project area.

Habitat Areas of Particular Concern

Areas considered HAPCs for pink shrimp are inshore nursery grounds, particularly seagrass beds. No HAPC was identified for rock shrimp.

Table 3-2 Invertebrate Species for Which EFH has been Identified Near Key West, Florida (SAFMC 1998a).

Species	Life Stages	Habitat
Queen conch *(Strombus gigas)*	Adults; Juveniles; Larvae	Back-Reef Zones; Rubble-Sand; Coarse Sand; Pelagic
Pink shrimp (*Penaeus dourarum*)	Adults; Juveniles; Larvae	Soft Bottom; Seagrass; Pelagic
Rock shrimp (*Sicyonia brevirostris*)	Adults; Juveniles; Larvae	Soft Bottom (18 to 180 m); Pelagic
Stone crab (*Menippe mercenaria*)	Adults; Juveniles; Larvae	Hard Bottom; Seagrass; Mangrove; Sponges; Macroalgae; Pelagic
Golden crab (*Chaceon fenneri*)	Adults; Larvae	Soft bottom (>200 m); Pelagic
Spiny lobster (*Panulirus argus*)	Adults; Juveniles; Larvae	Hard Bottom; Seagrass; Mangrove; Sponges; Macroalgae; Pelagic

Spiny Lobster

Spiny lobster (*Panulirus argus*) is very important economically to the Florida Keys. Both commercial and recreational interests benefit from healthy spiny lobster populations. Spiny lobster EFH consists of hard bottom, coral reefs, crevices, cracks, and other structured bottom in shelf waters (Table 3-2). Juvenile habitat is in nearshore waters and ranges in type from massive sponges, mangrove roots, and seagrass meadows to soft bottom with macroalgal clumps. The Gulf Stream provides an important mode of transport for early life history stages of spiny lobster.

Habitat Areas of Particular Concern

HAPCs for spiny lobster include coral/hard bottom habitat from Jupiter Inlet, Florida to the Dry Tortugas, Florida.

Stone Crab

All life stages of the stone crab (*Menippe mercenaria*) occur in the Key West area, however, highest densities of adult stone crab exist in Florida Bay. EFH for adult stone crab includes seagrass meadows, hard bottom, rock ledges, channel margins, and coral heads (GMFMC 1998). Adults construct burrows and prefer areas with hard packed sand with scattered hard bottom covered with algae, soft corals, and sponges. Juveniles do not burrow, but are found in seagrass, shell hash, sponges, and other structurally complex benthic habitats. Larvae are planktonic and grow fastest in warm (> 30° C), high salinity (> 30 ppt) waters. Table 3-2 describes EFH for the Key West project area.

Habitat Areas of Particular Concern

The GMFMC did not identify any particular HAPC for stone crab, but did include Florida Bay (a primary habitat for adult stone crab) as an HAPC (GMFMC 1998).

Golden Crab

EFH for golden crab and spiny lobster exists in the southeastern Florida region. Golden crab EFH includes a variety of bottom types including foraminiferan ooze, distinct mounds of dead coral, ripple bottom, dunes, black pebbles, low outcrop, and soft bioturbated bottom (SAFMC 1998a). All of these habitats are in water depth exceeding 200 m. The Gulf Stream current is considered important in dispersal of planktonic eggs and larvae.

Habitat Areas of Particular Concern

The SAFMC (1998a) indicates that there is too little information available on the life history of golden crab to identify HAPC's.

Spiny Lobster

Spiny lobster (*Panulirus argus*) is very important economically to the Florida Keys. Both commercial and recreational interests benefit from healthy spiny lobster populations. Spiny lobster EFH consists of hard bottom, coral reefs, crevices, cracks, and other structured bottom in shelf waters (Table 3-2). Juvenile habitat is in nearshore waters and ranges in type from massive sponges, mangrove roots, and seagrass meadows to soft bottom with macroalgal clumps. The Gulf Stream provides an important mode of transport for early life history stages of spiny lobster.

Habitat Areas of Particular Concern

HAPCs for spiny lobster include coral/hard bottom habitat from Jupiter Inlet, Florida to the Dry Tortugas, Florida.

Reef Fishes (Snapper-Grouper Management Unit)

The SAFMC Snapper-Grouper Management Unit consists of 73 species from 10 families (SAFMC 1983; 1998a). Members of this management unit inhabit reefs and hard bottom areas as adults and are very important components of commercial and recreational fisheries of the area. Because of their affinity for hard bottom and reefs, members of the Snapper-Grouper Management Unit are collectively referred to as reef fishes. Although snappers (Lutjanidae) and groupers (Serranidae) are the most valuable members of the group, species from other families including grunts (Haemulidae), jacks (Carangidae), porgies (Sparidae), spadefishes (Ephippidae), temperate basses (Percichthyidae), tilefishes (Malacanthidae), triggerfishes (Balistidae), and wrasses (Labridae) are also represented. In deeper waters of the ODMDS, species such as snowy grouper, yellowedge grouper, Warsaw grouper, scamp, and blackfin snapper will associate with hard substrates. Not strictly a reef species, tilefish will occur in water depths of the ODMDS where the substrate is muddy or clayey. Other reef fishes, not managed by SAFMC but important to the ornamental or aquarium trade, occur in the Key West area and include angelfishes (Pomacanthidae), butterflyfishes (Chaetodontidae), gobies (Gobiidae), jawfishes (Opistognathidae), and wrasses. Most reef fishes (and invertebrates) have a two-phase life cycle that greatly influences habitat use by individuals throughout their development. The early phase of the life cycle consists of planktonic or demersal eggs and planktonic larvae capable of considerable spatial transport by currents, tides, and winds. This transport can be advective or retentive. The second phase begins when larvae settle to the seafloor and begin life as benthic juveniles inhabiting shallow water habitats such as patch reefs, seagrass beds, mangroves, and other structurally complex features. As these young individuals grow, they gradually migrate offshore to adult habitat where they develop to maturity. EFH descriptions for representative reef fishes are given in Table 3-3.

Habitat Areas of Particular Concern

HAPCs described for the Snapper-Grouper Management Unit include high-relief offshore areas where spawning occurs and localities of known spawning aggregations. In addition, nearshore mangrove habitat; seagrass habitat; coral, coral reef, and hard/live bottom habitats; pelagic and benthic *Sargassum*; and artificial reefs encompass HAPCs for reef fishes.

Table 3-3 Representative Reef Fish Species for Which EFH has been Identified Near Key West, Florida (SAFMC 1998a).

Species	Life Stages	Habitat
Jewfish (*Epinephelus itajara*)	Adults; Juveniles; Larvae; Eggs	Hard Bottom; Seagrass; Mangrove; Water Column
Red grouper (*Epinephelus morio*)	Adults; Juveniles; Larvae; Eggs	Hard Bottom; Seagrass; Water Column
Nassau grouper (*Epinephelus striatus*)	Adults; Juveniles; Larvae; Eggs	Hard Bottom; Seagrass; Water Column
Yellowedge grouper (*Epinephelus flavolimbatus*)	Adults; Juveniles; Larvae; Eggs	Hard Bottom; Soft Bottom; Pelagic
Snowy grouper (*Epinephelus niveatus*)	Adults; Juveniles; Larvae; Eggs	Hard Bottom; Deep Reef; Pelagic
Warsaw grouper (*Epinephelus nigritus*)	Adults; Juveniles; Larvae; Eggs	Hard Bottom; Deep Reef; Pelagic
Black grouper (*Mycteroperca bonaci*)	Adults; Juveniles; Larvae; Eggs	Hard Bottom; Seagrass; Water Column
Gag (*Mycteroperca microlepis*)	Adults; Juveniles; Larvae; Eggs	Hard Bottom; Seagrass; Water Column
Scamp (*Mycteroperca phenax*)	Adults; Juveniles; Larvae; Eggs	Hard Bottom; Pelagic
Mutton snapper (*Lutjanus analis*)	Adults; Juveniles; Larvae; Eggs	Hard Bottom; Seagrass; Water Column
Schoolmaster (*Lutjanus apodus*)	Adults; Juveniles; Larvae; Eggs	Hard Bottom; Seagrass; Mangrove; Water Column
Blackfin snapper (*Lutjanus bucanella*)	Adults; Juveniles; Larvae; Eggs	Hard Bottom; Seagrass; Water Column
Red snapper (*Lutjanus campechanus*)	Adults; Juveniles; Larvae; Eggs	Hard Bottom; Soft Bottom; Water Column
Gray snapper (*Lutjanus griseus*)	Adults; Juveniles; Larvae; Eggs	Hard Bottom; Seagrass; Mangrove; Water Column
Dog snapper (*Lutjanus jocu*)	Adults; Juveniles; Larvae; Eggs	Hard Bottom; Seagrass; Mangrove; Water Column
Mahogany snapper (*Lutjanus mahogoni*)	Adults; Juveniles; Larvae; Eggs	Hard Bottom; Seagrass; Water Column
Lane snapper (*Lutjanus synagris*)	Adults; Juveniles; Larvae; Eggs	Hard Bottom; Seagrass; Mangrove; Water Column
Vermilion snapper (*Rhomboplites aurorubens*)	Adults; Juveniles; Larvae; Eggs	Hard Bottom; Seagrass; Water Column
Yellowtail snapper (*Ocyurus chrysurus*)	Adults; Juveniles; Larvae; Eggs	Hard Bottom; Seagrass; Water Column

Species	Life Stages	Habitat
Tilefish (*Lopholatilus chamaeleonticeps*)	Adults; Juveniles; Larvae; Eggs	Soft Bottom; Pelagic
Blueline tilefish (*Caulolatilus microps*)	Adults; Juveniles; Larvae; Eggs	Hard Bottom; Deep-reef; Pelagic
Greater amberjack (*Seriola dumerili*)	Adults; Juveniles; Larvae; Eggs	Hard Bottom; Seagrass; Water Column
Almaco jack (*Seriola rivoliana*)	Adults; Juveniles; Larvae; Eggs	Hard Bottom; Seagrass; Water Column
Gray triggerfish (*Balistes capriscus*)	Adults; Juveniles; Larvae; Eggs	Hard Bottom; Seagrass; Water Column
Queen triggerfish (*Balistes vetula*)	Adults; Juveniles; Larvae; Eggs	Hard Bottom; Seagrass; Water Column

Highly Migratory Species

Many highly migratory species including sharks (Orectolobidae, Lamnidae, Carcharhinidae, and Sphyrnidae), dolphin (*Coryphaena hippurus*), wahoo (*Acanthocybium solanderi*), tunas (*Thunnus* spp. and *Katsuwonus pelamis*), swordfish (*Xiphias gladius*), and billfishes (Istiophoridae) may occur in the Key West area because of the proximity of the Gulf Stream current. Several shark species frequent the Gulfstream, shelf, and shallow waters of the area. Swordfish and bluefin tuna (*Thunnus thynnus*) migrate through the Florida Straits and into the eastern Gulf of Mexico to spawn (NMFS 1999a). *Sargassum* is important habitat for various life stages of the swordfish and tunas. Blue marlin (*Makaira nigricans*) and white marlin (*Tetrapturus albidus*) occur offshore of the Florida Keys. Table 3-4 lists the sharks, dolphin, wahoo, tunas, swordfish, and billfishes with EFH in the Key West area.

Habitat Areas of Particular Concern

HAPCs have not been designated by NMFS (1999a,b) for members of the highly migratory species groups.

Table 3-4 Highly Migratory Species for Which EFH has been Identified Near Key West, Florida (NMFS 1999a,b; South Atlantic Fisheries Management Council 2001).

Species	Life Stages	Habitat
SHARKS		
Nurse shark (*Ginglymostoma cirratum*)	Adults; Late Juveniles/Subadults; Neonates/Early Juveniles	Pelagic; Hard Bottom
Longfin mako shark (*Isurus paucus*)	Adults; Late Juveniles/Subadults; Neonates/Early Juveniles	Oceanic
Oceanic whitetip shark (*Carcharhinus longimanus*)	Late Juveniles/Subadults	Oceanic
Blacknose shark (*Carcharhinus acronotus*)	Adults; Late Juveniles/Subadults	Pelagic
Spinner shark (*Carcharhinus brevipinna*)	Adults; Neonates/Early Juveniles	Pelagic
Silky shark (*Carcharhinus falciformis*)	Adults; Late Juveniles/Subadults; Neonates/Early Juveniles	Pelagic
Bull shark (*Carcharhinus leucas*)	Adults; Late Juveniles/Subadults; Neonates/Early Juveniles	Pelagic; Estuaries; Bays
Night shark (*Carcharhinus signatus*)	Adults; Late Juveniles/Subadults; Neonates/Early Juveniles	Pelagic

Species	Life Stages	Habitat
Dusky shark (*Carcharhinus obscurus*)	Neonates/Early Juveniles; Late Juveniles/Subadults	Pelagic
Caribbean reef shark (*Carcharhinus perezi*)	Adults; Late Juveniles/Subadults	Pelagic
Sandbar shark (*Carcharhinus plumbeus*)	Adults; Late Juveniles/Subadults; Neonates/Early Juveniles	Pelagic
Tiger shark (*Galeocerdo cuvier*)	Adults; Late Juveniles/Subadults	Pelagic
Lemon shark (*Negaprion brevirostris*)	Adults; Late Juveniles/Subadults; Neonates/Early Juveniles	Mangrove; Sand Flats; Pelagic
Scalloped hammerhead (*Sphyrna lewini*)	Adults; Late Juveniles/Subadults	Pelagic
Great hammerhead (*Sphyrna mokarran*)	Adults; Late Juveniles/Subadults	Pelagic
DOLPHIN AND WAHOO		
Dolphin (*Coryphaena hippurus*)	Adults; Subadults; Juveniles; Larvae; Eggs (spawning area)	Pelagic; *Sargassum*
Wahoo (*Acanthocybium solanderi*)	Adults; Subadults; Juveniles; Larvae; Eggs (spawning area)	Pelagic; *Sargassum*
TUNA		
Skipjack tuna (*Katsuwonus pelamis*)	Adults; Larvae; Eggs (spawning area)	Pelagic; *Sargassum*
Yellowfin tuna (*Thunnus albacares*)	Adults; Larvae; Eggs (spawning area)	Pelagic; *Sargassum*
Blackfin tuna (*Thunnus atlanticus*)	Adults; Larvae; Eggs (spawning area)	Pelagic; *Sargassum*
Bluefin tuna (*Thunnus thynnus*)	Adults; Larvae; Eggs (spawning area)	Pelagic; *Sargassum*
SWORDFISH		
Swordfish (*Xiphias gladius*)	Subadults; Juveniles; Larvae; Eggs (spawning area)	Pelagic
BILLFISHES		
Blue marlin (*Makaira nigricans*)	Adults; Subadults; Juveniles; Larvae; Eggs	Pelagic
White marlin (*Tetrapturus albidus*)	Adults; Subadults; Juveniles	Pelagic
Longbill spearfish (*Tetrapturus pfluegeri*)	Adults	Pelagic
Atlantic sailfish (*Istiophorus platypterus*)	Adults; Subadults; Juveniles; Larvae; Eggs (spawning area)	Pelagic

Coastal Pelagic Fishes

The Coastal Pelagic Management Unit includes cobia (*Rachycentron canadum*), cero mackerel (*Scomberomorus regalis*), king mackerel (*S. cavalla*), Spanish mackerel (*S. maculatus*), and little tunny (*Euthynnus alletteratus*) (SAFMC 1998a). All of these species occur in waters of the project area and all are important to local fisheries. Coastal pelagic species are migratory water column dwellers, however, most species have some affinity for man-made and natural structures. Sandy bottoms, shoal areas, and hard bottom features occurring from the surf zone to the shelf break encompass EFH for coastal pelagic fishes. Passes, high-salinity bays, and *Sargassum* rafts are also important for various life stages of coastal pelagic fishes. A species account of EFH for these species in the Florida Keys is given in Table 3-5.

Other species not considered under the FMP but important to recreational fisheries and therefore the local economy are bonefish (*Albula vulpes*), permit (*Trachinotus falcatus*), and tarpon (*Megalops atlanticus*). Bonefish inhabit shallow sand flats throughout the Keys. Like bonefish, permit occur in shallow water but also congregate around deeper natural and artificial reefs as well. Tarpon are found on flats, in deeper channels, around bridges, and most inshore habitats in the Keys.

Habitat Areas of Particular Concern

For coastal pelagic fishes, HAPCs generally include shelf waters inshore of the Gulf Stream. Specifically in the Florida Keys, the “Hump” off Islamorada, the “Marathon Hump”, and the “Wall” were all identified as HAPCs for coastal pelagic fishes.

Table 3-5 Coastal Pelagic Fishes for Which EFH has been Identified Near Key West, Florida (SAFMC 1998a).

Species	Life Stages	Habitat
COASTAL PELAGIC FISHES		
Cobia (*Rachycentron canadum*)	Adults; Subadults; Juveniles; Larvae; Eggs	Pelagic; Hard Bottom
Cero (*Scomberomorus regalis*)	Adults; Subadults; Juveniles; Larvae; Eggs	Pelagic; Hard Bottom
King mackerel (*Scomberomorus cavalla*)	Adults; Subadults; Juveniles; Larvae; Eggs	Pelagic; Hard Bottom
Spanish mackerel (*Scomberomorus maculatus*)	Adults; Subadults; Juveniles; Larvae; Eggs	Pelagic; Hard Bottom
Little tunny (*Euthynnus alletteratus*)	Adults; Subadults; Juveniles; Larvae; Eggs	Pelagic; Hard Bottom

3.2.3.3 Federally Endangered or Threatened Marine Turtles

Descriptions of Federally endangered or threatened marine turtles were included in the EA.

3.2.3.4 Marine Mammals

Descriptions of marine mammals were provided in the EA.

3.2.4 Existing Conditions – ODMDS

3.2.4.1 Benthic Biological Resources

Benthic biological resources observed in the area of the ODMDS include the deep reef and hard ground habitat described in Section 3.1.4 of this EAS. From 450 to 600 ft depths, the benthic community in the sandy sediments is anticipated to be similar to the soft bottom benthic communities described previously for the Florida Keys and Southwest Florida Continental Shelf. Within these areas, macroinfaunal abundance ranged between 1,000 to 14,000 individuals/m^2 and decreased with depth. Polychaetes, crustaceans, and mollusks accounted for 64 percent, 17 percent, and 10 percent of this community, respectively (Continental Shelf Associates, Inc. 1990).

Species observed on the deep reef features during the ODMDS biological resources survey included sponges, antipitharians, crabs, sea urchins, stalked and burrowing anemones, and red crustose coralline algae. Fish species observed consisted of serranids, tilefish, and boarfish. Biotic cover across these deep reef habitats was low compared to the bank and patch reefs within the Florida Keys National Marine Sanctuary (FKNMS).

3.2.4.2 Essential Fish Habitat

Essential fish habitat in the area of the proposed ODMDS consists of the water column itself, the deep reef and hard ground habitats, and the soft bottom habitat observed across the majority of the 0.5 nm by 0.5 nm block proposed for the ODMDS (Tables 3-3, 3-4 and 3-5). Of particular concern is the deep reef habitat noted to the north of the proposed ODMDS and the mound feature noted southeast of the proposed ODMDS (Continental Shelf Associates, Inc. 2003a). The sinkhole reported to the southeast of the proposed ODMDS also is a unique habitat characteristic of the Pourtales Terrace and was carefully avoided when selecting the final location for the 0.5 nm by 0.5 nm ODMDS location.

3.2.4.3 Federally Endangered or Threatened Marine Turtles

Essentially all the marine turtles discussed in Section 3.2.3.3 may occur in the ODMDS. There is no critical habitat for marine turtles in the ODMDS, and any turtles observed in that area would be transients.

3.2.4.4 Marine Mammals

With the exception of the Florida manatee, all of the marine mammals discussed in Section 3.2.3.4 may occur in the ODMDS area. There is no critical habitat for marine mammals in this area, and any individuals observed would be transients. Although manatees are not expected to be observed as far offshore as the ODMDS, they may occur in the channel and along the barge route to the ODMDS.

3.3 WATER RESOURCES

3.3.1 Definition of Resources

Descriptions of general water resources of the Florida Keys were provided in the EA.

3.3.2 Existing Conditions -- Landside – Fleming Key

A description of freshwater resources of the Key West area is found in the EA.

Operations Management International operates three underground injection disposal wells on Fleming Key. Each injection well has a Florida Department of Environmental Protection (FDEP) permitted monitoring well associated with it. Monthly water quality is monitored at varying depths to approximately -18 ft NGVD. Because potable water sources do not occur on Fleming Key, the data are empirical and not related to drinking water protection.

3.3.3 Existing Conditions – Marine

Descriptions of marine water resources and the effects of ship related turbidity were provided in the EA.

3.3.4 Coastal Zone

Description of Coastal Zone Management was provided in the EA.

3.3.5 Existing Conditions – ODMDS

No long-term water quality data are available from the proposed ODMDS. The area over the Pourtales Terrace is regularly flushed by the Florida Current and the Pourtales Gyre. One conductivity, temperature, and depth (CTD) cast was performed by Continental Shelf Associates, Inc. (2003a) during the survey of the proposed offshore dredge material placement site. Table 3-6 summarizes data from that cast, performed in the approximate center of the 2 nm by 9 nm block surveyed (Figure 3-2). Water quality within the designated 0.5 nm by 0.5 nm dredge material placement area is considered to be excellent.

Table 3-6. Results of the Water Column Profile Conducted at ODMDS by Continental Shelf Associates, Inc. on 28 June 2003.

Depth (ft)	Temp. (Cº)	Salinity (ppt)	DO (mg/L)	DO% Saturation
Surface	28.8	36.1	5.8	92.4
50	28.8	36.1	5.8	92.4
100	28.6	36.3	5.9	93.2
150	19.5	35.5	4.9	66.5
200	14.1	35.8	4.1	49.8
250	12.2	35.4	3.8	44.1
300	11.4	35.4	3.7	42.9
350	10.6	35.3	3.7	41.3
400	9.8	35.2	3.6	40.2
450	9.8	35.2	3.6	40.2
500	9.3	35.1	3.7	40.3
550	9.2	35.1	3.7	40.3
600	9.1	35.1	3.7	40.3
650	9.1	35.1	3.7	40.3
700	9.1	35.1	3.7	40.3
727	9.1	35.1	3.7	40.3

3.4 CULTURAL RESOURCES

Descriptions governing protection of cultural resources were provided in the EA

3.4.2 Existing Conditions

3.4.2.1 Fleming Key

Surveys of archeological and historic resources were conducted at NAS Key West in the mid-1990's. *An Architectural Inventory – NAS Key West, Key West, Florida,* (Inventory) was completed by the USACOE, Mobile District, in 1995, and *Archaeological Survey of Key West NAS, Monroe County, Florida,* (Survey) was completed by Brockington and Associates, Inc., in 1997. The purpose of the Archaeological Survey was to identify and locate all prehistoric and historic archaeological sites on government-owned lands at NAS Key West and to evaluate them to determine their eligibility for listing on the National Register of Historic Places (NRHP). This survey was conducted in compliance with Section 106 of the National Historic Preservation Act (NHPA). Bunker F-26 is a historic structure listed on the NRHP.

3.4.2.2 ODMDS

A detailed marine archeological survey was performed on the entire 2 nm by 9 nm block (Figure 3-2) proposed for the location of the 0.5 nm by 0.5 ODMDS placement site (Lydecker, A. 2003). The results of this investigation indicated eight side-scan sonar targets located within the proposed ODMDS area that are likely to represent manmade objects or debris. Of these eight targets, none were likely to represent potentially significant submerged cultural resources. It is the opinion of the Marine Archeology Principal Investigator that there are no potentially significant submerged cultural resources within the ODMDS area, and no further archaeological investigations are required (Lydecker, A. 2003).

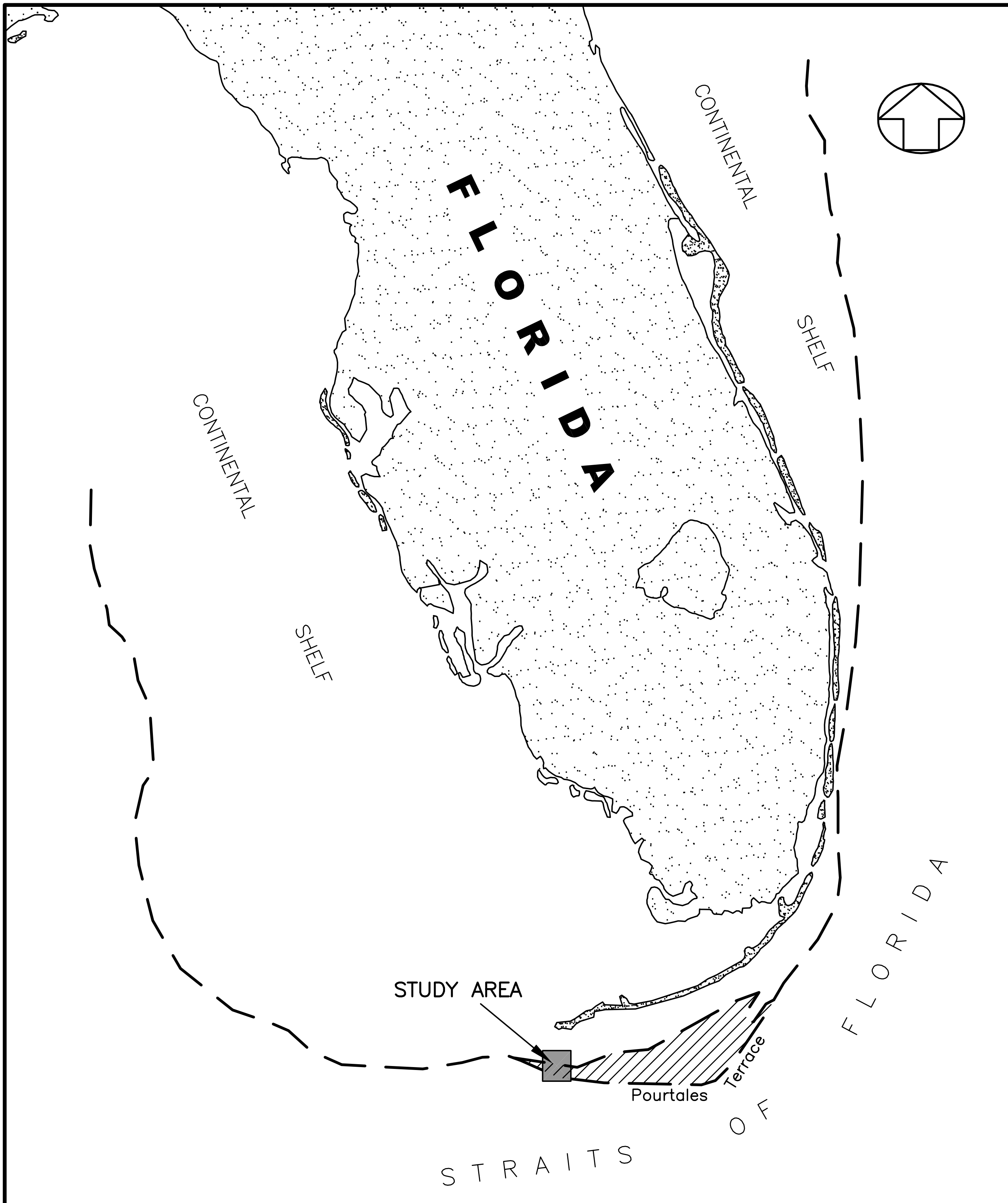


FIGURE 3–1

POURTALES TERRACE AND PROPOSED OFFSHORE DREDGED MATERIAL DISPOSAL SITE (ODMDS) STUDY AREA

ENVIRONMENTAL ASSESSMENT SUPLEMENT FOR FLEET SUPPORT AND INFRASTRUCTURE IMPROVEMENTS NAS KEY WEST

SOURCE: JORDAN, G.F.,R.J. MALLOY AND J.W. FOFOED, 1964, BATHYMETRY AND GEOLOGY OF POURTALES TERRACE, FLORIDA, MARINE GEOL. 1:259–287.

FILE: 1917.01/EA–SUPPLEMENT/1917–FIG3–1.DWG DATE: 07/09/03

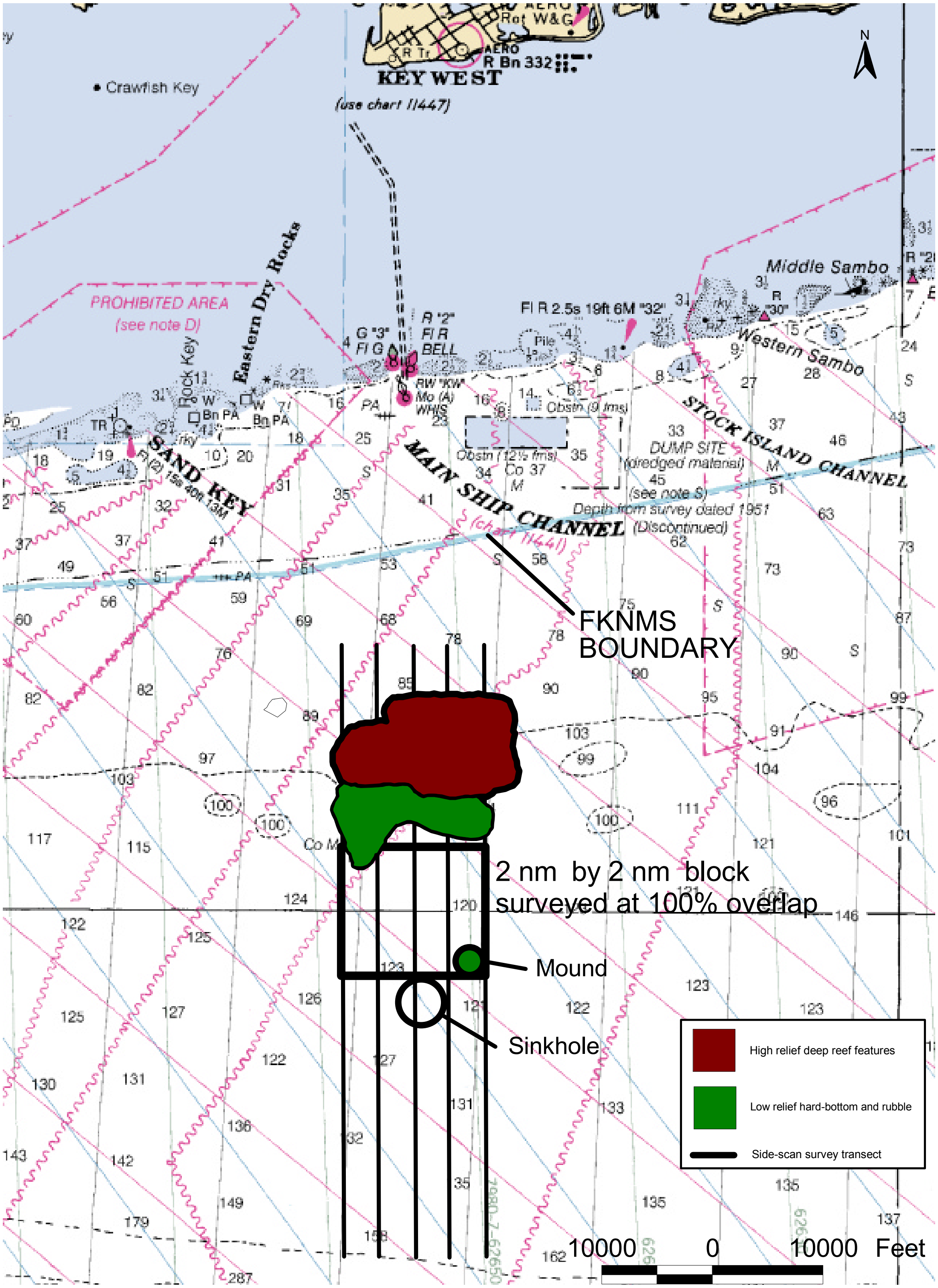


FIGURE 3-2

SIDE SCAN SONAR SUMMARY RESULTS

ENVIRONMENTAL ASSESSMENT SUPLEMENT FOR FLEET SUPPORT AND INFRASTRUCTURE IMPROVEMENTS NAS KEY WEST

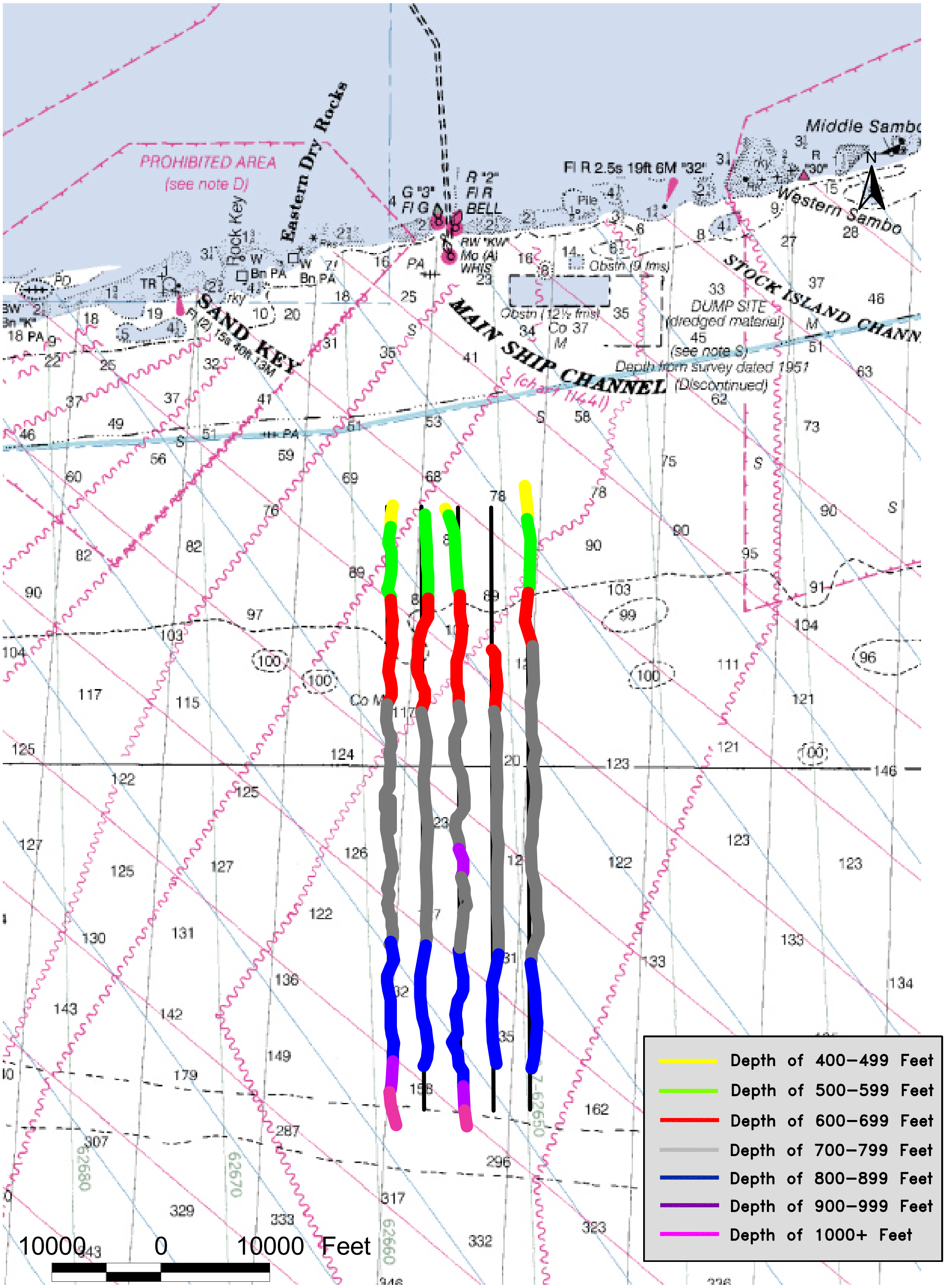


FIGURE 3-3

BATHYMETRY WITHIN THE ODMDS
2 NM x 9 NM SURVEY AREA

ENVIRONMENTAL ASSESSMENT SUPLEMENT FOR FLEET SUPPORT AND INFRASTRUCTURE IMPROVEMENTS NAS KEY WEST

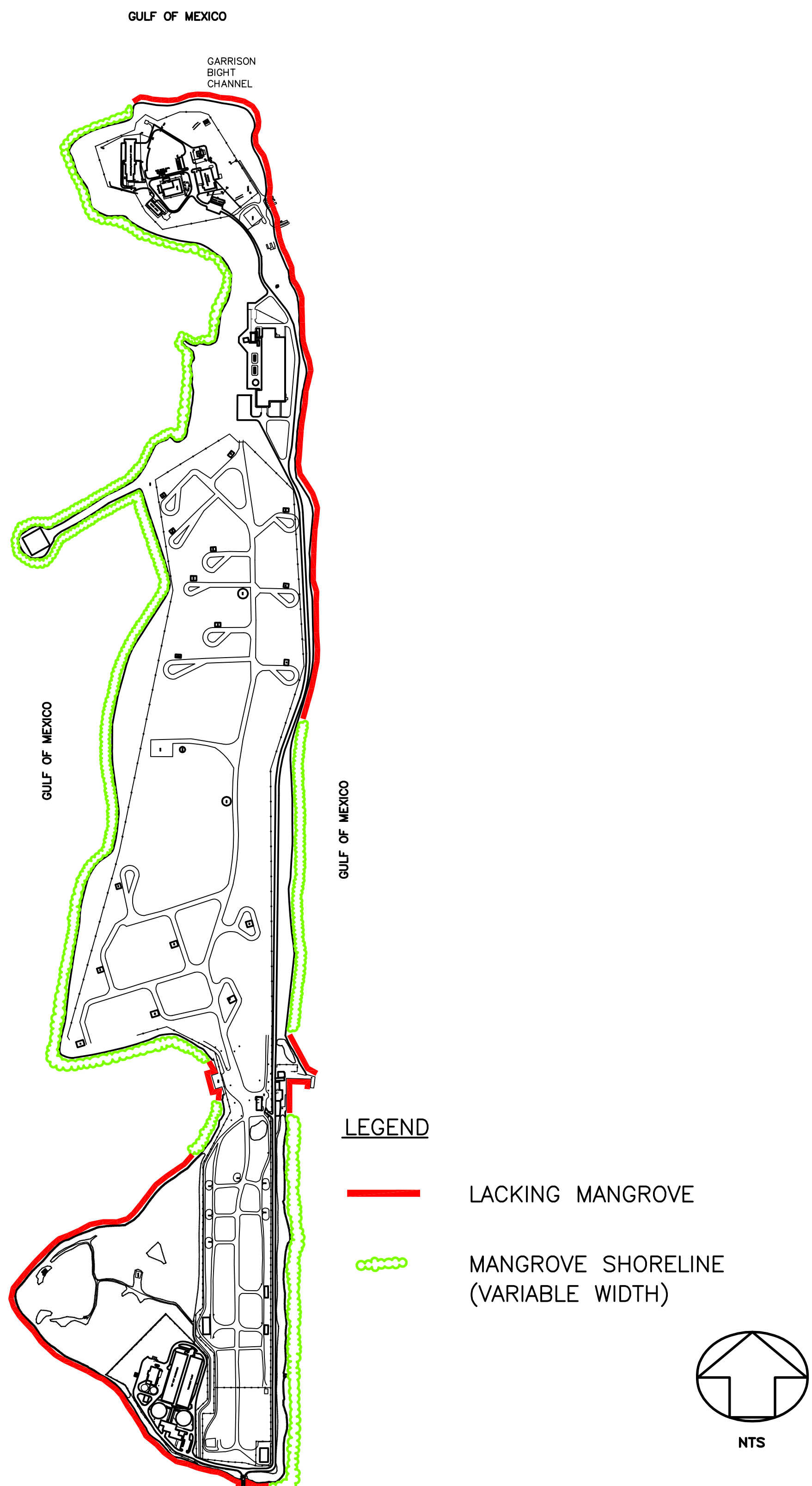


FIGURE 3–4

FLEMING KEY
TIDAL WETLANDS

ENVIRONMENTAL ASSESSMENT SUPPLEMENT FOR FLEET SUPPORT AND INFRASTRUCTURE IMPROVEMENTS NAS KEY WEST

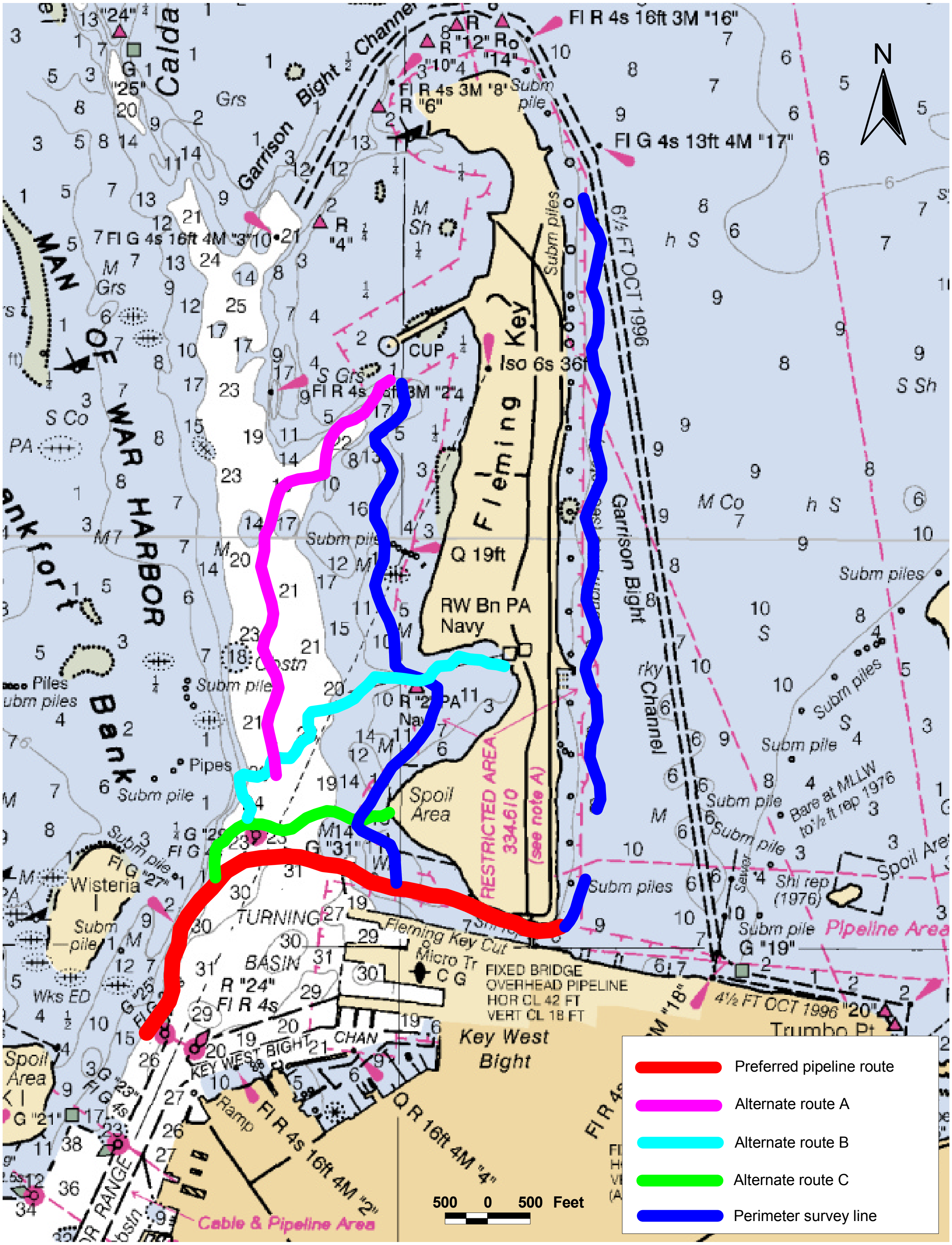


FIGURE 3-5

MARINE RESOURCE SURVEY TRACKS

ENVIRONMENTAL ASSESSMENT SUPLEMENT FOR FLEET SUPPORT AND INFRASTRUCTURE IMPROVEMENTS NAS KEY WEST

CHAPTER 4

ENVIRONMENTAL CONSEQUENCES AND MITIGATION MEASURES

Chapter 4 discusses in detail the environmental consequences of the disposal alternatives: Split Disposal between Fleming Key and ODMDS, All Disposal at Fleming Key, and No-Action.

4.1 TOPOGRAPHY, GEOLOGY, SOILS, AND MARINE SEDIMENTS

4.1.1 Approach to Analysis

In this section, the potential impacts to topography, geology, and soils resulting from the stated Alternatives are evaluated. Of concern are the protection of valuable geologic features, the minimization of soil erosion, and the situating of facilities away from potential geological hazards. Usually, geologic resource impacts can be avoided or minimized if proper construction techniques, erosion control measures, and structural engineering components are incorporated into the project design.

4.1.2 Landside

4.1.2.1 Split Disposal between Fleming Key and ODMDS Alternative

This Alternative would result in placement of approximately 400,000 cy of sandy silt material on Fleming Key. All material would be contained within earth fill dikes, constructed with parent material excavated from Fleming Key inside of a 37 ac containment dike footprint. Excavation, dike construction, and fill would result in a dredged material maintenance site with elevations from grade (approximately 5 ft NGVD) at the toe of the containment dike to 15 ft above grade (approximately 20 ft NGVD) at dike top.

4.1.2.2 All Material to Fleming Key Alternative

This Alternative would require placement of the entire project excavation of approximately 819,000 cy of sand, silt, gravel, and rock rubble on Fleming Key. All material would be contained within earth fill dikes, constructed with parent material from Fleming Key inside of a 37 ac containment dike footprint. Excavation, dike construction, and fill would result in a dredged material maintenance site with elevations from grade (approximately 5 ft NGVD) at the toe of the containment dike to 30 ft above grade (approximately 35 ft NGVD) at dike top.

4.1.2.3 No-Action Alternative

Under the No-Action Alternative, no dredged material would be moved or placed therefore, the current topography, geology and soils resources would remain unchanged. No significant impacts to topography, geology or soils would occur as a result of implementation of the No-Action Alternative.

4.1.3 Marine

4.1.3.1 Bathymetry

4.1.3.1.1 Split Disposal between Fleming Key and ODMDS Alternative

Under the Split Disposal Site Alternative, approximately 400,000 cy of material would be placed on Fleming Key. This material would be contained on the uplands of the key and have no impact on the bathymetry of the surrounding waters.

Under the Split Disposal Site Alternative, approximately 419,000 cy of rock and sand material would be transported to the ODMDS and discharged in approximately 740 ft of water. This material would, by definition, be very coarse and would be expected to settle directly to the bottom, entraining most of the fines associated with it. Placement of the rock material may result in a increase in bottom relief across the placement site. Rather than building up a significant pile in one area, this dredged material is expected to be spread across the site, increasing the hard bottom habitat within the placement site without producing a significant change in overall bottom topography (Wagner, R.J. et. al 2003).

The sand component of the dredged material would be projected to settle within the near field of the placement site. Due to current dispersion, these sediments would not be expected to impact bottom topography in any meaningful way.

Some fine sediments would be discharged into the water column at the ODMDS along with the proposed rock and sand. This fine material may remain suspended in the water column for a longer period of time and may be dispersed beyond the boundaries of the 0.5 nm by 0.5 nm dredged material placement site. Concentrations of such fine sediment materials would be anticipated to be limited, and once dispersed by the ambient currents within the ODMDS area, no significant impacts from these fine sediments would be anticipated (Wagner, R.J. et. al 2003).

In summary, no significant impacts to bathymetry of the ODMDS are anticipated under the Split Disposal Site Alternative.

4.1.3.1.2 All Material to Fleming Key Alternative

Under this Alternative, approximately 819,000 cy of material would be placed on Fleming Key. The material would be confined to the uplands and would have no impact to the bathymetry of the surrounding waters.

4.1.3.1.3 No-Action Alternative

Under the No-Action Alternative, proposed dredging activities in the Ship Channel, turning basin and Truman Harbor would not occur, and there would be no marine bathymetric impacts.

4.1.3.2 Sediment Quality

4.1.3.2.1 Split Disposal between Fleming Key and ODMDS Alternative

Under the Split Disposal Site Alternative, approximately 400,000 cy of silt and gravel material would be placed on Fleming Key. This material would be contained on the uplands of the key and have no impact on the sediment quality in the vicinity of Fleming Key.

Under the Split Disposal Site Alternative, the large majority of the sediments and rock material transported to the ODMDS would be very similar to the ambient material currently found at that location. There would be no impacts to sediment quality in the ODMDS under this alternative.

4.1.3.2.2 All Material to Fleming Key Alternative

Under this Alternative, approximately 819,000 cy of material would be placed on Fleming Key. The material would be confined to the uplands and would have no impact on the sediment quality in the vicinity of Fleming Key.

4.1.3.2.3 No-Action Alternative

Under the No-Action Alternative, proposed dredging activities would not occur. Sediment quality would be unaffected.

4.2 BIOLOGICAL RESOURCES

4.2.1 Approach to Analysis

In this section, potential impacts to biological resources resulting from the alternatives are evaluated. Evaluations consider importance of the resource from commercial, recreational, ecological, and scientific standpoints; the occurrence of the resource in the area of the proposed activities relative to occurrence in the region; the sensitivity of the resource to the proposed activities; and the duration of potential impacts.

4.2.2 Terrestrial/Wetland

4.2.2.1 Split Disposal between Fleming Key and ODMDS Alternative

Construction of containment dikes and deposition of approximately 400,000 cy of dredged material at Fleming Key would have little, if any, impact on the terrestrial or wetland resources. Excavation of soil material and construction of dikes would occur in disturbed upland, consisting of a managed grass surface and gravel roads. With the exception of non-nesting use by passerine birds, and occupation by rodents and other small mammals (e.g., raccoon), Fleming Key affords little sustaining habitat for terrestrial animals.

Wetland resources are limited mainly to a fringing band of mangroves that would not be affected by construction in this Alternative. No construction fill would be placed in mangroves, and the pipeline used to convey dredged material to within the containment dikes would likewise avoid mangroves.

4.2.2.2 All Material to Fleming Key Alternative

Construction of containment dikes and deposition of the approximately 819,000 cy of dredged material at Fleming Key would have little, if any, impact on the terrestrial or wetland resources. The footprint of the containment dikes in this Alternative would be the same as in the Split Disposal Alternative; the additional volume of dredged material would be accommodated by constructing the dikes to a higher elevation and placing the additional fill within the dikes.

Wetland resources in this Alternative also would not be affected, as construction would avoid mangroves and the pipelines conveying dredged material and decant water out of the containment dikes would avoid mangrove habitat.

4.2.2.3 No-Action Alternative

Under the No-Action Alternative, proposed dredging would not occur, therefore, the current animal and vegetation communities would remain unaltered. No significant impacts to terrestrial and wetland resources would result from implementing the No-Action Alternative.

4.2.3 Marine

4.2.3.1 Benthic Communities

4.2.3.1.1 Split Disposal between Fleming Key and ODMDS Alternative

Seafloor Disturbance

The pipeline could impact seagrass beds and hard bottom communities in the vicinity of Fleming Key if placed in the wrong locations. Vessel groundings during pipeline placement and positioning activities could also impact shallow water coral, hard bottom, and seagrass communities.

All of the previously discussed impacts to benthic communities are considered accidental and not part of the proposed routine dredging activities. Methods to reduce the possibility of these accidental impacts occurring include the delineation of all sensitive resources adjacent to the project area and establishment of buffer areas in which no anchor or cable placement would be allowed.

Soft bottom benthic communities in the ODMDS may be temporarily disturbed and dislocated during the period of time when dredged material is actively being deposited in the placement area, but they would be expected to recover quickly. While all the benthic habitats within the ODMDS may be classified as EFH, the soft bottom benthic communities at the dredged material placement site are more resilient to changing environmental conditions than hard bottom and deep reef communities. Soft bottom benthic community impacts at the ODMDS would be expected to be localized and short-term in nature under the Split Disposal Site Alternative.

Turbidity/Sedimentation

Turbidity and sedimentation are both associated with dredge material placement projects. Turbidity impacts can cause decreased photosynthesis and productivity in benthic communities. Heavy levels of sedimentation can often be more detrimental, by totally covering seagrasses and preventing photosynthesis, clogging filter-feeding organisms such as sponges, or causing corals to spend large amounts of energy producing mucous to clear the sediment from their surfaces.

High sedimentation can also reduce coral recruitment by covering potential substrate and burying juvenile corals. Turbidity and sedimentation impacts to the benthic community are also dependent on tides, currents, wind, and local weather conditions. Due to variability in water flow over the course of the day, specific locations will not be exposed to high levels of turbidity and sedimentation for extended periods of time. Levels of turbidity also decrease significantly with distance from the source, lowering the possibility of adverse impacts to benthic communities. Patch reefs, hard bottom communities, and seagrass beds in the vicinity are also adapted to conditions of increased turbidity as evidenced by the significant decline in water clarity associated with only marginal increases in wind speed during passage of weather systems.

There may be a slight increase in turbidity at the mouth of the pipeline returning overflow water to the Fleming Key disposal site mixing zone. This turbidity should be minimal and should have no impact on benthic resources since water will be directed into the Key West Bight turning basin, where presently there are no significant benthic biological resources.

There would be localized increases in ambient turbidities in the water column at the ODMDS when dredged material is released. These turbidity increases would be transient in nature. Discharge of dredged material would not be continuous over the life of the project but would occur in distinct increments as barges release their loads, allowing water column turbidities to return to ambient between discharge events. In addition, no single area or portion of the water column would be continuously exposed to these turbidity increases due to the fluctuating current directions experienced on the Pourtales Terrace.

4.2.3.1.2 All Material to Fleming Key Alternative

As under the Split Disposal Site Alternative previously mentioned, there may be a slight increase in turbidity at the mouth of the pipeline returning overflow water from the Fleming Key disposal site to the bottom of the Key West Bight turning basin. This turbidity should be minimal and should have no impact on benthic resources since it would be directed into the turning basin, where there are presently no significant benthic biological resources.

4.2.3.1.3 No-Action Alternative

Under the No-Action Alternative, there would be no additional effects to benthic communities as there would be no dredging.

4.2.3.2 Essential Fish Habitat

Potential effects that could occur in areas of dredged material placement operations to managed species and species groups and their EFH are discussed in this section and summarized in Table 4-1 according to the impact producing factors of seafloor disturbance and turbidity. Given the small areas affected relative to the entire region, the project may adversely affect but is unlikely to have a substantial adverse effect on EFH. The Navy will coordinate with regulatory agencies to determine protective requirements that will be incorporated into the Federal permits to address routine dredging operations and accidents. The Navy is fully committed to these requirements and to any appropriate mitigation strategy to address impacts to EFH from accidents.

Table 4-1 Impact Producing Factors on EFH From Alternative Placement Operations.

Species Group	Seafloor Disturbance	Turbidity
Sargassum Algae[1]	None expected	Potential mortality/ feeding impairment of associated juvenile fishes
Coral, Coral Reefs, and Hard/Live Bottom[2]	Detachment of individual colonies; direct physical damage	Suffocation of polyps and tissue
Queen Conch[5]	Adult habitat loss	Potential mortality of early life stages
Penaeid and Rock Shrimps	None expected	Potential mortality of early life stages
Spiny Lobster[2]	Adult and juvenile habitat loss	Potential mortality of early life stages
Stone Crab[3]	None expected	Potential mortality of early life stages
Coastal Sharks[4]	Adult and juvenile habitat loss (nurse sharks)	None expected
Highly Migratory Species[4]	None expected	Potential mortality/ feeding impairment of early life stages
Reef Fishes (Snapper-Grouper Management Unit)[2]	Adult and juvenile habitat loss	Potential mortality/ feeding impairment of early life stages
Coastal Migratory Pelagic Fishes[2]	None expected	Potential mortality/ feeding impairment of early life stages

1-South Atlantic Fishery Management Council 1998b
2-South Atlantic Fishery Management Council 1998a
3-Gulf of Mexico Fishery Management Council 1998
4-NMFS 1999a
5-Robert Glazer (Florida Fish and Wildlife Conservation Commission pers. comm. 2003)

4.2.3.2.1 Split Disposal between Fleming Key and ODMDS Alternative

Seafloor Disturbance

A pipeline would be used to transport the dredged material to the placement site on Fleming Key and would be a potential source for seafloor disturbance. The pipeline activities may adversely affect, but are not likely to have a substantial adverse effect on EFH in and adjacent to the project area. A pipeline that settles on and is anchored to the bottom could damage seagrass beds, coral heads, and other hard bottom habitats along the Ship Channel. A potential dredged material pipeline route has been delineated from the Truman Harbor turning basin north along the western and northern edges of the Key West Harbor turning basin and east along Fleming Key Cut to the southeastern corner of Fleming Key (Figure 4-1). In areas of sensitive marine resources in the vicinity of Fleming Key and along the ship channel, the dredge pipeline would be selectively positioned on the bottom to avoid the resources.

Deposition of approximately 400,000 cy of silt and gravel material on the uplands of Fleming Key should have no impact on EFH around the Key.

Deposition of the approximately 419,000 cy of rock and sand materials proposed for the ODMDS will adversely affect EFH by causing increased turbidity in the water column and by depositing dredged material on the soft bottom benthos of the 0.5 nm by 0.5 nm dredged material placement site. Both of these impacts are expected to be localized, temporary, and not significant to the long-term viability of EFH in the ODMDS area. The 0.5 nm by 0.5 nm dredged material placement site was carefully selected to place all discharged sediments as far as possible from all coral reefs, deep reef communities, hard ground areas, and any other uniquely significant habitats, such as the sinkhole discovered during the side-scan sonar habitat mapping survey discussed in Section 3.0, Affected Environment, of this EAS.

Turbidity

Suspended sediment will be associated with all dredge material deposition. Turbidity will occur at the dredge material placement site. There are more opportunities for turbidity plumes to form when transferring material to and from barges, but other methods also will generate turbidity. Duration and extent of dredge-caused turbidity plumes will depend on local currents, tides, and winds. Although increased turbidity is expected to be temporary and localized, several detrimental effects of turbidity have been documented for fishes and invertebrates. One invertebrate that may be susceptible to elevated turbidity is queen conch. Increases in suspended silt near the southern end of the Ship Channel could affect larval and newly settled stages during the March to October spawning season. Some examples of effects on fishes are given in the EA. Fishes are primarily visual feeders and when turbidity reduces light penetration, the individual's reactive distance decreases (Vinyard and O'Brien 1976). Light scattering caused by suspended sediment also can affect a visual predator's ability to perceive and capture prey (Benfield and Minello 1996). Some fishes have demonstrated the ability to capture prey at various turbidity levels, but density of prey and light penetration are important factors (Boehlert and Morgan 1985; Grecay and Targett 1996). Some species will actively avoid or be attracted to turbid water. Experiments with kawakawa (*Euthynnus affinis*) and yellowfin tuna (*Thunnus albacares*) demonstrated that these species would actively avoid experimental turbidity clouds, but also would swim directly through them during some trials (Barry 1978).

Gill cavities can be clogged by suspended sediment preventing normal respiration and mechanically affecting food gathering in planktivorous species (Bruton 1985). High suspended sediment levels generated by storms have contributed to the death of nearshore and offshore fishes by clogging gill cavities and eroding gill lamellae (Robins 1957). High concentrations of fine sediments can coat the gill respiratory surfaces and prevent gas exchange (Wilber and Clarke 2001).

Consequences of such impacts to fishes depend on age or life stage of the fish (Lindeman 1997). Early life stages will be less resilient to direct effects of turbidity than adults. Ultimately, effects on young individuals will be reflected in later life stages as reduced fecundity, low growth rates, and year class depression. Understanding and predicting effects of suspended sediments on fishes require some information on the range and variation of turbidity levels found at a project site prior to dredging (Wilber and Clarke 2001). Spatial and temporal extents of turbidity plumes from dredging operations are expected to be limited; however, the activities may adversely affect but are not likely to have a substantial adverse effect on EFH in the dredged material placement area.

Deposition of approximately 400,000 cy of silt and gravel material on the uplands of Fleming Key should have no impact on EFH around the key. There could be a slight increase in turbidity within the turning basin should overflow water from the disposal site be directed to the turning basin via pipeline.

Turbidity increases associated with the discharge of dredged materials at the ODMDS would be localized and of short duration. They are not anticipated to have any sustained impact on plankton, fish larva, or the EFH represented by the water column itself.

4.2.3.2.2 All Material to Fleming Key Alternative

Deposition of an additional approximately 419,000 cy of material at Fleming Key should have no additional impact to the adjacent seafloor surrounding the Key. There may be an increase in turbidity associated with overflow water returned to the turning basin via pipeline. This increased turbidity should have minimal impact due to the lack of benthic resources within the turning basin.

4.2.3.2.3 No-Action Alternative

Under this alternative there will be no effects on EFH in the project area.

4.2.3.3 Federally Endangered or Threatened Marine Turtles

Potential effects that could occur in areas of dredged material placement operations to marine turtles are habitat loss or modification, turbidity, and disposal-related vessel collisions. All marine turtle species that inhabit waters near Key West are listed as endangered or threatened species under the ESA. This analysis of impacts to marine turtles takes into account their protected status under the ESA. Species most likely to occur in the Key West area include, in order of relative abundance, loggerhead, green, and hawksbill turtles.

4.2.3.3.1 Split Disposal between Fleming Key and ODMDS Alternative

Habitat Loss or Modification

Juvenile and subadult loggerhead, green, hawksbill, and perhaps Kemp's ridley turtles use inner shelf waters of the Keys as developmental habitat, foraging on benthic organisms on both hard and solf bottom substrates. Sandy beaches in select areas of the Keys, including areas around Truman Annex, serve as nesting habitat for marine turtles (Section 3.3.3.3 of the EA). When areas to be dredged or receive dredge material have significant concentrations of benthic resources (such as seagrass and algal beds), these activities can reduce overall food availability both by removing potential food items and destroying or modifying these habitats (NMFS 1996). There are no plans to alter beaches so marine turtle nesting habitat would not be affected. Overall, habitat loss or modification resulting from activities associated with proposed project activities is expected to be localized and not likely to adversely affect marine turtle populations.

Turbidity

There may be a slight increase in turbidity at the mouth of the pipeline returning overflow water from the Fleming Key disposal site to the bottom of the turning basin; however, this should not impact sea turtles.

There is limited potential for turbidity at the ODMDS to impact sea turtles during dredge material discharges because these discharges will be so short-term in nature. Turbidity produced by these discharges should dissipate before causing a problem for any marine turtles in the area.

Disposal-Related Vessel Collisions

Dredge support and construction vessel traffic through the project area associated with the Alternatives give rise to a chance of collision between these vessels and marine turtles. The risk would vary depending upon location, vessel speed, and visibility. As discussed in Section 3.3.3.3 of the EA, most marine turtles are distributed within nearshore waters and waters of the continental shelf, and all life stages (hatchling, juvenile or subadult, and adult) may be present within the project area. During the hatching season, it is believed that hatchling turtles leave their nesting beaches and swim offshore to areas of water mass convergence. Small and juvenile turtles in these areas, especially within patches of floating *Sargassum*, may be difficult to spot from a moving vessel. Adult turtles are generally visible at the surface during periods of daylight and clear visibility. They may also be very difficult to spot from a moving vessel when resting below the water surface, and during nighttime and periods of inclement weather. Further, the Sea Turtle Stranding and Salvage Network (NMFS, Southeast Fisheries Science Center) maintains detailed records that indicate wounds consistent with vessel strikes (S. Epperly 2001, pers. comm., NMFS, Southeast Fisheries Science Center, Miami, FL). Despite this, a vessel collision is unlikely. Adult and subadult, and perhaps juvenile turtles are capable of avoiding moving dredge related vessels, especially when these vessels operate within these limited areas at slow to relatively slow speeds. Impacts from collisions are, consequently, not likely to adversely affect marine turtles within the project area.

If barges and tugs are used to transport the material removed from the Key West harbor channel to the ODMDS, the presence of these vessels would increase the risk of a potential sea turtle vessel strike. This risk is believed to be relatively low due to the fact that such transport barges and tugs would be moving slowly.

4.2.3.3.2 All Material to Fleming Key

Deposition of an additional approximately 419,000 cy of material at Fleming Key may cause an increase in the amount of turbidity associated with overflow water returned to the turning basin via pipeline; however, this is not expected to cause an impact to sea turtles.

4.2.3.3.3 No-Action Alternative

There would be no impacts to marine turtles with the No-Action Alternative.

4.2.3.4 Marine Mammals

Potential impacts to marine mammals that could occur in areas of dredged material placement operations are discussed in this section. These impacts could include habitat loss or modification, turbidity, and disposal-related vessel collisions. All marine mammal species in U.S. waters and high seas are protected under the Marine Mammal Protection Act (MMPA), which prohibits all nonpermitted 'takes' of any marine mammal (within the MMPA, 'take' means to harass, hunt, capture, or kill). Species most likely to occur in the project area include, in order to relative abundance, common bottlenose dolphin, Atlantic spotted dolphin, and the manatee. The manatee also is listed as an endangered species under the ESA. Based on the best scientific information available, dredged material disposal activities are unlikely to result in the harassment, injury, or mortality of marine mammals inhabitating the project area (Ken Hollingshead 2003, pers. comm., NMFS, Silver Spring, MD). As per Navy consultation pursuant to Section 7 of the ESA, the NMFS concurs with this determination that "the proposed activity will not likely adversely affect endangered and threatened species, or their critical habitat, under the purview of the NOAA Fisheries" (all listed cetaceans but excluding the manatee).

4.2.3.4.1 Split Disposal between Fleming Key and ODMDS Alternative

Under the split disposal site alternative, there may be a slight increase in the possibility of an impact to marine mammals in the vicinity of Fleming Key during pipeline placement activities. However, vessels would be moving at slow speeds, and the likelihood of any impacts is extremely low. There would be limited potential for dredge material discharges in the ODMDS to impact marine mammals under this Alternative.

There are no designated critical habitat areas at the Pourtales Terrace, and any marine mammals moving through the area would have sufficient time to avoid the periodic discharge events.

The increased vessel traffic in the form of barges and their associated tugs may increase the risk of vessel/manatee strikes in the ship channel. Manatees would not be expected to be present in the ODMDS.

4.2.3.4.2 All Material to Fleming Key Alternative

There would be no additional increase in the likelihood of marine mammal impacts above those described under the Split Disposal Site Alternative.

4.2.3.4.3 No-Action Alternative

There would be no impacts to marine mammals with the No-Action Alternative.

4.3 WATER RESOURCES

4.3.1 Approach to Analysis

In this section, the potential impacts to water resources resulting from the alternatives are evaluated. Of concern are the protection of the public water supply, maintenance of unique hydrologic features and the avoidance of increased flood hazard.

4.3.2 Landside
4.3.2.1 Split Disposal between Fleming Key and ODMDS Alternative

Fleming Key is not a source of potable water for the area or region; no production wells are located on or adjacent to the proposed dredged material placement site. Deposition of approximately 400,000 cy of uncontaminated sand, silt, gravel, and rock rubble within the selected 37 ac site would not affect potable water production, existing hydrology, or flood hazard.

4.3.2.2 All Material to Fleming Key Alternative

Placement of the approximately 819,000 cy of uncontaminated sand, silt, gravel, and rock rubble dredged material within the same footprint site as in the Split Disposal Alternative would likewise have no effect on potable water production, existing hydrology, or flood hazard.

4.3.2.3 No-Action Alternative

Under the No-Action Alternative, proposed dredged material placement would not occur; therefore, the current water resources would remain unchanged and no significant impacts to water resources would occur.

4.3.3 Marine
4.3.3.1 Split Disposal between Fleming Key and ODMDS Alternative

Fleming Key Environs

No excavation or fill would occur in the Fleming Key marine environs. The limited construction consists of laying temporary pipelines on the bottom, principally within the Federal channel, to transport dredged material to the dredged material placement site, and return clean decant water to the turning basin. The temporary pipeline segments would not affect potable water production, current hydrology, or flood hazard.

ODMDS

Uncontaminated dredged material (sand, silt, gravel, or rock rubble) totaling approximately 419,000 cy would be placed in the 0.25 square nm ODMDS. There are no potable water sources in the area, and flood hazard is moot; dredged material deposition at the site would have no significant effect on current hydrology.

4.3.3.2 All Material to Fleming Key Alternative

Similarly to the discussion above, placement of all approximately 819,000 cy of dredged material at Fleming Key would be entirely on upland, and would not affect current water resources.

4.3.3.3 No-Action Alternative

Under the No-Action Alternative, proposed dredged material placement would not occur; therefore, the current water resources would remain unchanged, and no significant impact to current water resources would occur.

4.4 CULTURAL RESOURCES
4.4.1 Approach to Analysis

New construction, rehabilitation of existing structures, and street lighting must be appropriately designed to avoid or minimize adverse impacts to any historic properties listed, or which satisfy the criteria of eligibility for listing (36 CFR 60.4), in the NRHP. Analysis of potential impacts to cultural resources considers first the potential for presence of such resources and then the potential for: 1) physically altering, damaging, or destroying all or part of a resource, 2) altering characteristics of the surrounding environment that contribute to resource significance, 3) introducing visual, audible, or atmospheric elements that are out of character with the property or alter its setting, or 4) neglecting the resource to the extent that it deteriorates or is destroyed.

4.4.2 Split Disposal between Fleming Key and ODMDS Alternative

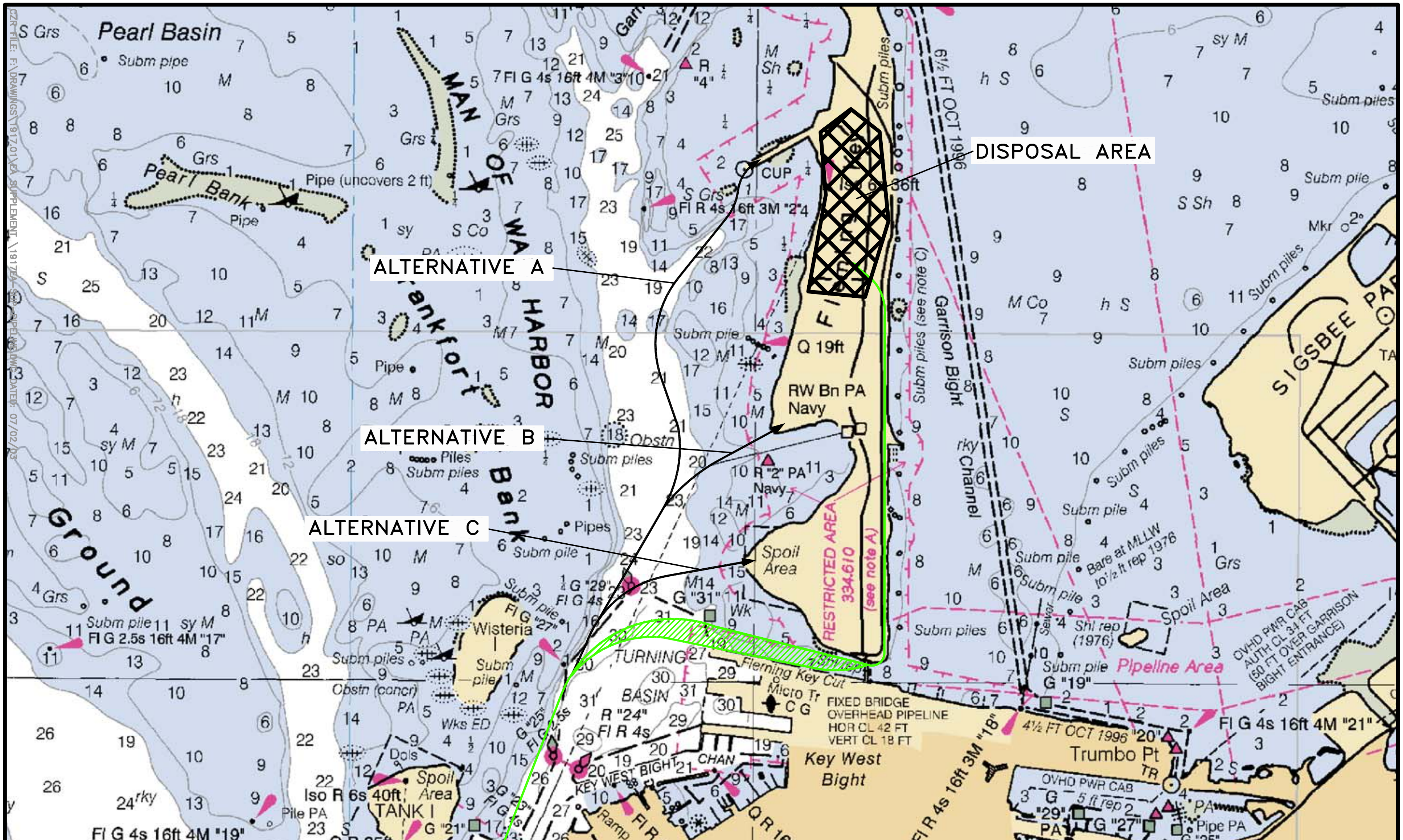
National Historic Preservation Act, Section 106 determinations will be completed as part of the permitting process for both the open ocean placement site as well as for the proposed site at Fleming Key. The Navy is currently completing a literature review for the proposed as well as assessing the potential effects on the historical structures (Bunker F-26 series) on Fleming Key. The Navy will complete Section 106 consultation with the State Historic Preservation Officer (SHPO) prior to the project mobilization.

4.4.3 All Material to Fleming Key Alternative

While SHPO consultation is not complete, cultural resources on Fleming Key would not be affected as Bunker F-26 series would be avoided.

4.4.4 No-Action Alternative

Under the No-Action alternative, dredge material placement would not occur; therefore, the current historical and archeological resources would remain unchanged and no significant impacts would occur.



LEGEND

PREFERRED PIPELINE ROUTE LIMITS OF CONSTRUCTION

PREFERRED PIPELINE ROUTE

MAGNETIC NORTH

NTS

FIGURE 4–1

PIPELINE ROUTING

ENVIRONMENTAL ASSESSMENT SUPPLEMENT FOR FLEET SUPPORT AND INFRASTRUCTURE IMPROVEMNTS NAS KEY WEST

CHAPTER 5

CUMULATIVE IMPACTS AND OTHER CONSIDERATIONS

5.1 POTENTIAL CUMULATIVE IMPACTS

CEQ regulations stipulate that the cumulative effects analysis within an EA should consider the potential environmental impacts resulting from "the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions" (40 CFR 1508.7). CEQ guidance in considering cumulative effects involves defining the scope of the other actions and their interrelationship with the selected Alternative. The Alternative selection will be made in subsequent decision documents. The scope must consider geographical and temporal overlaps among the selected Alternative and other actions. It must also evaluate the nature of the interactions at the time of overlap.

Cumulative effects can be either positive or negative. They are most likely to result when a relationship or synergism exists between the selected Alternative and other actions expected to occur in a similar location or during a similar time period. Actions overlapping or in close proximity to the selected Alternative would be expected to have more potential for a relationship than those more geographically separated.

On-Going and Reasonably Foreseeable Actions

No projects with the potential to interact with the implementation of the stated Alternatives that could result in cumulative effects have been identified in the form of NEPA documentation. The goal of the Alternative(s) is to assure dredged material placement that will be environmentally acceptable and economically practicable such that the Key West Channel, turning basin, and Truman Harbor dredging element, evaluated in the EA, can be accomplished. No new mission requirements or major facility construction in support of new mission requirements have been identified subsequent to Navy publication of the EA and FONSI. No other planned projects, either dependent on these Alternatives or a part of other actions have been identified with the potential for cumulative environmental effects when combined with potential impacts of these Alternatives.

Implementation of any of the stated Alternatives would result in more efficient use of the Navy facilities at NAS Key West. The improvements are consistent with Navy planning policies, and all project components are sited to be compatible with existing Navy facility siting and construction guidance. The number of additional Navy vessel visits will be insignificant in comparison to non-Navy traffic, and completion of the Navy's dredging proposal should improve navigation for such non-Navy vessels.

CHAPTER 6

REFERENCES CITED

Alevizon, W.S. and S.P. Bannerot. 1990. Fish communities and fisheries biology, pp. 231-265. In: N.W. Phillips and K.S. Larson (eds.), Synthesis of available geological, chemical, socioeconomic, and cultural resource information for the south Florida area. U.S. Department of the Interior, Minerals Management Service, Atlantic OCS Region. OCS Study MMS 90-0019.

Barry, M. 1978. Behavioral response of yellowfin tuna, *Thunnus albacares*, and kawakawa, *Euthynnus affinis*, to turbidity. U.S. Department of Commerce, NOAA, Environmental Research Laboratories, Pacific Marine Environmental Laboratory, Seattle, WA. Deep Ocean Mining Environmental Study (DOMES), Unpublished Manuscript Number 31. National Technical Information Service No. PB-297. 106 pp.

Benfield, M.C. and T.J. Minello. 1996. Relative effects of turbidity and light intensity on reactive distance and feeding of an estuarine fish. Environmental Biology of Fishes 46:211-216.

Boehlert, G.W. and J.B. Morgan. 1985. Turbidity enhances feeding abilities of larval Pacific herring, *Clupea harengus pallasi*. Hydrobiologia 123:161-170.

Bruton, M.N. 1985. The effects of suspensoids on fish. Hydrobiologia 125:221-241.

Chiappone, M. and R. Sluka. 1996. Fish and fisheries. Volume 6: Site characterization for the Florida Keys National Marine Sanctuary and environs. The Nature Conservancy, Florida and Caribbean Marine Conservation Science Center, University of Miami. 149 pp.

Continental Shelf Associates, Inc. 1990. Synthesis of available biological, geological, chemical, socioeconomic, and cultural resource information for the south Florida area. A final report for the U.S. Department of the Interior, Minerals Management Service, Atlantic OCS Region. Contract No. 14-12-0001-30417. OCS Study MMS 90-0019. 657 pp. + app.

Continental Shelf Associates, Inc. 2003a. Resource survey of a proposed offshore dredged material disposal site (ODMDS) on the Pourtales Terrace offshore of Key West, Florida. A report for Department of the Navy Southern Division, Naval Facilities Engineering Command, North Charleston, South Carolina.

Continental Shelf Associates, Inc. 2003b. Fleming Key dredged material pipeline route resource characterization survey. A report for Department of the Navy Southern Division, Naval Facilities Engineering Command, North Charleston, South Carolina.

Department of the Navy (DON). 2002. Integrated Natural Resources Management Plan for the Naval Air Facility Key West, Florida. NAVFAC, Southern Division, Charleston, South Carolina.

Dooley, J.K. 1972. Fishes associated with the pelagic *Sargassum* complex, with a discussion of the *Sargassum* community. Contr. Mar. Sci. 16:1-32.

Epperly, S. 2001. Personal communication, NMFS, Southeast Fisheries Science Center, Miami, FL.

Florida Natural Areas Inventory (FNAI). 1994. Ecological Survey of U.S. Navy Property in the Lower Keys, Monroe County, Florida, Volumes 1 and 2, the Nature Conservancy, Arlington, VA.

Glazer, R.A. 2001. Queen conch stock restoration. Report to Florida Fish and Wildlife Conservation Commission, 7 p.

Glazer, R.A. and J.A. Kidney. 2003. Habitat Associations of Adult Queen Conch (*Stromeus gigas L.)* in an unfished Florida Keys back-reef: Applications to Essential Fish Habitat. Bull. Mar. Sci. (in press).

Glazer, Robert. 2003. Personal communication, FFWCC.

Gomberg, D.N. 1976. Geology of the Pourtales Terrace, Straits of Florida. Ph.D. dissertation, University of Miami. 371 pp.

Grecay, P.A. and T.E. Targett. 1996. Spatial patterns in conditions and feeding of juvenile weakfish in Delaware Bay. Transactions of the American Fisheries Society 125(5):803-805.

Gulf of Mexico Fishery Management Council (GMFMC). 1998. Generic amendment for addressing Essential Fish Habitat requirements in the following Fishery Management Plans of the Gulf of Mexico: Shrimp fishery of the Gulf of Mexico, United States Waters, red drum fishery of the Gulf of Mexico, reef fishery of the Gulf of Mexico, coastal migratory resources (mackerels) in the Gulf of Mexico and South Atlantic, stone crab fishery of the Gulf of Mexico, spiny lobster fishery of the Gulf of Mexico and South Atlantic, and coral and coral reefs of the Gulf of Mexico. Gulf of Mexico Fishery Management Council, Tampa, Florida. 238 pp. + apps.

Hollingshead, K. 2003. Personal communications, NMFS, Silver Spring, MD

Jordan, G.F., R.J. Malloy, and J.W. Kofoed. 1964. Bathymetry and geology of Pourtales Terrace, Florida. Marine Geol. 1:259-287.

Lindeman, K.C. 1997. Development of grunts and snappers of southeast Florida: Cross-shelf distributions and effects of beach management alternatives. Ph.D. Dissertation, University of Miami, Coral Gables, FL. 419 pp.

Lydecker, A. 2003. Assessment of submerged cultural resources, ODMDS survey area – Key West, Florida. A report for the Department of the Navy Southern Division, Naval Facilities Engineering Command, North Charleston, South Carolina.

National Marine Fisheries Service (NMFS). 1996. ESA, Section 7 Consultation, Biological Opinion, Channel Maintenance Dredging Using a Hopper Dredge, November 1996.

National Marine Fisheries Service (NMFS). 1999b. Amendment 1 to the Atlantic Billfish Fishery Management Plan. NMFS Division of Highly Migratory Species, Office of Sustainable Fisheries, Silver Spring, MD.

National Marine Fisheries Service (NMFS). 1999a. Fishery Management Plan for Atlantic tunas, swordfish, and sharks, Volume II. NMFS Division of Highly Migratory Species, Office of Sustainable Fisheries, Silver Spring, MD. 302 pp.

National Oceanic and Atmospheric Administration (NOAA). 1996. Florida Keys National Marine Sanctuary, Final Management Plan/Environmental Impact Statement. 3 Vols. U.S. Department of Commerce, NOAA, National Ocean Service, Office of Ocean and Coastal Resource Management, Sanctuaries and Reserves Division.

Robins, C.R. 1957. Effects of storms on the shallow-water fish fauna of southern Florida with records of fishes from Florida. Bulletin of Marine Science in the Gulf and Caribbean 7(3):266-275.

South Atlantic Fishery Management Council (SAFMC). 1983. Source document for the snapper grouper fishery of the South Atlantic Region. South Atlantic Fishery Management Council, Charleston, SC.

South Atlantic Fishery Management Council (SAFMC). 1998a. Comprehensive amendment addressing Essential Fish Habitat in Fishery Management Plans of the South Atlantic Region. South Atlantic Fishery Management Council, Charleston, SC.

South Atlantic Fishery Management Council (SAFMC). 1998b. Final Fishery Management Plan for pelagic *Sargassum* habitat of the South Atlantic Region. South Atlantic Fishery Management Council, Charleston, SC.

South Atlantic Fishery Management Council (SAFMC). 2001. Fishery Management Plan for the dolphin and wahoo fishery of the Atlantic, Caribbean, and Gulf of Mexico. Including a draft environmental impact statement, regulatory impact review, initial regulatory flexibility analysis, and social impact assessment/fishery impact statement. In cooperation with the New England Fishery Management Council, Mid-Atlantic Fishery Management Council, Caribbean Fishery Management Council, and Gulf of Mexico Fishery Management Council. Pursuant to NOAA Award Number NA17FC1053.

United States Army Corps of Engineers (USACOE). June 2003. Drilling Log, Personal Communication, John Bearce

Vinyard, G.L. and J.W. O'Brien. 1976. Effects of light and turbidity on the reactive distance of bluegill (*Lepomis macrochirus*). Journal of the Fisheries Research Board of Canada 33:2,845-2,849.

Wagner, R.J., S.J. Schropp, and O. Sayao. 2003. Evaluation of dredged material behavior at a proposed ocean dredged material disposal site off Key West, Florida. A report for the Department of the Navy Southern Division, Naval Facilities Engineering Command, North Charleston, South Carolina.

Wilber, D.H. and D.G. Clarke. 2001. Biological effects of suspended sediments: A review of suspended sediment impacts on fish and shellfish with relation to dredging activities in estuaries. North American Journal of Fisheries Management 21(4):855-875.

CHAPTER 7

LIST OF PREPARERS

The Navy liaison associated with this EA document is:

Will Sloger, Code ES12/WS
United States Department of the Navy
Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
P.O. Box 190010
North Charleston, South Carolina 29406
(843) 820-5797

The following CZR Incorporated team members contributed to preparation of this EA:

CZR Incorporated
1061 East Indiantown Road, Suite 100
Jupiter, Florida 33477-5143

Name	Role	Years of Related Experience
CZR Incorporated		
James M. Hudgens	Project Director	33
Samuel E. Wiley	Project Director	15
Susan A. Hudgens	Project Manager	10
Jackie B. Kloss	Biologist	3
Mark Grippo	Biologist	1
J. Craig Wilcox	Biologist	12
Barbara F. Goad	GIS	22
Terry Jones	GIS	18
Continental Shelf Associates, Inc.		
Frederick B. Ayer, II	Project Director	29
Keith D. Spring	Project Manager, Benthos	27
David B. Snyder	Essential Fish Habitat	25
Stephen T. Viada	Marine Turtles, Marine Mammals	25
Alan D. Hart	Sediment and Water Quality	30
Richard M. Hammer	Marine Technical Review	32
M. John Thompson	Ocean Dredged Material Placement Site	34
Paul S. Fitzgerald	Fleming Key Material Placement Site	11
The Environmental Company		
Chuck Maguire	Project Manager	30

APPENDIX

CORRESPONDENCE RECEIVED

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
Florida Keys National Marine Sanctuary
P.O. Box 500368
Marathon, FL 33050
Phone: (305) 743-2437
Fax: (305) 743-2357

RECEIVED
JUN 2 7 2003
CZR NCORPORATED

Mr. James M. Hudgens
President
CZR Incorporated
1601 East Indiantown Road, Suite 100
Jupiter, FL 33477-5143

June 16, 2003

Dear Mr. Hudgens:

The Florida Keys National Marine Sanctuary (FKNMS or Sanctuary) staff have completed their review of the final *Environmental Assessment* (EA) *for Fleet Support and Infrastructure Improvements*, April 2003, published by the U.S. Navy.

The EA evaluates the proposal of the United States Department of the Navy (Navy) to maintenance dredge 1,400,000 cubic yards of material from 456.4 acres of submerged bottom in the Key West Harbor Entrance Channel, Truman Annex Harbor and Key West Harbor Turning Basin. The purpose of the proposed dredging is to facilitate national security missions that require vessel access to Key West harbor. Dredge spoil had been proposed to be transported via a pipeline to a disposal site at East Rockland Key. The EA is also meant to apply to the issuance of the Department of Army (DA) Corps of Engineers Section 404 permit for the project.

There have been several proposed changes to the design and scope of work of the project, in addition to the DA recent disclosure of significant impacts to FKNMS resources from cutterhead dredge anchoring activities. The FKNMS has not been presented with written descriptions of the change of scope and has only been advised verbally of several possible alternatives. Based on the possibility of these changes being implemented, the FKNMS finds it necessary to submit additional comments to those resulting from our review of the final EA.

The issuance of an approval for this project by the FKNMS is also subject to the requirements of NEPA. In the interest of meeting these requirements as efficiently as possible, FKNMS conducted its review of the referenced EA, not as a commenting agency, but with the intent to adopt the document as its own. However, in order for the FKNMS to be able to adopt this document to meet its NEPA requirements, the substantive and general comments outlined in this letter must be addressed. The following comments are our general and substantive comments.

1. *Description of Full Support and No Action Alternatives*: The EA descriptions for the *No Action Alternative* lack adequate discussion of the option to avoid dredging (thus the benefit to FKNMS resources of avoidance of all direct and indirect impacts of dredging) and an effort on the Navy's behalf to identify shallower draft vessels within their existing fleet that might be adequately employed to achieve the goals of the fleet and infrastructure improvements and the goals of increased national security. This type of analysis is consistent with a similar effort

required of the U.S. Coast Guard regarding the proposed dredging of Snake Creek in the Upper Keys, which was also requested in the interest of national security. Likewise, the *Full Support Alternative* is too similar to the preferred alternative and could benefit from a discussion of the original proposal for dredging to the deeper depth (38' total and 1.4 million cu yds) and the reasons for cutting back. These comments are offered at this stage of the review as the preliminary draft EA lacked any descriptions or evaluations of other alternatives, and FKNMS reserved the ability to provide additional comments upon release of the final EA.

2. *Dredge Disposal Placement Site References*: The EA includes reference to "Rockland Key" as the primary dredge material disposal site throughout the body of the text. It is our understanding that the cost of transporting dredge material to Rockland Key is prohibitive, and that the dredging industry questions the availability of the necessary equipment to conduct such transport, to the extent that this alternative is no longer under consideration for dredge material disposal. The Supplemental EA must reflect this decision and include a discussion of the recent switch back to the Fleming Key upland disposal site alternative as well as the potential offshore disposal option. The Supplemental EA must address the potential direct and indirect impacts to nearshore communities and discuss impact avoidance strategies (e.g. floating pipeline, turbidity screens or protection measures) relating to upland disposal activities and run off from dewatering on Fleming Key.

3. *Proposed Offshore Disposal Site:* The Supplemental EA must include a discussion of the potential primary and secondary impacts of the proposed alternative to dispose of dredge material at an open ocean placement site offshore of Key West. This discussion must include evaluation of the following:

a) potential current transport of rock, sand and fine sediments based on existing data of current patterns for this area, including local gyres and eddies; require the application of sediment transport models and require computations based on local data. Please contact Tom Lee, RSMAS (305/361-4046, tlee@rsmas.miami.edu) and John Proni, NOAA/AOML (305/361-4312).

It is virtually unconceivable that the dredging contractor will be capable of dissecting out all fine sediments from rock and sand collected for offshore disposal, especially with the understanding that offshore disposal is proposed to include dredge material from Cut A, B, Cut C widener and Truman Harbor where fine sediments are known to exist. Additionally, utilizing models based on data from Miami disposal sites is an inappropriate method for application in this area.

b) potential direct and indirect impacts to spawning aggregations and larval transport mechanisms related to commercially important fisheries such as conch, lobster, fish, and protected turtle species (see references to EFH considerations in the EA, pp. 41-50), especially gyres, eddies and sargassum mats.

Many species in larval or juvenile life stages rely on eddies and gyres for transport and entrainment, and inhabit sargassum mats, rafts and drift lines at some stage in their life cycle. Turbidity and mechanical impacts to these species and their transport systems nearshore may threaten survivability of these species. Please be certain to consult with Bob Glazer of FMRI regarding turbidity tolerances of conch spawning populations and larval conch and lobster in pelagic oceanic life stages.

c) potential direct and indirect impacts to deep water fisheries, e.g. snowy grouper, tilefish, golden crab, and fishery spawning grounds.

The FKNMS requests that the Navy's contractors writing the Supplemental EA consult with the appropriate fisheries management councils (South Atlantic Fishery Management Council, The Florida Fish and Wildlife Conservation Commission) and NMFS for EFH consultation in an effort to identify appropriate deepwater species that may be threatened by offshore dredge disposal activities. In addition, we suggest you contact Greg DiDeminico, Executive Director of the Monroe County Commercial Fisherman, (mccf@ddtcom.com).

d) potential direct and indirect impacts to deepwater benthic inhabitats.

Deepwater habitat descriptions and inhabitant characterizations may be available through the following sources known through NOAA research:

• Harbor Branch Oceanographic Institute's deepwater sub dives: Contact there is Shirley Pomponi or John Reed, (772/465-2400 Shirley x449, John x205).

• American Museum of Natural History's deepwater mollusk surveys: Contact is Paul Mikkelsen at mikkel@amnh.org.

e) potential direct and indirect impacts to coral reefs within 4 miles of the proposed disposal site, based on current transport mechanisms, especially eddies and gyres.

Coral reef resources within the vicinity of the ocean entrance to the Main Ship Channel have been documented by staff to depths of 125 feet. Coral species are exposed to multiple stressors on a daily basis and in some cases are losing the battle for survival, especially the branching corals which are presently in a state of rapid decline due to increased prevalence of coral disease outbreaks. Several area closures have been imposed due to this decline and additional stressors induced by human activities must be avoided or minimized.

f) The FKNMS strongly recommends that the EA evaluate the benefits of locating the offshore disposal site further offshore (> 15 miles) and in depths of 900 feet or greater to protect fisheries, both benthic and pelagic, in shallower waters.

Sargassum "weed-lines" are known to exist around the 600 foot depth range and shallower which are heavily utilized by offshore sport fishing enthusiasts, and commercial fishermen speak of viable fisheries within this depth range (snowy grouper, tilefish, golden crab and snapper/grouper spawning grounds).

g) monitoring for impacts, direct and indirect, from offshore disposal activities should be a component of the strategies to avoid and minimize the above mentioned concerns.

h) methods the dredging contractor will employ to ensure that the dredge material will be placed within the chosen and designated disposal site, so as to prevent accidental discharges or miss-placement.

4. *Potential Alternative Dredging and Dredge Material Transport Methods:* There has been much recent discussion (verbally and in the EA) and speculation that the dredge industry may propose to employ methods such as hopper dredge technology, clam shell or deep water back-hoe, transport mechanisms such as spider barges, scowls or deep-draft transport barges, and the possible use of explosives or cutter-head dredge technology. The FKNMS feels the EA is

lacking in adequate evaluation of the potential benefits and threats of the application of these various technologies relative to the sensitive resources adjacent to the dredged channel footprint and dredge activity project areas.

a) Anchoring methods have recently been described in greater detail and the potential for additional large scale impacts to Sanctuary resources adjacent to the channel from multiple anchor placements and anchor cable scarring have been identified. The EA references these direct impacts as not significant. Detailed discussion of methods and technologies that may be employed to avoid and minimize these impacts is deemed essential at this stage of the proposal.

b) Dewatering of dredge material during the dredging and disposal material transfer processes must be described in greater detail, especially relating to use of hopper dredges, spider barges and other possible methods not yet disclosed. This must include discussion of methods to be employed to minimize the heavy turbidity effects associated with such methods.

c) Dredge material transport methods must be described in greater detail, especially relating to the transport of disposal material to the offshore disposal site. This must include discussion of methods to minimize turbidity during transport, prevention of accidental discharge of disposal material during transit and measures to ensure that the material will be placed at the disposal site and not at inappropriate locations.

d) Dredge Material Pipeline Placement: The new proposed alternative for the disposal pipeline involves placement within the dredged channel, north through the Key West Harbor and Turning Basin to Fleming Key. A pipeline corridor must be identified with biological survey work to identify and characterize benthic resources that may be impacted by the new route for the pipeline. Discussion must include avoidance of seagrass and coral hard bottom communities around Fleming Key, and include consideration of the submerged cable running from the Key West cruise ship docks to Tank Island, (aka "Sunset Key", see EA descriptions on pp. 1-5 of Appendix A.)

e) A discussion of potential use of explosives or mechanical means that may be employed to address high relief, rock structures that must be removed to achieve the proposed dredge depths. Use of explosives is not likely to be approved by the FKNMS.

5. *Cumulative Impacts and Other Considerations*: The cumulative analysis remains incomplete in describing the overall impact and effect the project will have on the resources of the FKNMS. Turbidity continues to be a critical concern of the FKNMS due to the potential for detrimental impacts relating to the proposed request for a mixing zone variance and recent discussions of changes to the proposed scope of work. Corals within 150 feet of the channel footprint ledges are threatened by high turbidity and sedimentation, and direct physical impacts from anchoring practices. The cumulative effects of these stressors on corals already inhabiting a stressed environment have not been adequately described. Please refer to our original comments presented in our letter of March 14, 2003 to Jim Hudgens regarding the Preliminary

draft EA, specifically Attachment A, Chapter 5: Cummulative Impacts and Other Considerations. This letter is contained in Appendix E of the Navy's final EA.

6. *Storm Contingency Plan*: The stability of the pipeline throughout the duration of the project and especially through hurricane season is of concern to the FKNMS. We are particularly concerned about the stabilization of the dredge pipeline during storm events and hurricane preparedness. In an effort to avoid and minimize potential impacts, FKNMS recommends that in completing the Suppplemental EA, the Navy detail strategies that are designed to prevent direct and indirect impacts including stability analysis, daily diver inspections and the requirement for the dredge contractor to prepare a contingency plan for storms, hurricanes and other project malfunctions (e.g. dredge pipe failure).

7. *Dredging Adjacent to Mole Pier*: Dredging activity within the vicinity of the Mole Pier of Truman Annex is only briefly mentioned in the EA. FKNMS understands that Navy intends to remove the tip of the mole pier, dredge the underlying submerged substrate and install dolphin piles for mooring along the outside of the mole. A benthic survey of resources underlying and adjacent to all underwater project areas must be provided for review by FKNMS, including resources located on mole pier walls to be removed, repaired or encased. FKNMS will require removal and relocation of any significant resources that will be impacted by these activities.

8. *Letters of Correspondence and Public Record*: FKNMS requests that all letters of correspondence including those relating to the DA public notice and permitting review processes be incorporated in the Supplemental EA as public record of review of the proposed project and potential resource impacts.

The FKNMS offers these comments and looks forward to reviewing the Supplemental EA. After the Supplemental EA is released, the FKNMS will review it and the DA permit and determine if these documents adequately meet our requirements and address our concerns. Final approval by FKNMS will require review and formal adoption of the Navy's EA and Supplemental EA (or preparation by FKNMS of a separate document) and finding by FKNMS of no significant impacts.

Sanctuary staff is committed to working with the Navy and the DA to ensure that the impacts to benthic habitats and water quality are minimized and your cooperation is appreciated. Please address any questions you may have concerning the above comments to Lauri MacLaughlin at (305) 852-7717 x27 or Lauri.MacLaughlin@noaa.gov.

Sincerely,

Billy D. Causey
Superintendent

cc: Will Sloger, Ron Demes, United States Department of Navy

Fred Ayer, Keith Spring, CSA
Paul Kruger, Department of Army
Audra Livergood, Jocelyn Karazsia, NOAA National Marine Fisheries Service
Martin Seeling, FDEP Bureau of Beaches and Wetland Resources
Elizabeth Bergh, Florida Department of Environmental Protection
John Armor, National Marine Sanctuary Program
Bill Kruczinski, Fred McManus, EPA

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 9, 2003

Colonel James G. May
District Engineer, Jacksonville District
Regulatory Division, South Permits Branch
Department of the Army, Corps of Engineers
c/o Miami Regulatory Office
11420 North Kendall Drive, Suite 104
Miami, Florida 33176

Dear Colonel May:

The National Marine Fisheries Service (NOAA Fisheries) has reviewed the June 13, 2003, supplemental public notice regarding permit application number **200300203 (IP-PK)**. The applicant, the U.S. Navy, proposes to maintenance dredge approximately 1.0 million cubic yards (volume has been decreased from 1.4 million cubic yards) of material from approximately 465 acres of submerged bottom in an existing Federal channel. The project depth is 34 feet at Mean Low Water, plus 2 feet of advanced maintenance, plus 1 foot of over dredge. Maintenance dredging within the channel was last conducted in 1965. The proposed dredging would occur within the main ship channel, turning basin, Truman Harbor within the waters of Hawk Channel, and south and west of Key West in Monroe County, Florida. According to the public notice, the proposed dredging is needed to accomplish national security missions requiring vessel access to the harbor. The applicant is also seeking authorization from the U.S. Environmental Protection Agency (EPA) to dispose of 850,000 cubic yards, or less, of dredged material (primarily comprised of rock and sand) from the main ship channel within a 160-acre open ocean disposal site. According to the public notice, material dredged from Truman Harbor would be stored in a 37-acre upland disposal site on Fleming Key. Information regarding dredge pipeline routes to Fleming Key is not provided in the public notice.

Prior to the recently proposed project modifications (e.g., ocean disposal and upland disposal on Fleming Key), NOAA Fisheries provided written recommendations to your staff by letters dated February 12, 2003, and June 6, 2003. In addition, we provided comments on the *Pre-Release Draft Environmental Assessment for Maintenance Dredging of Key West Channel and Truman Annex Harbor* by letter dated March 19, 2003. The recommendations included in this letter supplement our previous EFH Conservation Recommendations, provided by letter dated February 12, 2003. These recommendations are provided pursuant to the Essential Fish Habitat (EFH) provisions set forth in the 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA).

According to the information provided in pubic notice number 200300203, dated January 15, 2003, the proposed project may impact sensitive patch reefs, seagrasses, and hard bottom communities. These resources have been identified as EFH by the South Atlantic Fishery Management Council (SAFMC). Categories of EFH found in this area include the marine water column, live/hard bottoms, coral and coral reefs, and seagrasses. Federally 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. The marine water column has also been identified as EFH for pelagic species, including sub-adult/juvenile king and Spanish mackerel, greater amberjack, cobia, and dolphin. Federally managed species associated with submerged aquatic vegetation (e.g., seagrasses) include postlarval, juvenile, and adult gray, lane, and schoolmaster snappers; juvenile Goliath grouper and mutton snapper; and adult white grunt. Hard bottom/coral reef habitats have been identified as EFH for juvenile and adult gag and yellowedge groupers, and gray and mutton snappers. Sponge, algae, coral, and hard bottom habitats have been identified as EFH for juvenile and adult spiny lobster. Hard bottom communities within the South Atlantic region also have been identified as Habitat Areas 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 also has identified the marine water column as EFH for highly migratory species including juvenile and adult nurse, lemon, blacktip, great hammerhead, sandbar, and bull sharks.

Detailed information on shrimp, the snapper/grouper complex (containing ten families and 73 species), mackerel, dolphin, spiny lobster, 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 in accordance with the MSFCMA (P.L. 104-297).

Offshore Disposal Site

Based on recent information obtained from the Navy's sub-contractors, Continental Shelf Associates (CSA), NOAA Fisheries understands that the final positioning of the 2 nautical mile (nm) by 2 nm target block, or area in which to locate the actual 0.5 nm by 0.5 nm target disposal site, has been determined. The target block is located between 13 nm and 15 nm south of downtown Key West. The location of the 0.5 nm by 0.5 nm target disposal site will be selected based on integrating site characterization data with the results of ocean disposal modeling using representative data on oceanic currents in the area. CSA is working closely with NOAA Fisheries, the Florida Keys National Marine Sanctuary (FKNMS), and the Navy to select a suitable location for the target disposal site.

Turbidity and Sedimentation

NOAA Fisheries is particularly concerned about potential adverse impacts to EFH and managed species from 1) elevated turbidity levels in the water column and 2) sediment loading. Below is a discussion of the various ways in which elevated turbidity levels and sedimentation have adversely impacted living marine resources.

Sediment loading is the rapid deposition of coarse silt and sand-sized sediment (Marszalek 1981) and results in burial and smothering of coral colonies, with degrees of injury or mortality that are dependent on the species and particle size, among other factors (Rogers 1990; Rice and Hunter 1992). Sediment loading can be detrimental to the growth and survival of reefs and the majority of associated species, including filter-feeding organisms such as hard corals, sponges, and soft corals. Other organisms such as algae, crustaceans, and fishes also can be adversely affected (Dodge and Vaisnys 1977; Bak 1978; Marszalek 1981; Herrnkind *et al.* 1988; Goldberg 1989; Nelson 1989; Hughes and Connell 1999). Sediment damage to hard bottom and coral reefs has been documented at John U. Lloyd State Park (Britt and Associates 1979), the Miami Beach dredging project in the late 1970s (Marszalek 1981), and the Bal Harbor project in 1990 (Blair *et al.* 1990b). Sediment damage to corals off John U. Lloyd State Park in 1977, was attributed to sea conditions and improper loading operations with a hopper dredge (Britt and Associates 1979). In the Miami Beach project, silt layers 0.5-1.3 inches thick were observed on patch reefs in the vicinity of the sand excavation areas. Post-construction surveys conducted for the Bal Harbor project revealed that a total of 24.8 acres of hard bottom reef habitat was impacted by sedimentation, with sediment depths of 1-5 inches. The report estimated that over 53 percent of the hard coral colonies were killed as a result of sedimentation, equivalent to the loss of 18,279 colonies. Inadequate buffer zones surrounding the sand excavation areas contributed to the impacts in this project (Blair *et al.* 1990a).

While the effects of sedimentation and siltation can result in acute stress and sudden death, exposure to chronic, high turbidity levels can cause stress responses and a reduction in the health and growth of algae, corals, and filter feeding organisms (Dodge *et al.* 1974; Dodge and Vaisnys 1977; Bak 1978). Suspension of sediment has been shown to cause mortality of eggs and larvae of marine and estuarine fish (Newcombe and Jensen 1996) and a reduction in feeding in juvenile and adult fish also can be expected. Reduced feeding success may influence survival, year-class strength, and recruitment of juvenile fish that inhabit nearshore hard bottom and coral reef habitats (Wilber and Clarke, draft manuscript).

Turbidity impacts are chronic perturbations that cause long-term reductions in primary and secondary productivity of reef and hard bottom communities by reducing water clarity and light penetration. Corals, when exposed to extended periods of high turbidity, loose the ability to clear sediments (Clarke *et al.* 1993). Elevated turbidity levels near hard bottom and coral reef habitat are particularly detrimental to photosynthetic organisms such as the zooxanthellae found in corals and algae (Dodge and Vaisnys 1977; Bak 1978). Experimental studies have demonstrated that certain species of hard corals are adversely affected at levels below the current Florida administrative threshold of 29 NTU (Telesnicki and Goldberg 1995). Telesnicki and Goldberg (1995) measured the effects of turbidity only on the P:R ratio (photosynthesis to respiration) for two stony coral species (*Dichocoenia stokesii* and *Meandrina meandrites*) found in south Florida waters. After only three days, colonies of both species showed significant increases in respiration under high turbidity conditions (28-30 NTU). In fact, mucus production, which may be an indicator of stress, was noticeable at the 14-16 NTU level. The P:R ratio was reduced to <1.0 in both species after only 3 days, and remained depressed (<1.0) for 21 days. In addition, the secretion of mucus globules and strands from the colony surface was conspicuous at the 28-30 NTU level. Prolonged exposure (up to 21 days) to high turbidity (28-30 NTU) resulted in the distension of the coenosarc and development of small, isolated lesions in both species. A P:R ratio depressed to <1.0 for an extended period of time additionally suggests that the coral is utilizing more carbon than is being fixed and may be in a state of decline (McCloskey et al., 1978). Telesnicki and Goldberg (1995) suggest that adherence to turbidity-related water quality standards as presently defined in Florida (29 NTU) may result in short term stress and long term decline in at least some coral species.

In addition to corals, filter feeding organisms, such as sponges and tube worms can be adversely affected by turbidity as well (Hay and Sutherland 1988). Elevated turbidity levels could also result in feeding impairment and mortality of managed species, especially in the early life stages. These species include members of the snapper/grouper complex; highly migratory species; and coastal migratory pelagics. Additional managed species that may be adversely impacted by elevated turbidity levels, especially in the early life stages, include penaeid and rock shrimps; spiny lobster; and stone crabs.

EFH Conservation Recommendations

The following recommendations are provided to avoid, minimize, mitigate, or otherwise offset potential adverse effects of the proposed project on living marine resources and EFH. We request that the following recommendations be considered as special conditions for the permit:

1. Prior to construction, the permittee shall determine and provide the environmental baseline condition through quantitative and qualitative descriptions of benthic communities in and adjacent to the main ship channel, within the dredge material disposal and upland disposal discharge pipeline corridors, and within the offshore disposal site to the FKNMS and NOAA Fisheries. This includes the upper ledges of the main ship channel; Cut B; Cut C; the turning basin; bank reefs, patch reefs, and seagrass communities located along the southern entrance to the main ship channel; and Hawk Channel patch reefs.

2. Pre-project monitoring shall establish background turbidity levels and sediment characteristics in the main ship channel and in areas supporting resources of special concern (e.g., coral reef and hard bottom communities) located adjacent to the main ship channel. Turbidity shall be monitored every two hours at fixed monitoring stations throughout the duration of the dredging activities. The fixed monitoring stations shall be located in areas identified through consultation with the FKNMS, NOAA Fisheries, and the EPA. If a turbidity reading exceeds 15 NTU above background in an area that supports resources of special concern (e.g., coral reef and hard bottom communities), then the

dredging operations shall cease until 1) the environmental conditions return to ambient levels and 2) the cause for the spike in turbidity is determined and corrected. If a turbidity reading is between 0-14 NTU above background in an area that supports resources of special concern, then turbidity levels at the location of the disturbance shall be monitored every 15 minutes after the first reading that is greater than 0 NTU above background. If turbidity levels exceed 15 NTU above background at a subsequent 15-minute interval monitoring event, dredging operations shall immediately cease until 1) the environmental conditions return to ambient levels and 2) the cause for the spike in turbidity is determined and corrected. If turbidity levels do not return to ambient conditions within 45 minutes (after 3 subsequent monitoring events) of the first reading, then dredging operations shall immediately cease until conditions return to 0 NTU above background and the source of the elevated turbidity is determined and corrected.

3. Turbidity and sedimentation monitoring standards shall be established and incorporated into a monitoring plan prior to commencement of dredging activities. Initial sedimentation monitoring at pre-established stations shall be conducted on a weekly basis. The monitoring plan shall include provisions for conducting more frequent sedimentation monitoring as necessary to protect resources of special concern (e.g., coral reef and hard bottom communities).

4. A benthic characterization of habitats within the offshore target disposal site shall be provided to NOAA Fisheries and the FKNMS prior to commencement of dredging activities. The location of the 0.5 nm by 0.5 nm target disposal site shall be selected based on integrating site characterization data with the results of ocean disposal modeling using representative data on oceanic currents in the area. The 0.5 nm by 0.5 nm target disposal site shall be located in an area devoid of hard bottom communities. Based on recent information obtained from CSA, side-scan sonar surveys have detected hard botttom features in the northwest and southeast corners of the 2 nm by 2 nm target block. The target disposal site shall avoid hard bottom communities in the northwest and southeast corners of the 2 nm by 2 nm target block. CSA shall consult with NOAA Fisheries and the FKNMS to determine 1) the location of the target disposal site and 2) an adequate buffer area needed to protect hard bottom communities within the vicinity of the target disposal site. Monitoring of sediment transport patterns and oceanic currents in the vicinity of the dredge disposal site shall be conducted prior to commencement of dredging activities, during offshore dredge disposal operations, and upon completion of dredge disposal operations in order to ground truth the results of the ocean disposal modeling.

5. The dredged material disposal pipeline shall be placed along the west side of the dredged channel, in the footprint of the dredged channel, and no less than 30 feet away from the base of the cut ledge walls where coral resources have been observed. The pipeline shall not be placed along the bottom in areas that support seagrasses, hard bottom, and/or corals. The permittee shall utilize pre-construction field survey results to identify a route in Key West Harbor and Fleming Key Cut, west and north of Key West for the placement of the dredge material disposal and upland disposal discharge pipelines. The dredged material disposal and upland disposal discharge pipeline corridors shall be determined in consultation with the FKNMS and NOAA Fisheries. The permittee shall

establish a protocol to monitor the two pipelines as part of a turbidity monitoring plan. The areas to be monitored shall include Cut C, Cut B, and the way points designated by the FKNMS (refer to the FKNMS No Anchor Zones/No Impact Areas and CSA's No Anchor chart).

6. The permittee shall advise the dredging contractor and others involved in the project that FKNMS approval is required in the placement of anchors (pipeline, cutterhead, or other) to avoid damage and injury to NOAA trust resources. The permittee shall comply with the FKNMS No Anchor Zones/No Impact Areas identified during pre-construction assessments. An anchoring plan shall be submitted to and approved by the FKNMS a minimum of two weeks in advance of the start date of dredging activities. The FKNMS may add to the list of No Anchor/No Impact Areas prior to commencement of construction.

7. The permittee shall notify the dredging contractor and others involved in the project that the FKNMS is available to provide information regarding alternative anchoring methods and measures to avoid anchoring impacts. The permittee shall record, using GPS coordinates, the location of each anchor placement and provide this data to the FKNMS for their inspection. If FKNMS staff are not available to ground truth proposed anchor placements outside the dredge footprint, the permittee shall provide divers to place anchors in order to avoid adverse impacts to NOAA trust resources.

8. Turbidity control structures shall be utilized at the upland disposal site on Fleming Key in order to minimize runoff into the marine environment. Adverse impacts to EFH (e.g., mangroves, seagrasses, and corals) shall require in-kind mitigation that is commensurate in scope with the level of impact incurred.

9. The permittee shall notify the FKNMS in a timely manner of adverse impacts to benthic resources or accidents that occur. The permittee shall initiate within 24 hours of any incident, the recovery and restoration of living coral colonies. FKNMS approval and oversight is required in this effort.

10. In order to offset unavoidable and inadvertent impacts to marine resources as a result of the proposed dredging and dredged material disposal operations, compensatory mitigation shall be provided. NOAA Fisheries notes that mitigation ratios should be supported by Habitat Equivalency Analysis. Given that some stony coral colonies have recovery periods in excess of 35-50 years, we recommend a greater than 1:1 mitigation ratio to offset adverse impacts. Temporal loss and risk factors shall be calculated and factored in to the mitigation ratio and included in the mitigation plan. A mitigation plan shall be developed in consultation with and approved by the FKNMS, NOAA Fisheries, and the EPA prior to commencement of dredging activities. Should an unforeseen accident(s) occur, the permittee shall consult with the FKNMS to identify appropriate mitigation sites.

Section 305(b)(4)(B) of the Magnuson-Stevens Act and NOAA Fisheries' implementing regulation at 50 CFR Section 600.920(k) require your office to provide a written response to this letter within 30 days of its receipt. If it is not possible to provide a substantive response within 30 days, in accordance with our "findings" with your Regulatory Functions Branch, an interim response should be provided to NOAA Fisheries. A detailed response then must be provided prior to final approval of the action. Your detailed response must include a description of measures proposed by your agency to avoid, mitigate, or offset the adverse impacts of the activity. If your response is inconsistent with our EFH Conservation Recommendations, you must provide a substantive discussion justifying the reasons for not following the recommendations.

Finally, the project area includes known distribution limits of Federally listed threatened and endangered species that are under purview of NOAA Fisheries. In accordance with the Endangered Species Act of 1973, as amended, it is the responsibility of the appropriate Federal regulatory agency to review its activities and programs and identify any activity or program that may affect endangered or threatened species or their habitat. Determinations involving species under NOAA Fisheries jurisdiction should be reported to our Protected Resources Division (PRD) at the letterhead address. If it is determined that the activities may adversely affect any species listed as endangered or threatened and under PRD purview, then formal consultation must be initiated.

We appreciate the opportunity to provide these comments. Related correspondence should be addressed to the attention of Ms. Audra Livergood at our Miami Office. She may be reached at 11420 North Kendall Drive, Suite #103, Miami, Florida 33176, or by telephone at (786) 263-0028.

Sincerely,

for Frederick C. Sutter III
Deputy Regional Administrator

cc:
FKNMS, Attn. Lauri Maclaughlin
EPA, Marathon
DEP, Marathon and Tallahassee
FFWCC, Marathon and Tallahassee
FWS, Vero
SAFMC, Charleston
F/SER45-Livergood