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F/SER3:BH

Mr. James C. Duck
Jacksonville District Corps of Engineers
P.O. Box 4970
Jacksonville, FL 32232-0019

Dear Mr. Duck:

This constitutes the National Marine Fisheries Service's (NOAA Fisheries) biological opinion (Opinion) based on our review of a Corps of Engineers' (COE) proposed project to improve the Port of Miami, in Miami-Dade County, Florida. This Opinion analyzes this project's effects on Johnson's seagrass (*Halophila johnsonii*) and its critical habitat in accordance with section 7 of the Endangered Species Act (ESA) of 1973 as amended. The COE requested formal ESA section 7 consultation on September 5, 2002.

This Opinion is based on information provided in your September 5, 2002, letter and attached biological assessment as well as information received in e-mails dated December 17, 2002, and January 27, 2003. NOAA Fisheries initiated formal consultation on January 27, 2003. A complete administrative record of this consultation is on file at the NOAA Fisheries Southeast Regional Office (F/SER/2002/01094).

Incidental takes of marine mammals (listed or non-listed) are not authorized through the ESA section 7 process. If such takes may occur, an incidental take authorization under Marine Mammal Protection Act (MMPA) Section 101 (a)(5) is necessary. For more information regarding MMPA permitting procedures contact Ken Hollingshead of our Headquarters' Protected Resources staff at (301) 713-2323.

We look forward to further cooperation with you on other COE projects to ensure the conservation and recovery of our threatened and endangered marine species.

Sincerely,

Roy E. Crabtree, Ph.D.
Regional Administrator

Enclosures (2)

cc: F/PR

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Endangered Species Act - Section 7 Consultation

Agency: United States Army Corps of Engineers (COE), Jacksonville District

Activity: Expansion of the Port of Miami, Miami-Dade County, Florida (F/SER/2002/01094)

Consultation Conducted By: National Marine Fisheries Service (NOAA Fisheries) Southeast Region

Date Issued: _____

Approved By: _____
Roy E. Crabtree, Ph.D.
Regional Administrator

This constitutes the National Marine Fisheries Service's (NOAA Fisheries) biological opinion (Opinion) based on our review of a Corps of Engineers' (COE) proposed project to improve the Port of Miami, in Miami-Dade County, Florida. This Opinion analyzes this project's effects on Johnson's seagrass (*Halophila johnsonii*) and its critical habitat in accordance with section 7 of the Endangered Species Act (ESA) of 1973 as amended. The COE requested formal ESA section 7 consultation on September 5, 2002.

Consultation History

The COE requested formal ESA section 7 consultation on September 5, 2002, with a letter and an attached biological assessment. NOAA Fisheries requested additional information which was received on December 17, 2002, via e-mail. The COE modified the proposed action via e-mail on January 27, 2003. NOAA Fisheries considered the September 5, 2002, letter and its attached biological assessment along with the information received via e-mail on December 17, 2002, and January 27, 2003, a complete ESA section 7 consultation package and initiated formal consultation on January 27, 2003.

BIOLOGICAL OPINION

I. Description of the Proposed Action

The proposed action includes the widening and deepening of most of the major channels and turning basins within Miami Harbor. This action includes five components: (1) flaring the existing 500-foot

wide entrance to provide an 800-foot wide entrance channel at Buoy 1, and deepening the entrance channel from a depth of 44 feet to a depth of 52 feet; (2) widening the southern intersection of Cut-3 and the Lummus Island Channel at Buoy 15, and deepening the area from 42 feet to 50 feet; (3) extending the existing Fisher Island turning basin to the north by approximately 300 feet near the west end of Cut-3, and deepening the area from 43 feet to 50 feet; (4) relocating the west end of the main channel to about 250 feet to the south (without dredging); and (5) increasing the width of the Lummus Island Cut by about 100 feet to the south of the existing channel, reducing the existing size of the Lummus Island turning basin to a diameter of 1,500 feet, and deepening the area from 42 feet to 50 feet. Hydraulic, cutterhead, and clam shell dredges will be used.

Sand, silt, clay, soft rock, rock fragments, and loose rock will be removed via traditional dredging methods (hopper dredges are not expected to be used because of the generally hard nature of the bottom in this area). Where hard rock is encountered, the COE anticipates that the explosives, punch-barge/pile driver equipment, and/or large cutterhead equipment will be used to remove the rock. Dredged material will be transported by barge and deposited in four locations: (1) an artificial reef site in the nearshore Atlantic Ocean off Dade County, Florida; (2) the Ocean Dredge Material Disposal Site in the Atlantic Ocean approximately 4.5 miles off Miami-Dade County, Florida; (3) an upland site on Virginia Key, Florida; and (4) a previously dredged depression in North Biscayne Bay, Florida.

Based on an e-mail dated January 27, 2003, the use of explosives will be inshore of the outer reef. To protect marine mammals and sea turtles the following mitigative measures will be used:

> A danger zone will be determined based on the explosive weight used and its effects during an open water detonation. This will be conservative because there will be no open water explosions.
>
> This danger zone will be monitored by a combination of aerial observers, on water observers, and observers on the drill vessel.
>
> Any marine mammal or sea turtle in the danger zone shall not be forced to move out of those zones. Detonations shall not occur until the animal has moved out of the danger zone on its own volition.
>
> In the event a protected species is injured or killed during the use of explosives, the COE will immediately notify NOAA Fisheries.
>
> If explosives are used the COE will place the explosives in strategically oriented pre-drilled holes. These holes will be stemmed with angled gravel to direct the explosive energy into the rock.

Action Area

The action area includes the Port of Miami and Miami Harbor which are located on the north side of Biscayne Bay in Miami-Dade County, Florida (see map at attachment 2). This includes the access channel which extends approximately 3 miles into the Atlantic Ocean. The action area also includes the spoil disposal sites which include an artificial reef site in the nearshore Atlantic Ocean off Dade County, Florida; the Ocean Dredge Material Disposal Site in the Atlantic Ocean approximately 4.5 miles off Miami-Dade County, Florida; an upland site on Virginia Key, Florida; and a previous dredged depression in North Biscayne Bay, Florida (see attachment 3).

II. Status of the Species

The following endangered (E) and threatened (T) marine mammal, sea turtle, and marine plant species and designated critical habitat under the jurisdiction of NOAA Fisheries are known to occur in or near the action area:

Common Name	**Scientific Name**	**Status**
Johnson's seagrass	*Halophila johnsonii*	T
Blue whale	*Balaenoptera musculus*	E
Humpback whale	*Megaptera novaeangliae*	E
Fin whale	*Balaenoptera physalus*	E
Northern right whale	*Eubalaena glacialis*	E
Sei whale	*Balaenoptera borealis*	E
Sperm whale	*Physeter macrocephalus*	E
Leatherback sea turtle	*Dermochelys coriacea*	E
Hawksbill sea turtle	*Eretmochelys imbricata*	E
Kemp's ridley sea turtle	*Lepidochelys kempii*	E
Green sea turtle	*Chelonia mydas*[1]	E/T
Olive ridley sea turtle	*Lepidochelys olivacea*[2]	E/T
Loggerhead sea turtle	*Caretta caretta*	T

Critical Habitat

[1]Green turtles in U.S. waters are listed as threatened except for the Florida breeding population which is listed as endangered. Due to the inability to distinguish between these populations away from the nesting beach, green turtles are considered endangered wherever they occur in U.S. waters.

[2]Olive ridley turtles are listed as threatened except for the Mexican breeding population which is listed as endangered. Due to the inability to distinguish between these populations away from the nesting beach, olive ridley turtles are considered endangered wherever they occur in U.S. waters. Olive ridley turtles in the United States are mainly found in the Pacific Ocean and rarely found in the southeast United States. However, in the past two years three confirmed strandings of olive ridleys have been recorded in South Florida. Although present, NOAA Fisheries believes their occurrence is very rare.

Johnson's seagrass *Halophila johnsonii*

Blue, fin, sei, and sperm whales are predominantly found seaward of the continental shelf. Northern right whales and humpback whales are coastal animals and have been sighted in the nearshore environment in the Atlantic along the southeastern United States from November through March on their migration south. Right whales are rarely sighted south of northeastern Florida. None of these whale species are expected to be found in the shallow waters inshore of the outer reef. NOAA Fisheries believes that these whales could be affected by the use of explosives offshore of the outer reef; however, the COE has modified the proposed action such that explosives are not expected to be used seaward of the outer reef. NOAA Fisheries believes that this change in the proposed action, in combination with the above mentioned mitigation measures decreases the effects of the proposed action on listed whales to insignificant levels. If the COE decides to use explosives seaward of the outer reef they must reinitiate consultation as NOAA Fisheries believes that this may affect listed whale species. It should be noted that incidental takes of marine mammals (listed or non-listed) are not authorized through the ESA section 7 process. If such takes may occur, an incidental take authorization under Marine Mammal Protection Act (MMPA) Section 101 (a)(5) is necessary. For more information regarding MMPA permitting procedures contact Ken Hollingshead of our Headquarters' Protected Resources staff at (301) 713-2323.

The six species of sea turtles (loggerhead, green, Kemp's ridley, hawksbill, leatherback, and olive ridley) found in the action area are not expected to be adversely affected by the proposed action. Injury or death of sea turtles has not been recorded with the use of clam shell or cutterhead dredges; however, sea turtles can be affected by the use of explosives. NOAA Fisheries believes that the use of the mitigative measures above in combination with stemming the hole the explosives are placed in (which will greatly reduce the explosive energy released into the water column) will reduce the proposed action's effects on sea turtles to insignificant levels.

Since NOAA Fisheries has determined that the sea turtles and marine mammals listed above are not likely to be adversely affected by the proposed action, these species will not be considered further in this Opinion. The remainder of this Opinion will focus on the only federally-listed species likely to be adversely affected by the proposed action, Johnson's seagrass, and its critical habitat.

Johnson's Seagrass (*Halophila johnsonii*)

A. Species Description

Johnson's seagrass was listed as threatened under the ESA on September 14, 1998, based on the results of field work and a status review initiated in 1990. Johnson's seagrass is the first marine plant ever listed under the ESA. Kenworthy (1993, 1997, 1999) discusses the results of the field studies and summarizes an extensive literature review and associated interviews regarding the status of Johnson's

seagrass. The following discussion summarizes those findings relevant to our evaluation of the proposed action.

Range

Johnson's seagrass has only been found growing along approximately 200 km of coastline in southeastern Florida between Sebastian Inlet, Indian River County, to northern Key Biscayne. This narrow range and apparent endemism suggests that Johnson's seagrass may have the most limited known geographic distribution of any seagrass in the world.

Johnson's seagrass occurs in dynamic and disjunct patches throughout its range. Growth appears to be rapid and leaf pairs have short life spans while horizontally spreading from dense apical meristems (Kenworthy 1997). Kenworthy suggested that the observed horizontal spreading, rapid growth patterns, and high biomass turnover could explain the dynamic patches observed in distribution studies of this species. New information reviewed in Kenworthy (1999, 1997) confirms *H. johnsonii*'s limited geographic distribution in patchy and vertically disjunct areas between Sebastian Inlet and northern Biscayne Bay. Surveys conducted by NOAA Fisheries and Florida Marine Research Institute staff in Biscayne Bay, Florida Bay, the Florida Keys, outer Florida Bay, Puerto Rico, and the Virgin Islands have provided no verifiable sightings of Johnson's seagrass outside of the range already reported.

Extent of critical habitat

The northern and southern ranges of Johnson's seagrass are defined as Sebastian Inlet and central Biscayne Bay, respectively. These limits to the species' range have been designated as critical habitat for Johnson's seagrass (May 5, 2000; 65 FR 17786). The designation of critical habitat provides explicit notice to Federal agencies and the public that these areas and features are vital to the conservation of the species. Within its range, Johnson's seagrass critical habitat has been designated for 10 areas: a portion of the Indian River Lagoon, north of the Sebastian Inlet Channel; a portion of the Indian River Lagoon, south of the Sebastian Inlet Channel; a portion of the Indian River Lagoon near the Fort Pierce Inlet; a portion of the Indian River Lagoon, north of the St. Lucie Inlet; a portion of Hobe Sound; a site on the south side of Jupiter Inlet; a site in central Lake Worth Lagoon; a site in Lake Worth Lagoon, Boynton Beach; a site in Lake Wyman, Boca Raton; and a portion of Biscayne Bay. Based on the best available information, NOAA Fisheries identified the following physical and biological features as those constituent elements which are essential to the conservation of Johnson's seagrass: adequate water quality, salinity levels, water transparency, and stable, unconsolidated sediments that are free from physical disturbance. The specific areas designated as critical habitat which are currently occupied by Johnson's seagrass include one or more of the following criteria: 1) locations with populations that have persisted for 10 years; 2) locations with persistent flowering populations; 3) locations at the northern and southern range limits of the species; 4) locations with unique genetic diversity; and 5) locations with a documented high abundance of Johnson's seagrass compared to other areas in the species' range.

B. Life History

Reproductive strategy

The species is perennial and may spread even during winter months under favorable conditions (Virnstein et al. 1997). Sexual reproduction in Johnson's seagrass has not been documented. Female flowers have been found; however, dedicated surveys in the Indian River Lagoon have not discovered male flowers, fertilized ovaries, fruits, or seeds either in the field or under laboratory conditions (Jewett-Smith et al. 1997). Searches throughout the range of Johnson's seagrass have produced the same results, suggesting that the species does not reproduce sexually or that the male flowers are difficult to observe or describe, as noted for other *Halophila* species (Kenworthy 1997). Surveys to date indicate that the incidence of female flowers appears to be much higher near the inlets leading to the Atlantic Ocean, suggesting that inlet conditions are qualitatively better for flowering than conditions further inshore (Kenworthy, pers. comm. 1998). It is possible that male flowers, if they exist, occur near inlets as well. Maintenance of good water quality around inlets may be essential for promoting flowering in the Johnson's seagrass population.

Niche

The essential features of habitat appear to be adequate water quality, salinity, water clarity, and stable sediments free from physical disturbance. Important habitat characteristics include shallow intertidal as well as deeper subtidal zones (2-5 m). Water transparency appears to be critical for Johnson's seagrass, limiting its distribution at depth to areas of suitable optical water quality (Kenworthy 1997). In areas in which long-term poor water and sediment quality have existed until recently, such as Lake Worth Lagoon, *H. johnsonii* appears to occur in relatively higher abundance perhaps due to the previous inability of the larger species to thrive. These studies support unconfirmed previous observations that suspended solids and tannin, which reduce light penetration and water clarity, may be important factors limiting seagrass distribution in the Indian River Lagoon (Woodward-Clyde 1994). Good water clarity is essential for *Halophila johnsonii* growth in deeper waters.

Johnson's seagrass occurs over varied depths, environmental conditions, salinities, and water quality. In tidal channels *H. johnsonii* is found in coarse sand substrates, although it has been found growing on sandy shoals, and in soft mud near canals and rivers where salinity may fluctuate widely (Virnstein et al. 1997). Virnstein has called Johnson's seagrass a "perennial opportunistic species." Within his study areas in the Indian River Lagoon, *H. johnsonii* was found by itself, with other seagrass species, in the intertidal, and (more commonly) at the deep edge of some transects in water depths of up to 180 cm. *H. johnsonii* was found shallowly rooted on sandy shoals, in soft mud, near the mouths of canals, rivers, and in shallow and deep water (Virnstein et al. 1997). Additionally, recent studies have documented large patches of Johnson's seagrass on flood deltas just inside Sebastian Inlet, as well as far from the influence of inlets (reported at the workshop discussed in Kenworthy 1997). These sites encompass a wide variety of salinities, water quality, and substrates.

Competitors

Halophila johnsonii appears to be out-competed in ideal seagrass habitats where environmental conditions permit the larger species to thrive (Virnstein et al. 1997; Kenworthy 1997).

C. Population Dynamics

Population stability

A factor leading to the listing of *H. johnsonii* is its rareness within its extremely restricted geographic range. Johnson's seagrass is characterized by small size (it is the smallest of all of the seagrasses found within its range, averaging about 3 cm in height), fragile rhizome structure and associated high turnover rate, and its apparent reliance on vegetative means to reproduce, grow, and migrate across the sea bottom. These factors make Johnson's seagrass extremely vulnerable to human or environmental impacts by reducing its capacity to repopulate an area once removed. The species and its habitat are impacted by human-related activities throughout the length of its range, including bridge construction and dredging, and the species' threatened status produces new and unique challenges for the management of shallow submerged lands. Vessel traffic resulting in propeller and anchor damage, maintenance dredging, dock and marine construction, water pollution, and land use practices could require special management within critical habitat.

Population (genetic) variability

The Boca Raton and Boynton Beach sites which have been designated as critical habitat have populations which are distinguished by a higher index of genetic variation than any of the central and northern populations examined to date (Kenworthy 1999). These two sites represent a genetically semi-isolated group which could be the reservoir of a large part of the overall genetic variation found in the species. Information is still lacking on the geographic extent of this genetic variability.

D. Status and Distribution

Reasons for listing

Kenworthy (1997, 1999) summarized the newest information on Johnson's seagrass biology, distribution and abundance, and confirmed the limited range and rareness of this species within its range. Additionally, the apparent restriction of propagation through vegetative means suggests that colonization between broadly disjunct areas is likely difficult, suggesting that the species is vulnerable to becoming endangered if it is removed from large areas within its range by natural or anthropogenic means. Human impacts to Johnson's seagrass and its habitat include: (1) vessel traffic and the resulting propeller dredging and anchor mooring; (2) dredging; (3) dock and marina construction and shading from these structures; (4) water pollution; and (5) land use practices including shoreline development, agriculture, and aquaculture.

Activities associated with recreational boat traffic account for the majority of human use associated with the designated critical habitat areas. The destruction of the benthic community due to boating activities, propeller dredging, anchor mooring, and dock and marina construction was observed at all sites during a study by NOAA Fisheries from 1990 to 1992. These activities severely disrupt the benthic habitat, breaching root systems, severing rhizomes, and significantly reducing the viability of the seagrass

community. Propeller dredging and anchoring in shallow areas are a major disturbance to even the most robust seagrasses. This destruction is expected to worsen with the predicted increase in boating activity. Trampling of seagrass beds, a secondary effect of recreational boating, also disturbs seagrass habitat. Populations of Johnson's seagrass inhabiting shallow water and close to inlets, where vessel traffic is concentrated, will be most affected.

The constant sedimentation patterns in and around inlets require frequent maintenance dredging, which could either directly remove essential seagrass habitat or indirectly affect it by redistributing sediments, burying plants, and destabilizing the bottom structure. Altering benthic topography or burying the plants may remove them from the photic zone. Permitted dredging of channels, basins, and other in- and on-water construction projects causes loss of Johnson's seagrass and its habitat through direct removal of the plant, fragmentation of habitat, and shading. Docking facilities that, upon meeting certain provisions, are exempt from state permitting also contribute to loss of Johnson's seagrass through construction impacts and shading. Fixed add-ons to exempt docks (such as finger piers, floating docks, or boat lifts) have recently been documented as an additional source of seagrass loss due to shading (Smith and Mezich 1999).

Decreased water transparency caused by suspended sediments, water color, and chlorophylls could have significant detrimental effects on the distribution and abundance of the deeper water populations of Johnson's seagrass. A distribution survey in Hobe and Jupiter Sounds indicates that the abundance of this seagrass diminishes in the more turbid interior portion of the lagoon where reduced light limits photosynthesis.

Other areas of concern include seagrass beds located in proximity to rivers and canal mouths where low salinity, highly colored water is discharged. Freshwater discharge into areas adjacent to seagrass beds may provoke physiological stress upon the plants by reducing the salinity levels. Additionally, colored waters released into these areas reduce the amount of sunlight available for photosynthesis by rapidly attenuating shorter wavelengths of photosynthetically active radiation.

Continuing and increasing degradation of water quality due to increased land use and water management threatens the welfare of seagrass communities. Nutrient overenrichment caused by inorganic and organic nitrogen and phosphorous loading via urban and agricultural land run-off stimulates increased algal growth that may smother Johnson's seagrass, shade rooted vegetation, and diminish the oxygen content of the water. Low oxygen conditions have a demonstrated negative impact on seagrasses and associated communities.

Range-wide trend

Lamentably, there is currently insufficient information to clearly determine trends in the Johnson's seagrass population, which was first described in 1980 and has only been extensively studied during the 1990s. Generally, seagrasses within the range of Johnson's seagrass have declined in some areas and increased in others. Where multi-year mapping studies have been conducted within the Indian River

Lagoon, recent increases in Johnson's seagrass have been noted but may be attributed in part to the recent increase in search effort and increased familiarity
with this species (Virnstein et al. 1997). The authors conclude that from 1994 through 1997, no strong seasonal distribution or increases or decreases in abundance or range can be discerned.

E. Analysis of the Species Likely to be Affected

Of the listed species under NOAA Fisheries' jurisdiction occurring in the Atlantic Ocean in the Southeast Region, NOAA Fisheries believes that only Johnson's seagrass and its critical habitat may be adversely affected by the proposed action. *Halophila johnsonii* may be affected because of its limited range, distribution within its range, reproductive capacity, and largely unknown ability to recover from removal from a site. Spread of the species into new areas is limited by its reproductive potential. Johnson's seagrass is thought to possess only female flowers; thus, vegetative propagation, most likely through asexual branching, appears to be its only means of reproduction and dispersal. If an established community is disturbed, the extent of regrowth and reestablishment, if any, is uncertain. If extirpated from an area, it is doubtful that the species would be capable of repopulation. This species' method of reproduction impedes the ability to increase distribution as establishment of new vegetation requires considerable stability in environmental conditions and protection from human-induced disturbances.

III. Environmental Baseline

A. Status of the Species Within the Action Area

Because of the limited nature of this species' range, the range-wide status of the species, given in Section II above, most appropriately reflects the species status within the action area.

B. Factors Affecting the Species Environment Within the Action Area

This seagrass occurs within inshore waters of the most populated counties in Florida, and is therefore influenced by numerous actions and potential sources of harm. Since 1981, the state of Florida has regulated activities that affect seagrasses and has implemented measures to minimize these effects. These protective measures directly benefit Johnson's seagrass.

Inlets into the Intracoastal Waterway (ICW) have been established or stabilized and maintained since the early 1900s, in some cases creating a marine environment where freshwater once occurred. Naturally-occurring channels have been expanded, deepened, and stabilized into continuous channels with access to harbors and inlets. These activities have had a dominant effect on the seagrass habitat throughout the range of *H. johnsonii*.

Urban development since the 1960s has affected inshore water quality throughout the range of Johnson's seagrass. However, Woodward-Clyde (1994) opined that improvements in erosion and sediment control in association with urban development in the 1980s and 1990s may have been responsible for reduced turbidity in those decades as compared to the previous two decades of development. Reductions in seagrasses were apparent in the 1970s, along with areas of highly turbid water. Increases in submersed aquatic vegetation were noted until coverage and density peaked in 1986, albeit at levels remaining below those observed in the decades prior to 1960.

In association with upland development, water quality and transparency within the range of Johnson's seagrass are affected by storm water and agricultural runoff, wastewater discharges, and other point and non-point sources. The effects of water management may result in large discharges of fresh water from Lake Okeechobee. Nutrient overenrichment resulting from these discharges may stimulate increased algal growth that may smother seagrasses, shade rooted vegetation, and diminish the oxygen content of the water. Water clarity, which has been identified as an essential feature to allow Johnson's seagrass to occur in the deeper reaches of its
range, may also be affected by these discharges. Although Johnson's seagrass has shown tolerance of wide salinity ranges, the discharge of large amounts of fresh water into the ICW may exceed even these ranges.

Increasing recreational vessel traffic in the range of Johnson's seagrass results in marina and dock construction, anchor mooring, propeller scoring and scouring by vessels operating outside of boat channels, and intentional, illegal propeller dredging. Additionally, seagrass beds may be trampled by fishermen and others using these inshore waters. These activities disrupt the benthic habitat, and easily breach the shallow root systems of Johnson's seagrass. A marina project permitted by the COE in 2002, is expected to cover 3.01 acres of the Biscayne Bay designated critical habitat.

Natural disasters, including hurricanes and large coastal storms, could also significantly harm seagrass beds. Storm surges could easily pull the shallowly-rooted *H. johnsonii* from the sediments and remove a large portion of its population in proximity to inlets. Because of its restricted geographic distribution and apparent reliance on asexual reproduction, it is less likely to survive environmental perturbations and to be able to repopulate an area once lost.

A wide range of activities funded, authorized, or carried out by Federal agencies may affect the essential habitat requirements of Johnson's seagrass. These include authorization by the COE for beach nourishment, dredging, and related activities including construction of docks and marinas; bridge construction projects funded by the Federal Highways Administration; actions by the Environmental Protection Agency and the COE to manage freshwater discharges into waterways; regulation of vessel traffic by the U.S. Coast Guard (USCG); management of national refuges and protected species by the U.S. Fish and Wildlife Service; management of vessel traffic (and other activities) by the U.S. Navy; authorization of state coastal zone management plans by NOAA's National Ocean Service; and management of commercial fishing and protected species by NOAA Fisheries.

Summary and Synthesis of the Environmental Baseline

In summary, several factors are presently adversely affecting Johnson's seagrass within the action area. These factors are ongoing and are expected to occur contemporaneously with the proposed action:

- the creation, widening, and deepening of inlets and channels will continue to fragment, smother, and directly remove seagrass beds;

- urban development will continue to create demands for new docks and marinas which will preclude the expansion of seagrasses by direct displacement and shading;

- upland development and associated runoff will continue to degrade water quality and decrease water clarity necessary for growth of seagrasses; and

- increased vessel traffic will continue to result in fragmentation of seagrass beds due to accidental groundings and propeller scarring.

These activities are expected to combine to adversely affect the recovery of Johnson's seagrass throughout its range.

IV. Effects of the Action

The proposal to list Johnson's seagrass as a threatened species identified a number of human and natural perturbations which adversely affect the species including 1) dredging and filling, 2) propeller scarring, 3) storm surge, 4) alterations in water quality, and 5) siltation. Due to the fragile nature of *H. johnsonii*'s shallow root system, these seagrasses are vulnerable to human-induced disturbances in addition to the major natural disturbances to the sediment.

A seagrass survey conducted by the COE (attachment 4) indicates that there is no Johnson's seagrass located in the areas of the port's channels and turning basins that will be dredged as part of the proposed action. The previously dredged depression in Biscayne Bay that will be used for spoil disposal is approximately 18.9 acres and between 11 and 15 feet deep. A seagrass survey completed by the COE (not yet published) indicates that there is no Johnson's seagrass around the perimeter of the depression nor is there Johnson's seagrass or any other seagrass species in the depression (Terry Jordan, COE biologist, personal communication). Based on this information the proposed action's effects on Johnson's seagrass will be insignificant.

As stated in the Environmental Baseline section of this Opinion and based on the best available information, NOAA Fisheries identified the following physical and biological features as those

constituent elements which are essential to the conservation of Johnson's seagrass: adequate water quality, salinity levels, water transparency, and stable, unconsolidated sediments that are free from physical disturbance. The specific areas designated as critical habitat which are currently occupied by Johnson's seagrass include one or more of the following criteria: 1) locations with populations that have persisted for 10 years; 2) locations with persistent flowering populations; 3) locations at the northern and southern range limits of the species; 4) locations with unique genetic diversity; and 5) locations with a documented high abundance of Johnson's seagrass compared to other areas in the species range.

A portion of Northern Biscayne Bay, Florida, defined by the following: The northern boundary of Biscayne Bay Aquatic Preserve, N.E. 163rd Street, and including all parts of the Biscayne Bay Aquatics Preserve as defined in 18-18.002 of the Florida Administrative Code (F.A.C.) excluding the Ortega River beyond its mouth, and all Federal navigation channels at the Port of Miami, not including the ICW, to the currently documented southern-most range of Johnson's seagrass, Central Key Biscayne (25°45'N) is designated as critical habitat. Therefore portions of the proposed action will occur in Johnson's seagrass critical habitat (see attachment 2, component 5A and attachment 3, "proposed seagrass restoration site").

This portion of Biscayne Bay was designated as critical habitat because it is the southern most portion of the species range. The geographical limits of the distributional range of a species can indicate a reduction or expansion of the species' range. Greater adaptative stresses can occur at the limits of the species' range. If the range extension were shrinking, the edges should be protected to prevent further loss. Secondly, the distribution limits may be a point where the populations are expanding and invading new environments. The unique phenotypic and genotypic characteristics of these populations could be an important reservoir for characteristics resistant to extinction and conducive to survival and growth.

Approximately 24.9 acres of this designated critical habitat will be affected by the proposed action. Six acres will be affected by the widening of the Lummus Island Cut by about 100 feet to the south of the existing channel (see attachment 2, component 5A) and an additional 18.9 acres will be affected by the disposal of spoil material in the previously dredged depression, mentioned above (attachment 3). The six acres of critical habitat that will be lost due to the widening of the Lummus Island Cut represents approximately .05% of the total Biscayne Bay critical habitat (6 acres of loss/19,000 total acres of the Biscayne Bay critical habitat). The deminimis nature of this loss will not stop the species from expanding and invading new environments. This loss will also not cause the loss of unique phenotypic and genotypic characteristics that may be present due to this area being the southern limit of Johnson's seagrass's range (this is due to no actual loss of Johnson's seagrass). The dredging associated with the widening will cause disturbances to the water quality, water transparency, and the sediments (due to the disturbance and temporary suspension of sediments) of the immediate area; however, these effects will be temporary and no permanent alteration of these constituent elements is expected. Salinity levels are not expected to be affected as a result of the proposed action. Based on this NOAA Fisheries believes that the loss of six acres of the Biscayne Bay critical habitat will not appreciably diminish the value of the critical habitat for both the survival and recovery of Johnson's seagrass.

The 18.9 acres of area to be filled is currently devoid of seagrass including Johnson's seagrass. The area is 11 to 15 feet deep with suspended sediments causing low light at the bottom (Terry Jordan, personal communication). The COE intends to fill this area to a depth of 4 feet and intends to use this area for seagrass mitigation (Terry Jordan, personal communication). This should increase the area's ability to support seagrasses including Johnson's seagrass by adjusting the bottom to a depth more conducive to light penetration and seagrass growth. Based on this information NOAA Fisheries believes that the filling of this depression may increase the area within the critical habitat that contain the constituent elements which are essential to the conservation of Johnson's seagrass and will add additional area for the expansion of Johnson's seagrass.

Based on the above information NOAA Fisheries does not believe that the proposed action will cause the destruction or adverse modification of the Biscayne Bay Johnson's seagrass critical habitat.

V. Cumulative Effects

Cumulative effects include the effects of future state, tribal, or local private actions that are reasonably certain to occur in the action area considered in this Opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

No effects beyond those already described in Sections IIIB and IV are expected in the action area. Dock and marina construction will likely continue at current rates, with concomitant loss and degradation of seagrass habitat, including Johnson's seagrass; however, these activities are subject to COE permitting and thus the ESA section 7 consultation requirement. Furthermore, NOAA Fisheries and the COE have developed protocols to encourage the use of light-transmitting materials in future constructions of single-family docks within the range of Johnson's seagrass.

In or near the action area it is expected that recreational watercraft use will continue to increase; however, it is expected that boater education programs and posted signage about the dangers to seagrass beds (and manatees) of propeller scarring will reduce boat interactions with listed species at a rate greater than the increase in boating activity. NOAA Fisheries does not believe that continuation of recreational boating activities at the current rate of increase will jeopardize the existence of *Halophila johnsonii* because of boater education programs and because of the designation of critical habitat for the species. This designation will help protect areas with persistent patches (patches that have been viable for at least 10 years), and areas of genetic variability, from adverse modifications.

VI. Conclusion

After reviewing the current status of Johnson's seagrass and its critical habitat, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is NOAA Fisheries' biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of Johnson's seagrass nor destroy or adversely modify critical habitat. Further surveys and monitoring of the action area after construction are necessary to quantify the effects of this project and to verify the conclusion of this Opinion.

VII. Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

NOAA Fisheries believes the following conservation recommendations are reasonable, necessary, and appropriate to minimize impacts on Johnson's seagrass and Johnson's seagrass critical habitat. The NOAA Fisheries strongly recommends that these measures be considered and adopted.

1. NOAA Fisheries recommends that a report of all current and proposed COE projects in the range of Johnson's seagrass be prepared and used by the COE to assess impacts on the species from these projects, to assess cumulative impacts, and to assist in early consultation that will avoid and/or minimize impacts to Johnson's seagrass and its critical habitat. Information in this report should include location and scope of each project and identify the Federal lead agency for each project.

The information should be made available to the South Florida Water Management District and NOAA Fisheries.

2. NOAA Fisheries recommends that the COE conduct and support research to assess trends in the distribution and abundance of Johnson's seagrass. Data collected should be contributed to the Florida Fish and Wildlife Conservation Commission's Florida Marine Research Institute to support ongoing GIS mapping of Johnson's and other seagrass distribution.

3. NOAA Fisheries recommends that the COE, in coordination with seagrass researchers and industry, support ongoing research on light requirements and transplanting techniques to preserve and restore Johnson's seagrass, and on collection of plants for genetics research, tissue culture, and tissue banking.

4. NOAA Fisheries recommends that the COE participate in state efforts to preserve and restore seagrass, and in the implementation of the Seagrass Preservation and Restoration Plan for the Indian River Lagoon.

5. NOAA Fisheries recommends that the COE prepare an assessment of the effects of other actions under its purview on Johnson's seagrass for consideration in future consultations. NOAA Fisheries recommends that the standardized survey methods identified at Attachment 1 (Recommendations for Sampling *Halophila johnsonii* at a Project Site) be used to collect data to support assessments of these new projects.

6. NOAA Fisheries recommends that the COE recommend the use of the *Key for Construction Conditions for Docks or other Minor Structures Constructed in or over Johnson's Seagrass*, revised October 2002, as the construction methodology for proposed docks located in the range of Johnson's seagrass.

7. NOAA Fisheries recommends that the COE monitor the seagrass mitigation site that is part of the proposed action for a period of no less than 5 years. Yearly reports should be completed and sent to NOAA Fisheries' Southeast Regional Office, Protected Resources Division.

Reinitiation of Consultation

As provided in 50 CFR Section 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if (1) the amount or extent of taking specified in the proposed action is exceeded, (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered, (3) the identified action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in the biological opinion, or (4) a new species is listed or critical habitat designated that may be affected by the identified action.

References

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ATTACHMENT 1

Recommendations for Sampling *Halophila johnsonii* at a Project Site

The above-suggested approaches for sampling *H. johnsonii* are recommendations of the *H. johnsonii* Recovery Team.

Objective:

To outline recommended survey methods for determining the distribution and abundance of *H. johnsonii* at sites under permit review. The methods should be applicable to a broad range of project scales, from a 20-m long dock, to marinas, bridges, and channels several kilometers long.

Problem:

Three aspects make quantitative sampling for *H. johnsonii* difficult: (1) Poor visibility; it is sometimes difficult to see more than 0.1 or even 0.01 m^2 at a time. (2) Patchy and clumped distribution, with patches as small as 0.01 m^2, which may be clumped together within a sub-area of the project area. (3) Stratified distribution, with occurrence perhaps limited to a particular depth gradient within a project area.

Recommended Methods:

The most appropriate approach depends on scale, and the amount of expected error depends on the approach. Unless a complete survey of the entire area is done, the estimated distribution and abundance of this species may be significantly in error. With the exception of very small project areas, efficient field sampling may require sampling in two stages. A preliminary visual reconnaissance of the site should be conducted to locate any occurrences of *H. johnsonii*. "The importance of preliminary sampling is probably the most under emphasized principal related to field studies. There is no substitute for it." (Green 1979). Following the preliminary reconnaissance, a more comprehensive sampling, using one of the techniques outlined below, should be initiated.

In situ monitoring for *H. johnsonii* is absolutely necessary. Aerial photography may be used to map distributions of larger canopy-forming species; however, mapping of *H. johnsonii* cannot be done reliably from aerial photos. Because of significant seasonal and annual variation in distribution and abundance of *H. johnsonii*, surveys must be conducted during spring/summer (April 1-August 31) period of maximum abundance, and sampling in more than one summer is recommended. Length of time between survey date and actual start of project should consider the potentially rapid turnover and migration of *H. johnsonii*. Personnel conducting the survey should clearly demonstrate that they can distinguish between *H. johnsonii* and *H. decipiens*. Surveys labeled simply as *"Halophila"* are not sufficient.

Deliverables: 1) amount (acres or square meters) impacted, 2) estimate of percent coverage and the species present/absent, 3) site map with seagrass patch or bed locations, 4) size of the patches, and 5) shoot density estimate.

SMALL PROJECT SITES (<0.1 ha, e.g., 10-m by 100-m, such as single-family docks). Two methods.

1. Provide a site map of submerged lands adjacent to the action area. The site map should include transects approximately every 7.5 m apart, perpendicular to the shore, and for a length 6 m longer than the proposed activity. A preliminary visual reconnaissance is necessary to fill in the information between the transects. Seagrass patches should be identified by species composition and drawn on the site map. Density can be accomplished with random sub-sampling for density within the identified patches. (An overall site map is important since it identifies seagrass habitat, not just existing seagrass patches.) (Mezich 2000).

2. The site is sub-divided into m^2 grids. A complete and intensive mapping of the entire area of concern can be developed by using DGPS, with coordinates provided every m^2, or every patch >0.01-0.1 m^2, with a tested map accuracy of >50%-95%. If percent cover is not used, an illustrated, standardized scale of density should be used. Presence-absence should be determined for every m^2 grid cell.

For monitoring project effects, additional information on shoot density, blade length, and flowering, can be collected from a random sub-sample of grids using 25-cm by 25-cm quadrants or multiple 10-cm by 10-cm sub-cells within the m^2 grid.

INTERMEDIATE-AREA PROJECT SITES (0.1 to 1 ha, e.g., a 100-m by 100-m marina). A two-step process is required.

a. Preliminary visual reconnaissance to locate general *H. johnsonii* areas and distribution.

b. The site should then be surveyed using transects across the dominant spatial gradient (e.g., depth, inshore-offshore, channel-shoal, etc.) of the site. The number of transects and sample intervals should adequately describe distribution and abundance of *H. johnsonii* patches. Besides noting presence-absence, x-y-z diameters of encountered patches should be noted, together with sub-samples of shoot density, blade length, and presence of flowering.

LARGE-AREA PROJECT SITES (>1 ha). Three choices are possible after preliminary visual reconnaissance.

1. Random sampling of points or quadrats within the area.

Sampling at least 1%-30% of the total area.

- 2 stages: (1) visual reconnaissance, then stratify, (2) second intensive sampling, with intensity relative to abundance of *H. johnsonii* within the strata.
- single step of 100-1,000 points/quadrats (min. # = ?).

2. Intensive survey of transects.

Transects across the entire area, sampling at least 1%-30% of the total area.

- point-intersects sampling along transects (with the size of a "point" defined, e.g., 5-cm x 5- cm or 10-cm x 10-cm).
- belt transect, of 0.1-2 m width.
- transects randomly located (min. # transects = 10-50 or min. spacing = 50 m).
- regularly-spaced transects (min. # transects = 10-50 or min. spacing = 50 m).
- quadrants at regular intervals along line (min. # = 10-50 or min. spacing = 50 m).

For any of these transect methods, x-y-z diameters of any patches encountered should be measured. At a minimum, presence-absence should be recorded at each point of each quadrant.

3. Combinations of above methods, e.g.,

(a) Intensive mapping in area of primary impact (e.g., within footprint of proposed dock), plus random points in surrounding, potentially affected area.

(b) Stratify from random point sampling, then map intensively in areas of greatest abundance.

It is the position of the Recovery Team, however, that the adoption of a valid survey protocol for identifying Johnson's seagrass be required by permitting agencies in the range of the species. In all seagrass surveys, emphasis should be placed on the identification of seagrass habitat as well as the distribution of currently existing patches. Identifying impacts to seagrass habitat, particularly from large projects, is more important in the long run than the "point-in-time" management approach of avoiding currently existing patches.

References

Green, R.H. 1979. Sampling design and statistical analysis methods environmental biologists. John. W. and Sons, Inc., New York.

Mezich, Ron (N.A.B). 2000. Personal Communication. Florida Freshwater and Wildlife Conservation Commission, Marine Resources, Tallahassee, Florida.

Attachment 2

LEGEND

- Approximate Extent of Survey Area
- Existing Channel Limits
- Modification Component 1C
- Modification Component 2A
- Modification Component 3B
- Modification Component 4
- Modification Component 5A

TURNING BASIN

COMPONENT 4

CUT 4

MAIN CHANNEL

DODGE ISLAND TURNING BASIN

LUMMUS ISLAND TURNING BASIN

COMPONENT 3B

CUT 3

FISHERMAN'S CHANNEL

COMPONENT 5A

COMPONENT 2A

NORRIS CUT

CUT 2

GOVERNMENT CUT

CUT 1

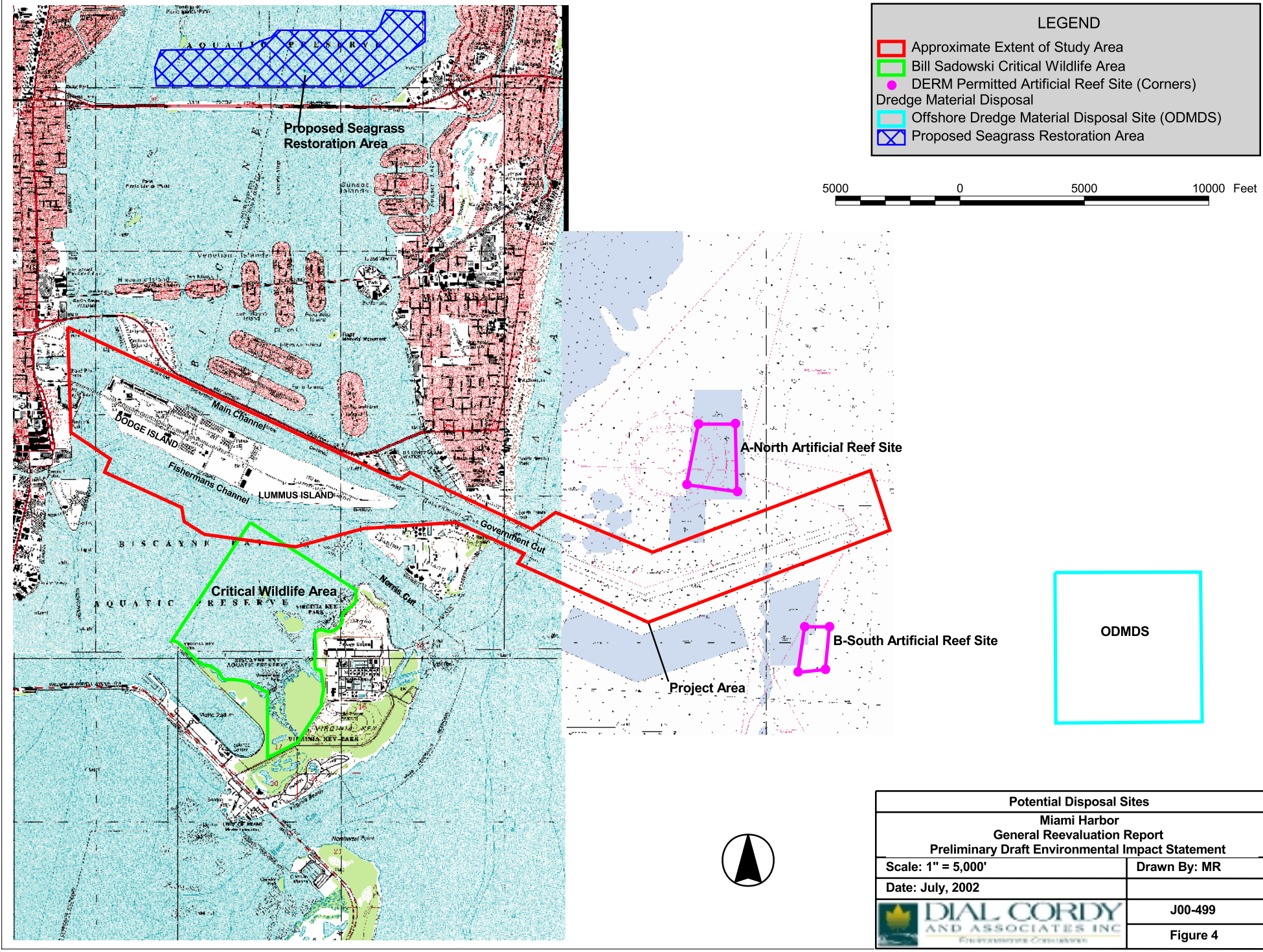
OUTER ENTRANCE CHANNEL

COMPONENT 1C

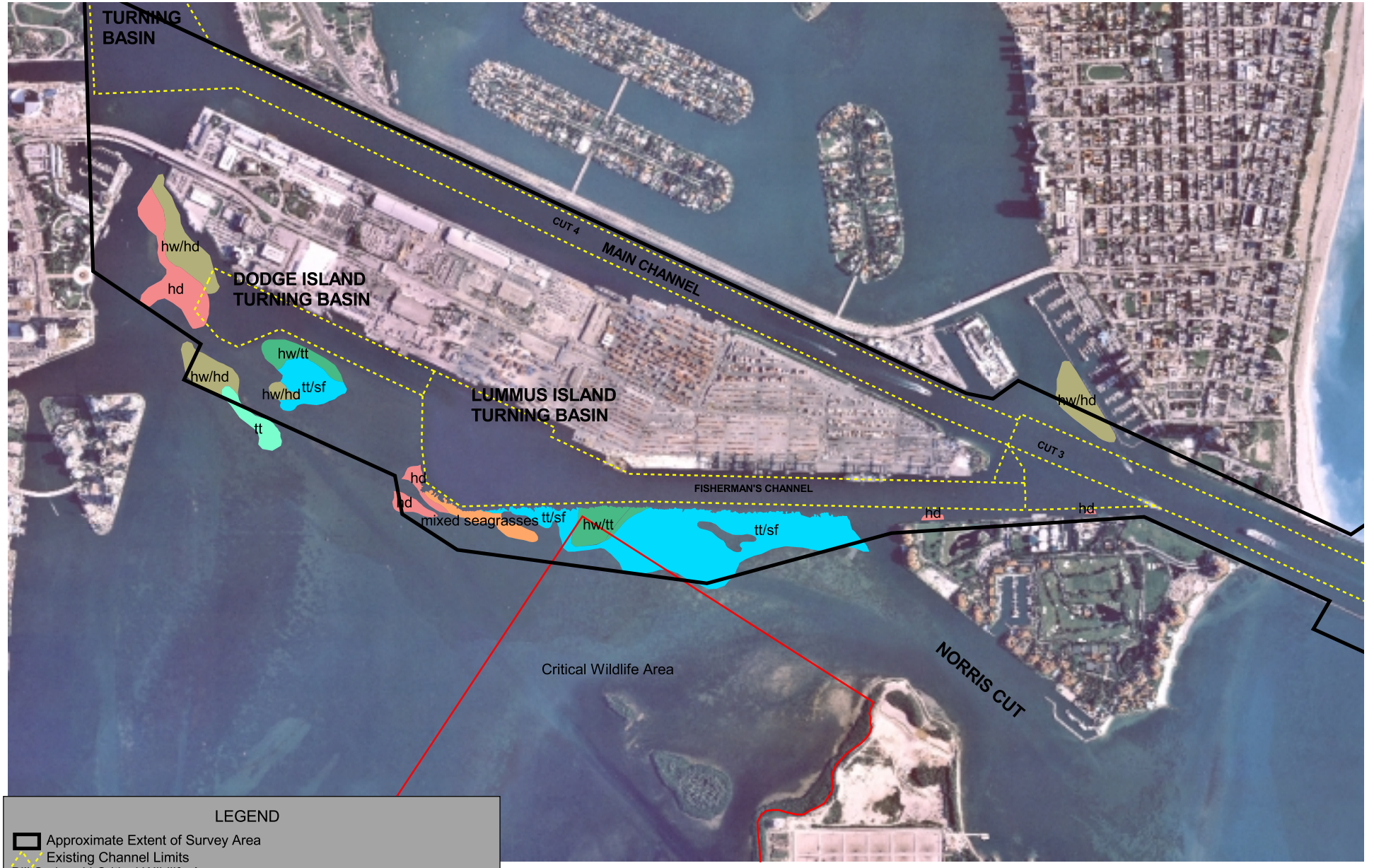
2500 0 2500 5000 Feet

Alternative 2	
Miami Harbor General Reevaluation Report Preliminary Draft Environmental Impact Statement	
Scale: 1" = 2,500'	Drawn By: MR
Date: July, 2002	
DIAL CORDY AND ASSOCIATES INC	J00-499
	Figure 3

Attachment 3


LEGEND
Approximate Extent of Study Area
Bill Sadowski Critical Wildlife Area
DERM Permitted Artificial Reef Site (Corners)
Dredge Material Disposal
Offshore Dredge Material Disposal Site (ODMDS)
Proposed Seagrass Restoration Area
5000 0 5000 10000 Feet
Proposed Seagrass Restoration Area
Main Channel
DODGE ISLAND
Fishermans Channel
LUMMUS ISLAND
Government Cut
Critical Wildlife Area
Norris Cut
A-North Artificial Reef Site
B-South Artificial Reef Site
Project Area
ODMDS
Potential Disposal Sites
Miami Harbor
General Reevaluation Report
Preliminary Draft Environmental Impact Statement
Scale: 1" = 5,000'
Drawn By: MR
Date: July, 2002
DIAL CORDY AND ASSOCIATES INC
J00-499
Figure 4

Attachment 4



LEGEND

- Approximate Extent of Survey Area
- Existing Channel Limits
- Bill Sadowski Critical Wildlife Area

Seagrass Cover Classes

- Halophila decipiens (paddle grass) - hd
- Thalassia testudinum (turtle grass) - tt
- Halodule wrightii (shoal grass) w/ Halophila decipiens - hw/hd
- Halophila wrightii w/ Thalassia testudinum - hw/tt
- Thalassia testudinum w/ Syringodinum filiforme (manatee grass) - tt/sf
- Mixed Seagrasses

2000 0 2000 4000 Feet

Seagrass Distribution

Miami Harbor
General Reevaluation Report
Preliminary Draft Environmental Impact Statement

Scale: 1" = 2,000'	Drawn By: MR
Date: July, 2002	
DIAL CORDY AND ASSOCIATES INC	J00-499
	Figure 5