APPENDIX F
EFH Coordination Documents

Planning Division
Environmental Branch

Mr. Rickey Ruebsamen
Acting Assistant Regional Administrator
Habitat Conservation Division
National Marine Fisheries Service
9721 Executive Center Drive North
St. Petersburg, Florida 33702

Dear Mr. Ruebsamen:

Thank you for the Essential Fish Habitat Conservation Recommendations included in your April 28, 2003 letter for the Port of Miami Navigation Project in Dade County, Florida. A detailed reply to the 19 EFH recommendations is enclosed. We intend to comply with most of the EFH recommendations (2,3,4,5,6,7,10,11,12,14,15,16,17 & 19). The remaining recommendations are not under our jurisdiction or are economically infeasible to implement.

If you have any questions, please contact Terri Jordan at 904 232-1817.

Sincerely,

James C. Duck
Chief, Planning Division

Enclosure

Copy Furnished:
Ms. Amy Kimball-Murley, Port of Miami, 7520 Red Road, Suite M, South Miami, Florida 33143

Jordan/CESAJ-PD-EA/1817/
McAdams/CESAJ-PD-EA
Mason/CESAJ-PD-E
R. Perez/CESAJ-DP-C
Strain/CESAJ-PD-P
Duck/CESAJ-PD

L: group/PDE/Jordan/Miami GRR/DEIS/Appendix F - EFH Assessment/Responses to NMFS EFH Conservation Recommendations

Recommendation #1 - As mitigation for elimination of 6.3 acres of seagrass habitat, 18.9 acres of compensatory replacement of habitat (a 3:1 ratio) shall be provided.

Response – The Corps will apply all of the 18.6 acres associated with the dredge hole in north Biscayne Bay toward the mitigation requirements associated with the project.

Recommendation #2 – The seagrass restoration site shall meet the seven criteria outlined by Fonseca *et al*. (1998). Additionally, it shall be demonstrated that the seagrass restoration site will be filled to the same elevation as nearby natural seagrass beds and it shall be determined whether *H. wrightii* and *H. decipiens* are present in locations adjacent to these sites.

Response – The proposed mitigation site meets the seven criteria set forth in Fonseca et *al*. (1998); will be filled to the same depth as surrounding seagrass beds; and *H. decipiens* and *H. wrightii* have been documented near the proposed mitigation site.

1. *They are at similar depths as nearby natural seagrass beds*. The proposed mitigation site currently has a depth of approximately –15 feet. It shall be filled to –3 or –4 feet in depth to match the surrounding seagrass beds.
2. *They were anthropogenically disturbed*. The mitigation site is a hole that was previously dredged (between 1922-1945) to allow the construction of the Julia Tuttle causeway to Miami Beach.
3. *They exist in areas not subject to chronic storm disruption*. The entire South Florida ecosystem is subject to hurricane events and tropical storms, however, the proposed mitigation site is located in Biscayne Bay, behind the sheltering effects of the Miami Beach barrier island. In addition, it appears that the site does not experience regular wind-driven turbulence or strong tidal currents. Relatively calm conditions prevail.
4. *They are not undergoing rapid and extensive natural colonization by seagrass*. The site is vegetated with primary seagrass colonizers dominated by *Halophila decipiens* but is not on a rapid or extensive track towards achievement of a climax community similar to that of surrounding natural beds. The proposed mitigation will remedy this situation.
5. *Seagrass restoration had been successful at similar sites*. Restoration of a 2.6-acre borrow area in North Biscayne Bay was completed in the late 1990's by Miami-Dade Environmental Resources Management (DERM) and recently inspected by NMFS, FWS, and DERM staff during an agency site visit with the USACE's contractor in March of 2002. Although no monitoring has been done by DERM since planting of the site, a visual inspection by the agency team revealed that seagrass occurs throughout the site and was dominated by *H. wrightii* and *T. testudinum*. Discussions with DERM staff indicate the old borrow area was filled with rubble and planting units of both *H. wrightii* and *T. testudinum* installed, the site was not capped with sand. Based on this evidence of general success, all in attendance agreed that seagrass restoration was a viable option for mitigating seagrass loss.
6. *There is sufficient acreage to conduct the project*. The proposed mitigation site has a footprint in excess of 18 acres.

Similar quality habitat would be restored as was lost. The seagrass beds being impacted by the proposed dredging are characterized by a climax community of patchy dense seagrasses. The community surrounding the mitigation site will serve as the target community for restoration at the site. This community also consists of a climax community of patchy dense seagrass beds. (Please refer to the mitigation site survey conducted in June 2002, Appendix L of the DEIS for a detailed species composition assessment).

Recommendation #3 – The criteria used to trigger contingency seagrass planting shall be provided for resource agency review prior to initiation of dredging.

Response - When a detailed mitigation plan is completed, this will be submitted to the resource agencies, including NOAA Fisheries, for review. The mitigation plan will include criteria to trigger planting of seagrasses.

Recommendation #4 – Successful replacement of seagrasses shall be defined in accordance with Fonseca *et al.* (1998) as the unassisted persistence of the required acreage of seagrass coverage for a prescribed period of time. In connection with this project, a five (5) year minimum seagrass restoration monitoring shall be established.

Response - The Corps agrees to monitor the seagrass mitigation site annually for five years.

Recommendation #5 – The COE shall identify the party responsible for the biological monitoring and long-term management of the seagrass mitigation site.

Response – The local sponsor (Port of Miami) is responsible for the biological monitoring and management of all mitigation associated with the proposed project. The Port may choose to contract to Miami-Dade DERM, or another contractor to perform the actual monitoring activities.

Recommendation #6 - An anchoring and vessel operation plan to effectively minimize anchor and anchor cable damage to hardbottom habitat shall be developed and implemented.

Response – The EIS is being updated to include the use of a cutterhead dredge in the construction operations. Use of this dredge will require anchoring, which has been documented as having the potential to impact. The Corps is working to develop an estimate of potential anchorage needs associated with the project, as well an assessment of potential impacts associated with the use of that technology. The assessment will include an anchoring plan to minimize anchor and cable damage.

Recommendation # 7 – Based on reexamination of the need to expand the entrance channel and evaluation of less damaging alternatives involving reduced channel dimensions, as discussed in the FEIS, the COE shall implement the least damaging alternative with regard to loss of hardbottom and coral habitats.

Response – Vessel safety is the #1 consideration for the entrance channel. The original plan for the Entrance Channel (Component 1C in the GRR) included the flare starting closer to the Port and would have impacted the 2nd and 3rd reefs. After reviewing comments received on the scoping documents and meeting with the Port Pilots, it was determined that the flare could be shortened to remove the impacts to the 2nd reef. A detailed discussion on this process can be found on pages 26 and 27 of the GRR in section 81. As a result of this coordination, the COE has implemented the least damaging alternative for hardbottom and coral habitats within the constraints of vessel safety.

Recommendation #8 – Using experienced personnel and established methods, remove and relocate to suitable nearby hardbottom substrate, all hard coral colonies larger than 12 inches in diameter within the project footprint (including previously dredged areas).

Response – To accept this recommendation, the Corps must conduct a survey and map corals greater than 6 inches throughout more than 49 acres of hardbottom communities throughout the project area. Forty-six acres of this is previously dredged, and will recover, as demonstrated by the recovery of the community since the dredging completed in the early 1990s. Then the Corps must obtain a permit to relocate the corals, or coordinate with Miami- Dade DERM to determine if they have a permit to relocate corals that would cover the project area. This conservation recommendation is not feasible due to the cost of this survey and the relocation activities. The Corps will discuss this recommendation with the non-federal sponsor and will determine if it is feasible to relocate these corals from the 3.1 acres of reef that is not previously dredged.

Recommendation #9 – In coordination with NOAA Fisheries, identify the criteria that will be used for selecting "live rocks" to be transplanted from the Entrance Channel to the artificial reef areas.

Response - The Corps is not planning on relocating "live rock." However, we do plan to use native rock from within the Port to construct the reef mitigation site, which will serve as a good substrate for reef fauna and flora. We expect sponges and other species that cover "live rock" to quickly recruit to the new habitat.

Recommendation #10 – The acreage of the impacted hardbottom/coral sites shall be increased by 20 percent to provide an adequate artificial hardbottom mitigation area that includes 20 percent interstitial spacing.

Response –The combined reef mitigation sites contain more than 130 acres of available space for placement of artificial reef material between them. This will allow for sufficient spacing between reef structures, thus there is no need to increase the amount of proposed hardbottom mitigation. The Corps will provide 6.2-acres of relief spread over an area larger than 3.3 acres in order to include interstitial sand habitat in the design. The Corps notes that this is a conservative approach since the 3.3-acre impact site includes interstitial sand habitat that is being mitigated for as though it were actual relief.

<u>Recommendation #11</u> – A five (5) year (minimum) physical and biological monitoring plan for the artificial reef mitigation areas shall be developed and implemented. The plan shall be developed cooperatively with NOAA Fisheries.

<u>Response</u> – The Corps agrees that five (5) years of physical and biological monitoring will be conducted on the artificial reef mitigation areas.

<u>Recommendation #12</u> – The COE shall identify the party responsible for the physical and biological monitoring and long-term management of the artificial reef sites.

<u>Response</u> - The local sponsor (Port of Miami) is responsible for the biological monitoring and management of all mitigation associated with the proposed project. The Port may choose to contract to Miami-Dade DERM, or another contractor to perform the actual monitoring activities.

<u>Recommendation #13</u> – A total of 19.34 acres of hardbottom compensatory mitigation shall be provided.

<u>Response</u> – The Corps and its non-federal sponsor will provide sufficient mitigation for the impacts associated with the project. Currently a total of 3.3 acres of hardbottom mitigation is planned. The Corps does not accept this recommendation for additional mitigation as requested by NOAA. The area that will be dredged has been previously dredged and has recovered since that dredging event, as noted by both the Corps and NOAA. Additionally, the Port of Miami mitigated for the impacts of the dredging of those hardbottoms during the 1990 dredging event by the placement of 15.91 acres of hardbottom mitigation in 1996. At this time the Corps has no plans to offer mitigation for the previously dredged and mitigated hardbottoms as requested by NOAA.

<u>Recommendation #14</u> – Based on a completed EFH/mitigation table to be provided in the FEIS which includes documentation of the total acres impacted by habitat type (including direct and indirect impacts including side slope equilibration); the associated mitigation performed (location, acreage, and type) and details concerning the state of those mitigation sites (monitoring reports) the COE, in coordination with NOAA Fisheries shall identify and provide for additional mitigation, as needed.

<u>Response</u> – The Corps has reviewed table #20 (page 91 & 92 of the DEIS) and agrees that a column or explanation with regard to the success of the previous mitigation will be included.

<u>Recommendation #15</u> – The COE shall explore alternatives to blasting and further analyses shall be conducted to better evaluate the effect of other dredging methods, such as punch barges and pile drivers, on reef biota.

<u>Response</u> – The Corps has reviewed all of the blasting alternatives, including the use cutterhead dredges, pile drivers and punch barges. A section will be added to the FEIS discussing the alternative construction methods reviewed and the determination made concerning the feasibility of each alternative construction technique. Currently the Corps is investigating the use of a cutterhead dredge in the Entrance Channel in lieu of blasting, however the remaining work, specifically the work in Fisherman's Channel will require blasting due to the hardness of the limestone.

Recommendation #16 – Biological monitoring shall be conducted during a test blast in order to assess damage to populations of managed species, and to assess whether blasting impacts exceeded acceptable levels. If results indicate that blasting has only minimal impacts on populations, and other NOAA Fisheries recommendations are followed, blasting may be implemented in locations where conventional dredging methods are clearly not feasible. The effects of blasting on EFH and managed species shall be evaluated after each blast and use of hydrophones and other technologies to determine likely impacts are encouraged.

Response – Biological monitoring will be conducted during a test blast to be conducted in Miami Harbor in the fall or winter of 2003. This monitoring will be used to prepare a comprehensive monitoring plan for the proposed blasting activities associated with port construction.

Recommendation #17 – A detailed water quality-monitoring program shall be developed in coordination with NOAA Fisheries and implemented at the initiation of any excavation or fill activity.

Response – The Corps will abide by the water quality monitoring requirements of the FLDEP Water Quality Certificate, when issued and accepted.

Recommendation #18 – A sedimentation-monitoring program shall be developed in coordination, which incorporates protocols developed for the Broward County Shoreline Protection Project. If the sedimentation monitoring reveals lethal or sublethal effects to marine resources, additional mitigation shall be determined and promptly implemented.

Response – The Corps will abide by the monitoring requirements of the FLDEP Water Quality Certificate, when issued and accepted.

Recommendation #19 – Due to the level of fine grained material contained in Biscayne Bay sediments, this material shall not be used for beach nourishment, however, it may be used as substrate at the seagrass restoration site.

Response – While the proposed project does not contain a beach placement component, potential future use of the material placed in the upland confined disposal facility at Virginia Key would require further processing to meet beach quality standards. Some of the sand material will be utilized to cap the proposed seagrass mitigation site.

Southeast Regional Office
9721 Executive Center Drive North
St. Petersburg, Florida 33702-2432

February 25, 2004

MEMORANDUM FOR: CS/EC - Ramona Schreiber

FROM: F/SER45 - David Rackley

SUBJECT: Draft Environmental Impact Statement for Miami Harbor Draft Environmental Impact Statement (DEIS) and General Reevaluation Report (GRR), Dade County Florida

The National Marine Fisheries Service (NOAA Fisheries) Southeast Region has reviewed information contained in the subject document provided by the U.S. Army Corps of Engineers (COE), Jacksonville District. The attached comments were provided to the COE and are provided for your information and use.

Attachment

cc:
F/SER4
F/SER45-Karazsia

Southeast Regional Office
9721 Executive Center Drive North
St. Petersburg, Florida 33702

April 28, 2003

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

Dear Mr. Duck:

The National Marine Fisheries Service (NOAA Fisheries) has reviewed the **Miami Harbor Draft Environmental Impact Statement (DEIS) and General Reevaluation Report (GRR)**, dated March 14, 2003. The proposed Federal project is located in the vicinity of Biscayne Bay in Dade County, Florida. The Recommended Plan includes components that would widen and deepen the Entrance Channel, deepen Government Cut, deepen and widen Fisher Island Turning Basin, relocate the west end of the Main Channel (no dredging involved), and deepen and widen Fisherman's Channel and the Lummus Island Turning Basin. A total volume of up to 4.1 million cubic yards of material would be dredged to deepen the Port from the existing depth of -42 feet to a project depth of -50 feet. The Recommended Plan would impact over 415 acres of habitat including 6.1 acres of seagrass habitat, 28.7 acres of low-relief hardbottom/reef habitat, 20.7 acres of high relief hardbottom/reef habitat, 123.5 acres of rock/rubble habitat, and 236.4 acres of unvegetated bottom habitat. Blasting is anticipated in site specific areas to remove substrate that cannot be removed via conventional dredge. The Biscayne Bay area, including the Miami Harbor is located within State of Florida Class III waters, which are designated for recreation, propagation, and maintenance of a healthy, well-balanced population of fish and wildlife.

By letter dated September 6, 2001, NOAA Fisheries provided preliminary comments to the U.S. Army Corps of Engineers (COE) regarding plans to prepare a DEIS for the project. We requested preparation of an Essential Fish Habitat (EFH) Assessment that identifies and describes EFH and other fishery resources in the vicinity of the project, describes the impacts to EFH associated with each action alternative, identifies the COE's views regarding effects on EFH, and identifies mitigation needed to fully offset losses of the functions and values of wetlands, aquatic resources, and EFH. In addition, NOAA Fisheries requested that the mitigation plan include a complete analysis of the proposed locations of wetland and estuarine/marine benthic habitat restoration and/or creation, in-kind mitigation for all habitat types to be impacted, and long-term monitoring to document success of any proposed mitigation. We further recommended that contingency out-ofkind mitigation plans be developed in case planned in-kind is not successful.

According to the DEIS, three alternative project plans for Miami Harbor expansion have been developed by the COE. Each alternative, except for "No Action," consists of widening and/or deepening Miami Harbor navigation channels and turning basins. According to information provided, the primary objective of the project is to provide access for larger vessels such as Post-Panamax cargo and Eagle Class cruise ships and to provide for the future capacity needs of the Port.

The Recommended Plan (Alternative 2) consists of the following five project components: *Component 1C*--widening the Entrance Channel from 500 feet to 800 feet, approximately 150 feet parallel to both sides of the Entrance Channel for approximately 900 feet. In addition, this component involves deepening the Entrance Channel and proposed widener from an existing depth of 44-feet to a depth of 52-feet; *Component 2A*--widen 700-feet of the southern intersection of Government's Cut by approximately 75-feet and deepen the existing project depth of 42-feet to 50-feet; *Component 3B*--widening and deepening the Fisher Island Turning Basin 300-feet to the north to 1,200-feet by 1,500-feet and deepen the existing project depth of 42-feet to 50-feet; *Component 4*--relocating the west end of the Main Channel about 250-feet to the south; *Component 5A*--widening and deepening Fisherman's Channel about 100-feet to the south. This component will reduce the size of the Lummus Island Turning Basin and would deepen the existing 42-foot channel depth to 50-feet.

General comments:

NOAA Fisheries is concerned the proposed work will significantly impact managed species through habitat alteration and loss, and as a result of blasting activities associated with the proposed modifications. The proposed project is located in an area identified as EFH by the South Atlantic Fishery Management Council (SAFMC). Categories of EFH that occur within the project vicinity include the estuarine water column, seagrass, macroalgae, coastal inlets, coral, and hardbottoms. Managed species associated with seagrass habitat include postlarval, juvenile, and adult gray, mutton, lane and schoolmaster snapper and white grunt. Seagrass habitat has been identified as EFH for postlarval/juvenile, subadult, and adult red drum, and brown and pink shrimp. Hardbottom areas are designated as EFH by the SAFMC for juvenile and adult red and gag grouper, gray and mutton snapper, white grunt, penaeid shrimp, and spiny lobster. Coral reef habitat has been designated as EFH for juvenile and adult red and gag grouper, gray and mutton snapper, white grunt, and spiny lobster. Marcoalgae has been designated as EFH for juvenile and adult spiny lobster and the marine water column has been designated as EFH due to its importance as the medium of transport for nutrients and migrating organisms between estuarine systems and the open ocean. In addition, coastal inlets are designated as EFH for penaeid shrimp. NOAA Fisheries has also identified EFH for highly migratory species that utilize the estuarine water column and seagrass beds in this area including nurse, bonnethead, lemon, black tip, and bull sharks. Detailed information on shrimp, red drum, snapper/grouper complex (containing ten families and 73 species), and other Federally managed fisheries and their EFH is provided in the 1998 generic amendment of the Fishery

Management Plans for the South Atlantic region prepared by the SAFMC. The generic amendment was prepared as required by the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA).

In addition, seagrass, coral, hardbottoms, coastal inlets, and Biscayne Bay have been designated as Habitat Areas of Particular Concern (HAPC) by the SAFMC. HAPCs are subsets of EFH that are rare, particularly susceptible to human-induced degradation, especially ecologically important, or located in an environmentally stressed area.

According to the DEIS, the Recommended Plan would directly impact over 415 acres of aquatic resources, including seagrass beds, soft bottom habitat (silt/sand/rubble and sand bottom), hardbottom, and coral habitat. Impacts to seagrasses would include 6.3 acres (0.2 acres of direct impacts and 6.1 acres of indirect impacts through side slope equilibration); 123.5 acres of rock/rubble bottom (51.7 acres of previously dredged rock/rubble with live bottom including coral; 3.0 acres of new impacts to rock rubble with algae/sponges; and 68.8 acres of previously dredged rock/rubble with algae/sponges); 28.7 acres of low relief hardbottom (0.6 acre of low relief hardbottom; 28.1 acres of previously impacted low relief hardbottom); 20.7 acres of high relief hardbottom (2.7 acres of high relief hardbottom; and 18.0 acres of high relief hardbottom); and 236.4 acres of soft bottom habitat (213.1 acres have been previously dredged). As noted, some of the habitats impacted by the Recommended Plan have been impacted by previous Miami Harbor expansion projects. According to the DEIS, the anticipated direct impacts associated with new dredging at the Miami Harbor are: 6.3 acres of seagrasses; 3.0 acres of rock/rubble bottom; 0.6 acre of low-relief hardbottom; 2.7 acres if high-relief hardbottom; and 23.3 acres of soft bottom habitat (DEIS Tables 12-18).

NOAA Fisheries biologists participated in site inspections of the proposed project with U.S. Fish and Wildlife Service (FWS) biologists in December 2001, and March 2002. The following comments provided are primarily based on our review of the DEIS, but consider information obtained as a result of field observations and participation in interagency meetings as well.

<u>Specific comments</u>:

NOAA Fisheries has a variety of specific comments resulting from our review of the DEIS. Those comments are stratified into the following primary sections:

- *Seagrasses;*
- *Hardbottom and coral reefs;*
- *Mitigation, previously dredged channel impacts involving shallow water soft bottom, high- and low-relief hardbottom/coral reef, rock/rubble habitats, and indirect impacts;*
- *Blasting;*
- *Water Quality;*
- *EFH Assessment; and*

- *Beneficial Use of Dredged Material.*

Seagrasses

NOAA Fisheries concurs with the COE's determination that compensatory mitigation is needed for direct and indirect impacts to seagrass habitat. To compensate for impacts to previously non-dredged habitats, the COE proposes to mitigate for the removal of 6.3 acres of seagrass at a ratio of 1:1 through the restoration of an 18.6 acre historic dredged borrow site in northern Biscayne Bay (GRR p 56). Any excess restoration resulting from filling of dredge holes would be retained by the Port for future use (DEIS p 103). The COE considers a compensation ratio of one acre seagrass compensation for one acre of seagrass impact to be conceptually valid based on a high probability of success and high likelihood that the restored seagrass beds would be of much higher quality than those impacted (GRR p 59; DEIS Mitigation Plan p ii).

NOAA Fisheries does not concur with the COE in regard to the aforementioned seagrass compensatory mitigation ratio or the expectation that excess mitigation credits would be available. Instead, we concur with the FWS recommendation, as provided in the draft Coordination Act Report (CAR) that 18.9 acres of compensatory mitigation [a 3:1 (mitigation:impact) ratio] for impacts to 6.3 acres of seagrasses is needed (see EFH Conservation Recommendation #1). NOAA Fisheries considers 18.9 acres of compensatory mitigation appropriate for 6.3 acres of seagrass impacts since (1) natural colonization, while effective in properly prepared seagrass restoration sites, will not provide immediate replacement habitat and three years or more may be required to establish a viable "pioneer" seagrass community with shoal grass (*Halodule wrightii*) and paddle grass (*Halophila decipiens*). In addition, a large portion of the anticipated impacts to seagrasses would involve turtle grass (*Thalassia testudinum*), which is considered a climax seagrass community. Because this community often requires ten years to recover and replanting turtle grass has not been effective in seagrass restoration efforts (Fonseca *et al*. 1998), a higher mitigation ratio is needed to compensate for temporal losses. We further note that the risks associated with seagrass restoration projects can be large. Even "successful" seagrass restoration rarely achieves 100 percent recovery and a number of factors may limit the restoration success (e.g., interim seagrass losses, bioturbation, storm and other natural effects, and inadequate site preparation).

The mitigation plan proposed by the COE involves filling previous dredge holes in Biscayne Bay to match adjacent seagrass habitat elevations and monitoring of natural recruitment for at least three years. If success criteria are not met by natural recruitment of seagrasses, the COE would replant seagrasses. NOAA Fisheries can support the use of mitigation sites that support or appropriately exceed the following (minimum) criteria (from Fonseca *et al.*, 1998):

1. They are at similar depths as nearby natural seagrass beds;
2. They were anthropogenically disturbed;
3. They exist in areas that were not subject to chronic storm disruption;
4. They are not undergoing rapid and extensive natural colonization by seagrasses;
5. Seagrass restoration had been successful at similar sites;
6. There is sufficient acreage to conduct the project; and

7. Similar quality habitat would be restored as was lost.

According to the information provided, the site selection criteria, as outlined in the DEIS, are consistent with several components outlined in Fonseca *et al.*, (1998). Therefore, based on the limited information provided, NOAA Fisheries preliminarily concurs that natural seagrass recruitment at this site will likely occur. Specifically, seagrass restoration would be performed in an area where seagrass once occurred and is now absent due to anthropogenic activities and the proposed site is bordered by dense seagrass beds (DEIS Marine Survey and Assessment for the Potential Mitigation Sites p 20). In addition, according to the information provided the fill material from the Port would be utilized to fill portions of this previous borrow area to ambient depths. It is anticipated that depths will range from -2 feet to -6 feet MSL in the restored areas following restoration (DEIS Mitigation Plan p 13). However, some discrepancies exist in the information provided which warrant further clarification. According to the information provided, recruitment by *H. wrightii* and *H. decipiens*, is expected to occur rapidly since both species *likely* occur within the shallow flats adjacent to these sites (DEIS Mitigation Plan p 13). The Final EIS (FEIS) should definitively state that: (1) the seagrass restoration site will be filled to the same depths as nearby natural seagrass beds and (2) that the presence and relative abundance of *H. wrightii* and *H. decipiens* or other seagrasses has been verified in the shallow flats located adjacent to these sites (see EFH Conservation Recommendation #2).

NOAA Fisheries concurs that the seagrass planting methods should follow guidance developed by Fonseca *et al.*, (1998) and peer reviewed by NOAA Fisheries prior to construction. However, we have concerns regarding the criteria that will trigger contingency seagrass planting. The DEIS (p 104) states that in the event that natural recruitment has not started within three years following excavation, then methods to plant seagrass donor material *would be* initiated; however, other sections of the DEIS are less direct in this regard. For example, the DEIS Marine Survey and Assessment for the Potential Mitigation Sites (p iii), states that if established success criteria are not met within three years, supplemental planting *may* be performed to speed recovery. NOAA Fisheries requests that the FEIS provide specific criteria that would trigger contingency seagrass planting and that such criteria be in concert with EFH Conservation Recommendation #3.

In our previous comments we also recommend that the criteria to be used to determine when adequate and successful seagrass restoration had been attained should be implemented into the Seagrass Monitoring Plan. Specifically, we recommend that "successful replacement" should be defined in accordance with Fonseca *et al.*, (1998) as the *unassisted persistence of the required acreage of seagrass coverage for a prescribed period of time* (suggested minimum of five years). We note that in an area having physical conditions capable of supporting *H. decipiens* restoration, this species of seagrass is likely to colonize rapidly within the first year of restoration, and to be followed by a marked decline in the percent spacial coverage if an adequate seed bank is not developed early-on. Therefore, it is necessary to evaluate the persistence of restored seagrass coverage over a fixed (absolute minimum of three years) period of time (Fonseca, M. pers. comm., 2003). Therefore, the FEIS should contain a detailed seagrass biological monitoring plan which calls for a minimum of five years of monitoring and integrates the Fonseca *et al.,* (1998) definition of success criteria (see EFH Conservation Recommendation #4).

In addition, it is not clear who would be responsible for long-term management of the mitigation area. According to the GRR page 59, item 165, the Miami-Dade Seaport is responsible for the operation, maintenance, repair, and replacement, and rehabilitation of all mitigation areas for the life of the authorized project. Please identify the party responsible for the biological monitoring and long-term management of the seagrass mitigation area (see EFH Conservation Recommendation #5).

NOAA Fisheries is concerned that Johnson's seagrass (*Halophila johnsonii*) may be present in the area of the proposed work. This species is rare, has a limited reproductive capacity, and is vulnerable to a number of anthropogenic and natural disturbances. Johnson's seagrass exhibits the most limited geographic distribution of any seagrasses. Due to its limited reproductive capacity and energy storage capacity, it is less likely to survive environmental perturbations and to be able to repopulate an area when lost (NOAA Fisheries 2001). Despite its diminutive size, studies indicate that Johnson's seagrass provides similar ecological and economic benefits (i.e., food source, refuge, nursery for numerous wildlife species, sediment stabilization, and deceleration of water currents and waves reducing turbidity and erosion) to the larger seagrasses (Zieman 1982; Virnstein et al. 1983; Phillips and Menez 1988; Fonseca 1994). Similar to other *Halophila* species, because of its small size and rapid turnover rate, this seagrass is especially important in detritus and nutrient cycling (Kenworthy 1993; Bolen 1997). If extirpated from an area, *H. johnsonii* will be at a disadvantage compared to either highly fecund or larger species in re-establishing itself due to its known lack of seed banks and limited energy storage capabilities. Importantly, *H. johnsonii* has the ability to stabilize sediments of disturbed sites before the larger seagrasses can establish themselves (Packard n1981; Fonseca 1989; Kenworthy 2000). The above mentioned knowledge of the species coupled with NOAA Fisheries biologists observations regarding the biology of the species, NOAA Fisheries recognizes *H. johnsonii* as an important pioneer species that stabilizes sediments and may ultimately facilitate colonization of more climatic species. *H. johnsonii* has been positively identified and documented in areas around Biscayne Bay and in areas adjacent to the Harbor and no justification exists that the species would not occur within the Miami Harbor, since the conditions are similar to the areas in Biscayne Bay where it has been found.

As previously mentioned, NOAA Fisheries was involved with the resource surveys conducted in the Miami Harbor. During the March 20, 2002, site visit, a NOAA Fisheries biologist observed *H. johnsonii* in the vicinity of the proposed work. While NOAA Fisheries recognizes that Miami-Dade Department of Environmental Resources Management (DERM) has not observed *H. johnsonii* in any of their resource surveys in the Harbor, we note that DERM has not conducted a focused survey for the species specifically using standard survey methods recommended by the Johnson Seagrass Recovery Team (Craig Grossenbacher, pers. comm., 2003). The diminutive nature of this species and the low visibility in areas where it is normally located, make it difficult to accurately identify and characterize during typical resource surveys. Representatives from Dial Cordy, an agent for the

COE, recorded the Latitude/Longitude on a map where the specimen was located. NOAA Fisheries is concerned that this information has been omitted in the DEIS.

Given that there is no apparent physiological or ecological limitation for *H. johnsonii* to exist in Miami Harbor, that at least one unconfirmed identification of the species in Miami Harbor vicinity exists, and the diminutive nature of the species, NOAA Fisheries believes some level of further investigation is prudent. Therefore we recommend that a survey is conducted of the Harbor using survey methodologies (see NOAA Fisheries 2000) developed for *H. johnsonii*. NOAA Fisheries believes that conducting a survey specific for *H. johnsonii* would provide more credible and reliable evidence that impacts to this federally-protected plan will be avoided. The results of this survey in addition to the map where the specimen was located in 2002, should be included in the FEIS.

Additional issues pertaining to seagrass impacts are addressed in the *Water Quality* section (below).

Hardbottom and Coral Reefs

NOAA Fisheries considers the anticipated impacts to corals and hardbottoms as being highly significant and we find that avoidance and minimization of impacts to these resources is not been sufficiently addressed in the DEIS. As presently written, this component of the DEIS, does not comply with sequential mitigation requirement which is defined in Section 1508.20 of the Regulations for Implementing the Procedural Provisions of the NEPA (40 CFR Parts 1500-1508). Therefore, we again request that the COE consider reducing channel expansion in hardbottom habitats prior to the consideration of mitigation. In addition, NOAA Fisheries also recommends that an anchoring and vessel operation plan be developed to assist in reducing anchor and anchor cable damage to hardbottom habitat (see EFH Conservation Recommendation #6). Once developed, these plans should be forwarded to FWS and NOAA Fisheries for review prior to project implementation. These matters and any planned action should be fully addressed and appropriately described in the FEIS.

NOAA Fisheries concurs with the FWS recommendation (number 7, page 36 of the CAR) that proposed widening and deepening of the Entrance Channel should be reduced. Increasing the channel width from 500 feet to 800 feet would result in elimination of over 20 acres of high relief hardbottom and coral reef habitat. A joint FWS-NOAA Fisheries site inspection of the Entrance Channel on March 20, 2002, revealed that some of these areas, particularly the existing channel edges, contain hard and soft coral colonies. These habitats provide important ecological functions for numerous marine species. Some of the hard coral colonies (e.g., *Montastrea* sp. and *Diploria* sp.) observed were in excess of 36 inches in diameter and the vertical relief of the habitat was two to three feet in elevation. Using an average hard coral growth rate of 0.5 centimeter per year for this area, these coral colonies may be greater than 100 years old (Dodge 1987). In addition to designation as Resource Category 1 by the FWS, they are identified as EFH-Habitat Areas of Particular Concern by the South Atlantic Fishery Management Council (SAFMC) and NOAA Fisheries. Rather than attempting to compensate for their loss by constructing artificial habitats, we believe the COE should make further effort to avoid hardbottom and coral reef habitats in the area of the Entrance Channel (see EFH Conservation Recommendation #7). With regard to the FEIS, we recommend that the

COE reexamine the need to widen the Entrance Channel and describe possible alternatives and, if possible, a less damaging alternative.

If dredging in these areas cannot be avoided then NOAA Fisheries maintains that the COE should develop a plan to relocate hard corals that comprise the high-relief hardbottom/coral reef. NOAA Fisheries recommends that, at a minimum, all hard coral colonies larger than 12 inches in diameter be relocated by experienced personnel and using established methods, to suitable nearby hardbottom substrate (see EFH Conservation Recommendation #8). In this regard, we recommend all hard coral colonies in all areas be relocated when larger than 12 inches in diameter and are located in proposed dredging sites, including previously dredged areas within Cut 2 and Cut 3 (e.g., a NOAA Fisheries biologist identified a 2-foot diameter brain coral within the littoral zone of Cut 3, to the north of Fisher Island).

NOAA Fisheries agrees with the COE in that mitigation for reef and hardbottom impacts should be type-for-type, to reflect the ecological differences between the different reef types impacted (DEIS Mitigation Plan p 17). To compensate for the effects of the action on previously non-dredged habitats, the COE has proposed to mitigate for the removal of 2.7 acres of high-relief coral habitat at a ratio of 2:1 through the creation of 5.3 acres of high complexity, high relief artificial reef habitat; and to mitigate for the 0.8 acre of impact to low-relief hardbottom at a ratio of 1.3:1 (GRR p 56). NOAA Fisheries supports the use of endemic rock for the mitigation sites as opposed to other non-native materials and, therefore, we concur that the limestone rock excavated from the Entrance Channel should be used in reef construction and that construction should take place concurrent with the dredging of the Entrance Channel (DEIS p 104-107; DEIS Mitigation Plan p 20-21). Further, we support relocating rocks that have been colonized by coral and other epifauna. However, the criteria that will be used for selecting the rocks for transplantation to the artificial reef areas is not provided in the DEIS. The criteria that will be used for selecting the live rocks from the Entrance Channel to be transplanted to the artificial reef areas should be provided in the FEIS (see EFH Conservation Recommendation #9).

NOAA Fisheries also concurs that interstitial sand patches associated with reef habitat are important in the ecological functioning of the reef habitat (DEIS p 104-5; Mitigation Plan p 21) and, therefore, the proposed artificial reef footprint should contain approximately 20 percent open sand surface. However, we are concerned that through integrating a 20 percent open sand surface within the artificial reef design, a 20 percent decrease in the footprint of hardbottom mitigation area would result. Therefore, NOAA Fisheries recommends that the acreage of the impact hardbottom/coral sites should be increased by 20 percent to ensure provision of adequate artificial hardbottom mitigation as well as 20 percent interstitial spacing (see EFH Conservation Recommendation #10).

Furthermore, an artificial reef biological and physical monitoring plan should be developed and submitted to NOAA Fisheries and FWS for review. Although the DEIS Marine Survey and Assessment for the Potential Mitigation Sites (p iii) states that biological monitoring will be conducted annually in the summer months for three years, we believe that bi-annual physical and biological monitoring of mitigation areas for a minimum of five years is warranted in order to ensure acreage is maintained and remediation occurs, if necessary (see EFH Conservation Recommendation #11).

According to the GRR page 59, item 165, the Miami-Dade Seaport is responsible for the operation, maintenance, repair, and replacement, and rehabilitation of all mitigation areas for the life of the authorized project. However, page 104 of the DEIS states that reefs would be constructed at approved sites managed by Dade Environmental Resources Management. Please clarify the responsible party for the long-term maintenance and biological and physical monitoring of the artificial reef mitigation areas (see EFH Conservation Recommendation #12).

Mitigation, previously dredged channel impacts involving high- and low-relief hardbottom/coral reef, rock/rubble habitats, and indirect impacts to hardbottoms:

NOAA Fisheries is concerned that development of a compensatory mitigation site was premature in connection with the Miami Harbor Expansion Project since it has not been demonstrated that requisite impact avoidance and minimization efforts have been fully implemented. In the absence of clear application of sequential mitigation involving impact avoidance, minimization, and offset (compensation) the NEPA requirements are unmet. We further note that the CWA §404(b)(1) Guidelines state that no discharge of dredged or fill material shall be permitted unless appropriate and practicable steps have been taken which will minimize potential adverse impacts of the discharge on the aquatic environment. In addition, the U.S. Army Corps of Engineer's Regulatory Guidance Letter 02-2 reinforces that compensatory mitigation is the last step in the sequencing requirements of the CWA §404(b)(1) Guidelines.

To compensate for the effects of the action on habitats that have not been previously dredged, the COE has proposed: (1) to mitigate for the removal of 6.3 acres of seagrass at a ratio of 1:1 through the restoration of an 18.6 acre historic dredged borrow site in northern Biscayne Bay; (2) mitigate for the removal of 2.7 acres of high-relief coral habitat at a ratio of 2:1 through the creation of 5.3 acres of high complexity, high relief artificial reef habitat; and (3): mitigate for the 0.8 acre of impact to low-relief hardbottom at a ratio of 1.3:1 (GRR p 56).

According to the COE, mitigation for previously impacted areas was provided by the Port of Miami during their last dredging event and neither the COE nor the Port propose to mitigate for additional work in these areas (Terri Jordon, pers. comm.). NOAA Fisheries believes that this perspective does not consider the value of the resources being impacted. During site inspections of the areas proposed for dredging within the existing Entrance Channel, we found that previously dredged bottoms contain sponges, soft corals, and small hard coral colonies with average diameters of two inches. These benthic habitats support a large number Federally-managed species such as snappers, grunts, hogfish, and spiny lobster. Proposed impacts to previously dredged areas within Miami Harbor include approximately 28.1 acres of low-relief hard bottom habitat, 18 acres of high-relief hard bottom habitat, 52 acres of rock/rubble (with live bottom), 68.8 acres of rock/rubble (with algae and sponges), and 213 acres of soft bottom habitat. Although these areas have been affected by previous dredging projects, they are productive fishery habitats. The functional loss of these habitats will diminish fishery resource production and the replacement time for related ecological functions and values could exceed ten years. Therefore, we do not support the COE's determination that "all previously dredged areas including hardgrounds on channel walls are expected to colonize rapidly with similar species assemblages after dredging (DEIS p 63)." No scientific data or monitoring reports were provided to support this assertion. Therefore, the FEIS should include documentation supporting the determination that all previously dredged areas including hardgrounds on channel walls are expected to colonize rapidly with similar species assemblages after dredging and the need for mitigation for impacts to previously dredged and colonized bottoms should be reconsidered.

Although the COE quantified indirect impacts to seagrass habitat, indirect impacts to hardbottom areas that would occur through side slope equilibration (i.e., the hardbottom habitat located on the edge of existing channels) have not been quantified (DEIS Table 2, p 13; DEIS EFH Assessment Table 2, p 7). A NOAA Fisheries biologist participated in two site inspection at the Port of Miami which revealed the presence of well developed hardbottom/coral reef areas along the side slopes of the channels. Significant levels of fish biomass of managed species (i.e., grunts and spiny lobsters) were observed along these habitat corridors. Our observations support the determination that this edge habitat provides refuge and requisite needs for managed species. The FEIS should provide an assessment of direct and indirect impacts to these areas (i.e., the channel walls). NOAA Fisheries believes that, at a minimum, additional hardbottom mitigation should be provided for impacts to the channel walls. We concur with the FWS recommendation, as provided in the revised draft CAR, that 19.34 acres of hardbottom compensatory mitigation is needed (see EFH Conservation Recommendation #13).

Although a subset of the historical impacts to EFH and the associated mitigation required is provided in the DEIS (Table 20, p 91), NOAA Fisheries considers the Natural Resource Impact and Mitigation Table (DEIS Table 20, p 91-92) as incomplete. More specifically, the table does not identify all mitigation required in connection with the issued COE permit nor does not include information regarding the success of the mitigation provided (e.g., the 140 acres mitigation for seagrass impacts resulting from the 1980 Expansion Project was largely unsuccessful). To address this the FEIS should include a complete table that includes: (1) documentation of the total acres impacted per habitat type (including direct and indirect impacts, e.g., side slope equilibration); (2) the associated mitigation performed (location, acreage, and type); and (3) details concerning the status of those mitigation sites (monitoring reports). This information is needed to determine whether a net loss of EFH will result if previously impacted sites are not mitigated through compensatory mitigation. In order for NOAA Fisheries to concur that adequate mitigation for previous impacts has been provided and additional mitigation is not warranted, documentation is needed of the acres of each respective habitat impacted, the associated mitigation performed, and the status of those mitigation projects (see EFH Conservation Recommendation #14).

Blasting

The COE also proposes to use explosives to fracture solid rock bottom and hardbottom habitat in areas where large cutterhead or other dredges cannot be used. According to the COE, blasting is preferred over other methods such as punch barge or pile driver since blasting would require less time and is less expensive. The COE also believes that, compared to dredging, blasting would be less damaging to bottom and other communities and it may be used in all areas where needed. To minimize impacts, the COE intends to use best management practices, such as conducting test blasts and employing turtle/manatee observers. NOAA Fisheries is concerned regarding direct and indirect adverse effects of blasting on marine mammals, sea turtles, and fishes. Previous studies on blasting effects have revealed that organisms having air bladders are more susceptible than those without air bladders (e.g. shrimp and crabs) (Keevin and Hempen 1997); and juvenile and larval fish are more susceptible than adult fish (Settle *et al*., 2002). Although best management practices have been utilized to reduce adverse effects of blasting in other dredging projects, such as in the Cape Fear River in North Carolina, we believe the use of explosives in Miami Harbor may pose risks and impacts that are significantly greater than those at other COE dredging projects. The most important distinction between the proposed project and other port dredging projects is that fish and invertebrates feed, aggregate around, and live within the three-dimensional spaces of hardbottom and coral reef habitats while organisms such as sea turtles are attracted to hardbottom and coral reefs for protection and resting. Consequently, the use of explosives in the vicinity of reefs poses greater risk of significant harm to marine organisms since resident fish and invertebrates are more likely to be present when blasting occurs. NOAA Fisheries does not concur with the COE's determination in the DEIS EFH Assessment (p 14) that impacts associated with the recommended Plan have been minimized and remaining habitats under that alternative are unavoidable. Therefore, NOAA Fisheries recommends that alternatives to blasting be explored and further analysis be conducted to better evaluate the effect of other dredging methods, such as punch barges and pile drivers, on reef biota (see EFH Conservation Recommendation #15). The results of this additional analysis should be provided in the FEIS.

Biological monitoring should be conducted during a test blast in order to assess damage to populations of managed species and other resources, and to determine whether blasting impacts exceed acceptable levels. If results indicate that blasting has only minimal impacts on populations, and other NOAA Fisheries recommendations are followed, blasting should be used only when absolutely necessary and alternative conventional dredging methods have been proven to be ineffective. Also, after each blasting event during project implementation, it is recommended the effects of blating on EFH and managed species is determined (use of hydrophones and other technologies to determine likely impacts is encouraged and information regarding the extent of the blasting safety radius should be determined and addressed in the FEIS (see EFH Conservation Recommendation #16).

Water Quality

NOAA Fisheries believes that water quality monitoring should be implemented for the Miami Harbor project (see EFH Conservation Recommendation #17). The COE has determined, based on sediment analyses, that substrates along the southern margin of Fisherman's Channel and the Dodge Island Cut are comprised of considerable amounts of fine materials (USACE 2001). Therefore, dredging is likely to suspend these sediments into the water column. The strong tidal currents may redistribute suspended sediments in other areas both inside and outside the study area that support submerged vegetation. Potentially affected areas include seagrass habitats immediately adjacent to Fisherman's Channel, as well as habitats inside the Bill Sadowski Critical Wildlife Area, and possibly other areas of the Biscayne Bay Aquatic Preserve. Resuspended particulate matter may temporarily decrease water clarity in the above areas. Deposition of sediments on grass beds and coral reefs may have adverse effects including, but are not limited to, temporary displacement of, and alteration of, fish, invertebrate, or epiphyte communities (DEIS p 59). The presence of highly important living marine resources both inside and beyond the limits of the Miami Harbor (i.e., corals sensitive to sedimentation and turbidity; seagrasses located south of the Port in the Virginia Key Basin) warrant water quality standards that exceed the State of Florida's general water quality certificate for dredging. In addition, we recommend that a sedimentation monitoring program be developed for the Miami Harbor project, incorporating the protocols developed for the Broward County Shoreline Protection Project (see EFH Conservation Recommendation #18). If the sedimentation monitoring reveals lethal or sublethal effects to marine resources, additional mitigation may be warranted. These matters and recommendations should be fully addressed in the FEIS.

According to the DEIS, because the sediment plumes are transient and temporary, and the area to be impacted is relatively small when examined on a spatial scale and the overall impact to the larval fish population and, consequently, the adult population should be minimal (Sale 1991). The chapters Dr. Sale contributed to the referenced book did not address this issue. Therefore, if the COE intended to cite one of the other chapters, the specific author should be mentioned. Furthermore, according to Dr. Sale (Sale pers. comm. 2003), he would be "hard pressed to find any of these chapters as a useful citation supporting the idea that dredging does not impact fishes." Based on this. the FEIS should be modified to ensure proper citation concerning the above mentioned statement to which we take exception.

Essential Fish Habitat Assessment

The EFH Assessment provides a reasonably complete description of EFH and other fishery resources in the vicinity of the project, quantifies the direct impacts to EFH associated with Recommended Plan, identifies the COE's views regarding the effects of the action on EFH, and discusses the proposed mitigation to fully offset any losses of the functions and values of wetlands, aquatic resources, and EFH. The majority of our EFH comments are stated in the preceding; however a few outstanding items are discussed below.

The EFH Assessment recognizes that where silt and/or silty sand are to be dredged, water quality impacts are expected due to temporarily increased levels of turbidity. Resuspended materials may interfere with the diversity and concentration of phytoplankton and zooplankton and could, consequently, affect foraging success patterns of schooling fishes and other grazers that serve as prey for managed species (DEIS EFH Assessment p 13). However, the information provided does not take into account sublethal effects to managed species. The information provided states that juvenile and adult species have the ability to migrate away from the dredging activities (DEIS EFH Assessment p 34), managed species can forage in adjacent areas (DEIS EFH Assessment p 17), will only be temporarily displaced (DEIS EFH Assessment p 19), should quickly return to the project area (DEIS EFH Assessment p 33), and mortality should be minimal (DEIS EFH Assessment p 35). The FEIS should include proper scientific citations with the above referenced statements. In addition, we do not concur with the determination that past impacts within the region do not appear to have had any adverse or significant cumulative impact on hardbottom and coral resources (DEIS EFH Assessment p 21), especially when considering that the DEIS cumulative impact analysis was limited to Port activities and did not include other significant projects beyond the geographic scope of the Port (e.g., beach renourishment of Miami beaches, destructive fishing activities, other large-scale dredging projects). Given the lack of research and long-term monitoring in the region, NOAA Fisheries believes these statements lack meaning without supporting data and should be substantiated in, or deleted from, the FEIS.

Beneficial Use of the Dredged Material

According to GRR, item 167 (p 60), the COE proposes to place beach quality material on the north side of Virginia Key where it can be offloaded in the future to provide hurricane and storm damage protection for the easterly shoreline of Virginia Key. NOAA Fisheries concurs with the FWS recommendation, as provided in the draft CAR, that due to the level of fine grained material present in the benthic sediments of Biscayne Bay, this material should not be used for beach renourishment activities; however it may be used as substrate at the seagrass restoration site. Although the COE, in responding to the FWS, advised that none of the material dredged from Miami Harbor would be placed on Miami beaches and the DEIS does not specifically identify the Virginia Key as an approved upland disposal site (DEIS page 18), this mater warrants clarification (see EFH Conservation Recommendation #19).

EFH Conservation Recommendations:

1. As mitigation for elimination of 6.3 acres of seagrass habitat, 18.9 acres of compensatory replacement habitat (a 3:1 ratio) shall be provided;

2. The seagrass restoration site shall meet the seven criteria outlined by Fonseca *et al.* (1998). Additionally, it shall be demonstrated that the seagrass restoration site will be filled to the same elevation as nearby natural sea grass beds and it shall be determined whether *H. wrightii* and *H. decipiens* are present in locations adjacent to these sites;

3. The criteria to be used to trigger contingency seagrass planting shall be provided for resource agency review prior to initiation of dredging;

4. Successful replacement of seagrass shall be defined in accordance with Fonseca *et al.*, (1998) as the *unassisted persistence of the required acreage of seagrass coverage for a prescribed*

period of time. In connection with this project, a five (5) year minimum seagrass restoration monitoring period shall be established;

5. The COE shall identify the party responsible for biological monitoring and long-term management of the seagrass mitigation site;

6. An anchoring and vessel operation plan to effectively minimize anchor and anchor cable damage to hardbottom habitat shall be developed and implemented;

7. Based on reexamination of the need to expand the Entrance Channel and evaluation of less damaging alternatives involving reduced channel dimensions, as discussed in the FEIS, the COE shall implement the least damaging alternative with regard to loss of hardbottom and coral habitats;

8. Using experienced personnel and established methods, remove and relocate to suitable nearby hardbottom substrate, all hard coral colonies larger than 12 inches in diameter within the project footprint (including previously dredged areas);

9. In coordination with NOAA Fisheries, identify the criteria that will be used for selecting "live rocks" to be transplanted from the Entrance Channel to the artificial reef areas;

10. The acreage of the impact hardbottom/coral sites shall be increased by 20 percent to provide an adequate artificial hardbottom mitigation area that includes 20 percent interstitial spacing;

11. A five (5) year (minimum) physical and biological monitoring plan for the artificial reef mitigation areas shall be developed and implemented. The plan shall be developed cooperatively with NOAA Fisheries;

12. The COE shall identify the party responsible for the physical and biological monitoring and long-term management of the artificial reef mitigation sites;

13. A total of 19.34 acres of hardbottom compensatory mitigation shall be provided;

14. Based on a complete EFH impact/mitigation table to be provided in the FEIS which includes documentation of the total acres impacted per habitat type (including direct and indirect impacts including side slope equilibration); the associated mitigation performed (location, acreage, and type); and details concerning the status of those mitigation sites (monitoring reports) the COE, in coordination with NOAA Fisheries shall identify and provide for additional mitigation, as needed;

15. The COE shall explore alternatives to blasting and further analyses shall be conducted to better evaluate the effect of other dredging methods, such as punch barges and pile drivers, on reef

biota;

16. Biological monitoring shall be conducted during a test blast in order to assess damage to populations of managed species, and to assess whether blasting impacts exceed acceptable levels. If results indicate that blasting has only minimal impacts on populations, and other NOAA Fisheries recommendations are followed, blasting may be implemented in locations where conventional dredging methods are clearly not feasible. The effects of blasting on EFH and managed species shall be evaluated immediately after each blast and use of hydrophones and other technologies to determine likely impacts is encouraged;

17. A detailed water quality monitoring program shall be developed in coordination with NOAA Fisheries and implemented at the initiation of any excavation or fill activity;
18. A sedimentation monitoring program shall be developed which incorporates protocols developed for the Broward County Shoreline Protection Project. If the sedimentation monitoring reveals lethal or sublethal effects to marine resources, additional mitigation needs shall be determined and promptly implemented;

19. Due to the level of fine grained material contained in Biscayne Bay sediments, this material shall not be used for beach nourishment; however, it may be used as substrate at the seagrass restoration site.

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 the 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.

These comments do not satisfy your consultation responsibilities under Section 7 of the Endangered Species Act of 1973, as amended. If any activity(ies) "may effect" listed species and habitats under the purview of NOAA Fisheries, consultation should be initiated with our Protected Resources Division at the letterhead address.

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

Sincerely,

Rickey N. Ruebsamen
Acting Assistant Regional Administrator
Habitat Conservation Division

cc:
EPA, WPB
DEP, WPB
FFWCC, Tallahassee
FWS, Vero Beach
DERM
CS/EC
F/SER3
F/SER4
F/SER45-Karazsia

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ESSENTIAL FISH HABITAT ASSESSMENT

FOR THE
MIAMI HARBOR
GENERAL REEVALUATION REPORT STUDY
DRAFT ENVIRONMENTAL IMPACT STATEMENT

July 2002

Prepared for:
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1.0 INTRODUCTION

The Port of Miami (Port) requested that the U.S. Army Corps of Engineers (USACE) study the feasibility of widening and deepening most of the major channels and basins within the Port. Two major improvement goals were identified to accommodate larger vessels: 1) widen the Entrance Channel, Fisher Island Turning Basin and Fisherman's Channel; and 2) deepen the Entrance Channel, Government Cut and Fisher Island Turning Basin. A number of alternatives were originally considered, but during in an effort to reduce impacts to the natural environment, many were eliminated from further analysis. Three alternatives are being analyzed (two action alternatives and the No-Action alternative) in the Draft Environmental Impact Statement. The Recommended Plan (Alternative 2) includes components that would widen and deepen the Entrance Channel, deepen Government Cut, deepen and widen Fisher Island Turning Basin, relocate the west end of the Main Channel (no dredging involved), and deepen and widen Fisherman's Channel and the Lummus Island Turning Basin. Disposal of dredged materials would occur at up to four disposal sites [seagrass mitigation area, offshore permitted artificial reef areas, approved upland disposal site or the Miami Offshore Dredged Material Disposal Site (ODMDS)]. The Recommended Plan would impact 0.2 acre of seagrass habitat within the existing channel, 6.1 acres of seagrass habitat outside of the existing channel, 28.7 acres of low relief hardbottom/reef habitat, 20.7 acres of high relief hard/bottom/reef habitat, 123.5 acres of rock/rubble habitat, and 236.4 acres of unvegetated bottom habitat. Impacts to fish species may occur due to loss of habitat and blasting activities associated with project construction activities. The Recommended Plan would cause temporary increases in turbidity; however, these levels would not exceed permitted variance levels outside the mixing zone. Mitigation proposed for seagrass impacts would include restoration of previously dredged borrow areas within northern Biscayne Bay while mitigation proposed to offset impacts to high and low relief reef habitat would include creation of artificial reefs within permitted offshore artificial reef sites.

2.0 PROJECT DESCRIPTION

2.1 Background

The Port is a 660-acre island facility created from two spoil islands, Dodge Island and Lummus Island. The western end is Dodge Island, and the eastern end is Lummus Island. The Port is connected to the Miami mainland by two bridges, a 65-foot high, fixed span vehicular bridge, and a road and a rail bridge linking to the Florida East Coast Railroad Company's main line track (USACE 2002).

The Port is a "clean port," the designation of a seaport that does not handle bulk cargoes or potentially dangerous or hazardous cargoes such as fuel oil. The Port handles only palletized, roll-on/roll-off (RO/RO), and containerized cargo. In addition to cargo traffic, the Port is also a major cruise ship port. It is the year-round homeport of the largest cruise ship in the world, the VOYAGER OF THE SEAS. As reported in the 1999 Port of Miami Master Development Plan (April 30,1999), the Port consists of 518 acres of actual landmass. Of the 518 acres, 372.5 acres (71.9 percent) is devoted to cargo operations, mainly on Lummus Island, and 52 acres (10.0 percent) is devoted to cruise operations on Dodge Island. The Port also leases 34 acres from the Florida East Coast Railway at its Buena Vista yard, which is located approximately 2.5 miles northwest of the Port. This leased property is used as an intermodal container marshaling and storage area for transshipments.

The Port is a landlord port, owned by Miami-Dade County, Florida and managed by the Miami-Dade County Seaport Department. The Port Director reports to the County Manager. Facilities are leased to Port users and operators. There are three principal terminal operators at the Port: Seaboard Marine, the Port of Miami Terminal Operating Company (POMTOC), and Universal Maritime/Maersk. Seaboard Marine's container terminal and storage areas are located along the southern portion of Dodge Island and the southwest corner of Lummus Island. POMTOC's container terminal is located exclusively on Lummus Island, as is Universal Maritime/Maersk's (northeastern portion).

Currently there are three Panamax and seven Post-Panamax gantry cranes. Two additional super-Post-Panamax gantry cranes are scheduled to arrive in October 2002. Panamax, Post-Panamax, and Super-Post-Panamax gantry cranes are designed to reach across 13 containers (each approximately 8 feet wide), 17 containers, and 22 containers, respectively.

In addition to gantry cranes, the Port's cargo handling equipment includes forklifts, toploaders, and mobile truck cranes including three Mi-Jack 850-P Rubber Tire Gantries (RTGs), which allow containers to be stacked 6-wide and 4-high.

There are eleven passenger terminals that accommodated 3.3 million passengers in fiscal year 2000. The Port's passenger terminals are designated Terminals 1 through 5, Terminal 6/7, Terminal 8/9, Terminal 10, and Terminal 12.

As identified in the Port's 1999 Master Plan, approximately 47.5 acres of the Port's land area is utilized by support facilities: parking, 17.0 acres; circulation and open space, 10.5 acres; office – Federal Government, 8.5 acres; recreation, 7.5 acres; office-miscellaneous and office-Seaport Department, 1.7 acres.

CSX Transportation, Inc. serves the Port. The Miami-Dade County Seaport Department owns 2.1 miles of trackage at the Port on Dodge Island, which consists of a main line track extending the length of the island and a four-track, closed-end intermodal rail yard. The main track on Dodge Island connects with the Florida East Coast Railway via a rail bridge. A connection with CSX Transportation, Inc. is effected through an interchange in the west part of the City of Miami. Moreover, the Port is less than one mile from major highways: Interstate 95 and Federal Route 1 via Interstate 395, and Interstate 75 via Dolphin and Palmetto Expressways.

Even though the Port is considered a "clean port" there is a private petroleum facility at Fisher Island. This facility receives Number 6 fuel oil and diesel fuel by tankers and barge (integrated tug and barge units). The fuel is used solely for bunkering the Port's cargo and cruise ships, which are bunkered at the berth by tank truck or by bunkering barge. This facility has an 800-foot long berth with a depth of 36 feet and 12 storage tanks having a total capacity of 667,190 barrels.

As reported in the USACE Port Series No. 16 document (revised 1999), within Metropolitan Miami-Dade County 12 companies operate warehouses having a total of over 1,000,000 square feet of dry storage space and over 6,000,000 cubic feet of cooler and freezer space. All except three of the warehouses have railroad connections, and each is accessible to arterial highways.

Anchorage for deep-draft cargo vessels lies north of the Entrance Channel to the Port of Miami. There are no bridges crossing the shipping channels for Dodge and Lummus Islands.

2.2 Description of the Alternatives

2.2.1 No-Action Alternative

The Port would continue operations under existing conditions. Currently, there are two options available for moving cargo to terminal facilities in those areas. One is to use vessels with drafts that enable access over existing depths and widths. The second is to use another terminal at the Port and move the cargo to the facilities (USACE 1996). Current dimensions of the channels and turning basins are described below in Table 1.

Table 1 Current Channel and Turning Basin Dimensions

Entrance Channel	500 feet wide and 44-foot depth
Government Cut	500 feet wide and 42-foot depth
Fisher Island Turning Basin	Triangular-shaped bottom with a 42-foot depth
Main Channel	400 feet wide and 36-foot depth
Fisherman's Channel and Lummus Island Turning Basin	The channel is 400 feet wide and 42-foot depth. The turning basin has a turning diameter of 1,500 feet and 42-foot depth.
Dodge Island Cut and Turning Basin	400 feet wide and 34-foot depth

2.2.2 Alternative 1

Alternative 1 consists of six components that are designed to improve Port transit for the existing and future fleets.

Component 1C — Flare the existing 500-foot wide Entrance Channel to provide an 800-foot wide entrance at Buoy #1. The widener would extend from the beginning of the Entrance Channel approximately 150 feet parallel to both sides of the existing Entrance Channel for approximately 900 feet before tapering back to the existing channel edge over a total distance of approximately 2,000 feet. Deepen the Entrance Channel and proposed widener along Government Cut from an existing depth of 44 feet to a depth of 52 feet.

Component 2A — Widen the southern intersection of Government Cut near Buoy #15. The length of the widener would be approximately 700 feet with a maximum width of approximately 75 feet. Deepen from existing project depth of 42 feet to 50 feet.

Component 3B — Extend the existing Fisher Island Turning Basin 300 feet to the north of the existing channel edge near the west end of Government Cut. Widen the basin to 1,500 feet by 1,200 feet. Deepen channel below existing project depths of 42 feet to 50 feet.

Component 4 — Relocate the west end of the Main Channel approximately 250 feet to the south between channel miles 2 and 3 over a two- or three-degree transition to the existing cruise ship turning basin. No dredging is expected for this component since existing depths allow for continuation of the authorized depth of 36 feet.

Component 5A Increase the width of the Fisherman's Channel approximately 100 feet to the south of the existing channel. This component also includes a 1,500-foot diameter turning basin, which would reduce the existing size of the Lummus Island Turning Basin. This widener at the northwest corner of the turning basin eases the turn to the Dodge Island Cut. Deepen channel from the current authorized depth of 42 feet to 50 feet along the proposed widener of Fisherman's Channel from Station 0+00 to the Lummus Island Turning Basin.

Component 6 Deepen Dodge Island Cut and the proposed 1,200-foot turning basin from 32 and 34 feet to 36 feet. Relocate the western end of the Dodge Island Cut to accommodate proposed port expansion.

2.2.3 Alternative 2

Alternative 2 consists of five components that are designed to Port transit for the existing and future fleets.

Component 1C Flare the existing 500-foot wide Entrance Channel to provide an 800-foot wide entrance at Buoy #1. The widener would extend from the beginning of the Entrance Channel approximately 150 feet parallel to both sides of the existing Entrance Channel for approximately 900 feet before tapering back to the existing channel edge over a total distance of approximately 2,000 feet. Deepen the Entrance Channel and proposed widener along Government Cut from an existing depth of 44 feet to a depth of 52 feet.

Component 2A Widen the southern intersection of Government Cut near Buoy #15. The length of the widener would be approximately 700 feet with a maximum width of approximately 75 feet. Deepen from existing project depth of 42 feet to 50 feet.

Component 3B Extend the existing Fisher Island Turning Basin 300 feet to the north of the existing channel edge near the west end of Government Cut. Widen the basin to 1,500 feet by 1,200 feet. Deepen channel below existing project depths of 42 feet to 50 feet.

Component 4 — Relocate the west end of the Main Channel approximately 250 feet to the south between channel miles 2 and 3 over a two- or three-degree transition to the existing cruise ship turning basin. No dredging is expected for this component since existing depths allow for continuation of the authorized depth of 36 feet.

Component 5A — Increase the width of the Fisherman's Channel approximately 100 feet to the south of the existing channel. This component also includes a 1,500-foot diameter turning basin, which would reduce the existing size of the Lummus Island Turning Basin. This widener at the northwest corner of the turning basin eases the turn to the Dodge Island Cut. Deepen channel from the current authorized depth of 42 feet to 50 feet along the proposed widener of Fisherman's Channel from Station 0+00 to the Lummus Island Turning Basin.

2.3 Alternatives Eliminated from Detailed Evaluation

Original components contained in the alternatives considered for this project have been revised several times to minimize cost and impacts to the environment. Previous versions of the components are described below and are listed in Table 2.

Component 1

Four different versions of Component 1 received consideration during the plan formulation process. Receipt of the Baseline Environmental Resource Survey and ship simulation results allowed additional evaluations of the Entrance Channel alternatives based on the location of environmental resources and ship transits.

Further discussions with the Pilots resulted in two additional modifications of Component 1, which completely avoids one reef area (Component 1C). Component 1A avoided one reef location, but did not provide sufficient widening in the area where currents impact vessel transits. Component 1B avoided both reef areas, but did not provide widening in the area of the difficult north and south currents.

Component 2

Two different orientations for the widener received consideration, which included Component 2 and Component 2A. The first recommended by the Pilots (Component 2) extended from the southern edge of Fisherman's Channel parallel to Government Cut between Buoys #13 and #15 over a distance of approximately 2,400 feet.

Ship simulation testing of Component 2 indicated the Pilots did not use the widener during any of the simulation exercises. Subsequent discussions on May 16, 2001 with the Pilots resulted in a reduction of the widener from 2,400 to 700 feet. During a later simulation of the revised Component 2A at the pilot station, a ship grounded at the location of the proposed widener.

Table 2 Avoidance and Minimization of Direct Impacts of the Preliminary Design Plan and Recommended Plan

Habitat Type	Component													
	1[1]	1C[2]	2[1]	2A[2]	3[1]	3B[2]	4[2]	5[1]	5A[2]	6[1]	6A[3]		Previous Total	Revised Total
Seagrass beds[4] (ac)	0	0	0	0	**0.7**	0	0	**1.7**	**0.2**	**22.8**	NA		**25.2**	**0.2**
Low relief hardbottom/reef (ac)	**35.1**	**28.7**	0	0	0	0	0	0	0	0	NA		**35.1**	**28.7**
High relief hardbottom/reef (ac)	**21.1**	**20.7**	0	0	0	0	0	0	0	0	NA		**21.1**	**20.7**
Rock/rubble w/ live bottom (ac)	**51.7**	**51.7**	0	0	0	0	0	0	0	0	NA		**51.7**	**51.7**
Rock/rubble w/ algae/sponges (ac)	**41.3**	**41.3**	**3.9**	**0.6**	**5.4**	**26.1**	0	**59.4**	**3.8**	0	NA		**136.2**	**71.8**
Unvegetated (ac)	**70.1**	**68.2**	**1.7**	**0**	**9.4**	**24.4**	**0**	**166.8**	**143.8**	**55.4**	**NA**		**333.5**	**236.4**
Total Project Footprint (ac)	**227.8**	**210.6**	**5.6**	**0.6**	**15.5**	**50.5**	**0**	**228.9**	**147.8**	**78.2**	**0**		**612.3**	**409.5**

[1]Original Proposed Impacts
[2]Recommended Plan Impacts
[3]Not Evaluated
[4]Does not include side slope equilibration impacts

Component 3

Component 3 proposed a 1,600-foot diameter turning basin. Following review of the Environmental Baseline Survey and ship simulation tests, Component 3A was identified which reduced the turning basin to a turning notch of approximately 1,500 by 1,450 feet. Since ship simulation testing indicated the Pilots did not use the northernmost section of Component 3, Component 3A was identified since it avoided impacts to most to the seagrass beds to the north.

Later discussions on May 16, 2001 resulted in the Pilots' proposal to completely avoid the seagrass area to the north by truncating the northeast section of the turning basin (Component 3B).

Component 4

No alternative design was considered for Component 4.

Component 5

During the ship simulation exercise, Component 5 provided additional room for vessels passing berthed ships along the container terminals. The Pilots used the additional width during almost every proposed condition test in the Fisherman's Channel.

Component 5A resulted from coordination with Fisher Island's engineering representatives to improve clearance between the proposed widener and a proposed new bulkhead in that area.

Component 6

Component 6 includes deepening of Dodge Island Cut and the proposed 1200-foot turning basin from 32 and 34 feet to 36 feet. It also involves relocating the western end of the Dodge Island Cut to accommodate proposed Port expansion.

Component 6A proposed widening about 1,200 feet of the Dodge Island Cut an additional 50 feet to the south as a result of ship simulation testing. During the ship simulation testing a number of ships left the south side of the channel segment between Lummus Island Turing Basin and Dodge Island Turning Basin. The Engineering Research and Development Center (Waterways Experiment Station) of the USACE recommended Component 6 on the condition that the southern edge of that segment is widened 50 feet, which resulted in Component 6A.

2.4 Recommended Plan

The Recommended Plan consists of five components that are designed to improve Port transit for the existing and future fleets.

Component 1C	Flare the existing 500-foot wide Entrance Channel to provide an 800-foot wide entrance at Buoy #1. The widener would extend from the beginning of the Entrance Channel approximately 150 feet parallel to both sides of the existing Entrance Channel for approximately 900 feet before tapering back to the existing channel edge over a total distance of approximately 2,000 feet. Deepen the Entrance Channel and proposed widener along Government Cut from an existing depth of 44 feet in one-foot increments to a depth of 52 feet.
Component 2A	Widen the southern intersection of Government Cut and Fisherman's Channel at Buoy #15. The length of the widener would be approximately 700 feet with a maximum width of approximately 75 feet. Deepen from existing project depth of 42 feet to 50 feet.
Component 3B	Extend the existing Fisher Island Turning Basin 300 feet to the north of the existing channel edge near the west end of Government Cut. This would widen the basin to 1,500 feet by 1,200. Deepen at one-foot increments below existing depths of 42 feet to 50 feet.
Component 4	Relocate the west end of the Main Channel approximately 250 feet to the south between channel miles 2 and 3 over a two- or three-degree transition to the existing cruise ship turning basin. No dredging is expected for this component since existing depths allow for continuation of the authorized depth of 36 feet.
Component 5A	Increase the width of the Fisherman's Channel approximately 100 feet to the south of the existing channel. This component also includes a 1,500-foot diameter turning basin, which would reduce the existing size of the Lummus Island Turning Basin. This widener at the northwest corner of the turning basin would ease the turn to the Dodge Island Cut. Deepen at one-foot increments from the existing 42-foot depth to 50 feet along the proposed widened Government Cut channel from Station 0+00 to Station 42+00.

2.5 Comparison of Alternatives

The following table (Table 3) provides a comparison of the No-Action Alternative and the Recommended Plan with regard to costs and potential impacts to natural resources and human environment. A more thorough analysis of potential impacts is included in Section 4.0, Environmental Consequences.

Table 3 Comparisons of Alternatives

Resource	No-Action Alternative	Alternative 1	Alternative 2 (Recommended Plan)
Coastal Environment	No significant impact.	No significant impact.	No significant impact.
Geology and Sediments	Additional vessel groundings may impact geological formations within the Biscayne Bay.	Additional sediment or material removal would occur.	Sediment or material removal would occur.
Water Quality	Additional vessel groundings may impact water quality.	Temporary increases in turbidity during dredging events may cause increased turbidity at the point of discharge from the disposal sites.	Temporary increases in turbidity during dredging events may cause increased turbidity at the point of discharge from the disposal sites.
Seagrass Communities	Additional vessel groundings may impact seagrass communities.	Significant direct impacts would include the removal of seagrass habitat. Indirect impacts to seagrass would occur through side slope equilibration.	Direct impacts would include the removal of seagrass habitat. Indirect impacts to seagrass would occur through side slope equilibration.
Hardbottom and Reef Communities	Additional vessel groundings may impact hardbottom and reef communities.	Widening and deepening would result in both direct and indirect impacts to hardbottom and reef communities within the Entrance Channel.	Widening and deepening would result in both direct and indirect impacts to hardbottom and reef communities within the Entrance Channel.
Rock/ Rubble Communities	Additional vessel groundings may impact rock rubble communities.	Proposed impacts to rock/rubble habitats are principally in areas that have already been dredged.	Proposed impacts to rock/rubble habitats are principally in areas that have already been dredged.
Unvegetated Bottom	Additional vessel groundings may impact unvegetated bottom communities.	Direct impacts to unvegetated bottom communities would include the impacts to both benthic epifauna and infauna but other direct effects and indirect effects would differ based on the general location of the impacts.	Direct impacts to unvegetated bottom communities would include the impacts to both benthic epifauna and infauna but other direct effects and indirect effects would differ based on the general location of the impacts.

Resource	No-Action Alternative	Alternative 1	Alternative 2 (Recommended Plan)
Essential Fish Habitat (EFH)	Additional vessel groundings may impact EFH.	EFH would be impacted.	EFH would be impacted.
Protected Species	Additional vessel groundings may impact protected species.	Potential impacts due to blasting and loss of habitat may occur during dredging and construction activities.	Potential impacts due to blasting and loss of habitat may occur during dredging and construction activities.
Other Areas of Special Concern	Navigational difficulties may impact Areas of Special Concern.	No significant impacts.	No significant impacts.
Air Quality	No significant impact.	Short-term impacts from dredge emissions and other construction equipment would not significantly impact air quality.	Short-term impacts from dredge emissions and other construction equipment would not significantly impact air quality.
Noise	No significant impact.	None of the project components are expected to have a significant impact to noise levels.	None of the project components are expected to have a significant impact to noise levels.
Utilities	No significant impact.	Four utility crossings would be impacted.	Four utility crossings would be impacted.
Hazardous, Toxic, and Radioactive Waste	No significant impact.	No significant impacts to HTRW within the project area would occur.	No significant impacts to HTRW within the project area would occur.
Economic Factors	Significant loss of cargo business would occur at the Port due to the inability to handle new industry standard deep draft cargo vessels.	Cargo business would be retained and may increase.	Cargo business would be retained and may increase.
Land Use	No significant impacts.	No significant imp acts.	No significant impacts
Recreation	No significant impacts.	No significant impacts.	No significant impacts.
Aesthetic Resources	No significant impacts.	No significant impacts.	No significant impacts.
Cultural Resources	No significant impacts.	No significant impacts.	No significant impacts.

3.0 ESSENTIAL FISH HABITAT DESIGNATION

In accordance with the Magnuson-Stevens Fishery Conservation and Management Act of 1976 and the 1996 Sustainable Fisheries Act, an Essential Fish Habitat (EFH) assessment is necessary for this project. An EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." *Waters* include aquatic areas and their associated physical, chemical, and biological properties that are used by fishes and may include areas historically used by fishes. *Substrate* includes sediment, hardbottom, structures underlying the waters, and any associated biological communities. *Necessary* means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem. *Spawning, breeding, feeding, or growth to maturity* covers all habitat types used by a species throughout its life cycle. Only species managed under a Federal fishery management plan (FMP) are covered (50 C.F.R. 600). The act requires Federal agencies to consult on activities that may adversely influence EFH designated in the FMPs. The activities may have direct (e.g., physical disruption) or indirect (e.g., loss of prey species) effects on EFH and may be site-specific or habitat-wide. The adverse result(s) must be evaluated individually and cumulatively.

3.1 Assessment

The Port lies in the north side of Biscayne Bay, a shallow subtropical lagoon that extends from the City of North Miami (Miami-Dade County, Florida) south to the northern end of Key Largo (at the juncture of Miami-Dade and Monroe Counties). Biscayne Bay is a long, narrow, water body approximately thirty-eight miles long, and three to nine miles wide. Average depth is six to ten feet (USACE 1989). Biscayne Bay is bordered on the west by the mainland of peninsular Florida and on the east by both the Atlantic Ocean and a series of barrier islands consisting of sand and carbonate deposits over limestone bedrock (Hoffmeister 1974).

A thin layer of sediment less than six inches in depth characterizes the bay bottom over most of its area. Sediment thickness is increased up to 40 inches in the northern part of the Biscayne Bay near Miami Beach. Two major natural communities inhabit the bay bottom: seagrass communities and hardbottom communities. In the Atlantic Ocean, waterward of Biscayne Bay and barrier islands, similar communities occur. Nearshore seagrass beds give way to mixed seagrass and hardbottom, deeper channels and, finally, the Florida Reef Tract, which runs from Soldier Key south through the Florida Keys.

The most obvious direct impact of the Recommended Plan on managed species in all habitats would be the potential for mortality and/or injury of individuals through the dredging and/or blasting processes. Species in any and all of the project area's habitats are susceptible. Fishes and invertebrates are at risk at any life-history stage. Eggs, larvae, juveniles, and even adults may be inadvertently killed, disabled, or undergo physiological stress, which may adversely affect behavior or health. Forms that are less motile, such as juvenile shrimp, are particularly vulnerable.

Blasting would also have a direct impact on managed fish species residing in/migrating through the harbor and associated waterways. Previous studies (USACE 1996; O' Keefe 1984; Keevin and Hempen 1997; Young 1991) have addressed the impacts of blasting on fishes. Fishes with air bladders are particularly more susceptible to the effects of blasting than aquatic taxa without air bladders such as shrimp and crabs (Keevin and Hempen 1997). Small fish are the most likely to be impacted.

Although dredge operations are likely to directly impact individuals of managed species in observable lethal and sublethal ways, dredging and blasting may also have more subtle effects observable only at the population level, rather than at the individual level. For example, dredging/blasting activities, particularly in linear corridors (such as Government Cut and Fisherman's Channel) may temporarily interfere with existing migration patterns of species that require utilization of both inshore and offshore habitats through ontogeny. This is a particular concern for species that travel along shorelines and bulkheads. Therefore the dredging of berths and littoral zone habitats is anticipated to have greater effects. These impacts may result in displacement of individuals or disjuncture in the life cycles of managed species.

Impacts to the water column can have effects on marine and estuarine species. Hence, it is recognized as EFH. The water column is a habitat used for foraging, spawning, and migration by both managed species and organisms consumed by managed species. Water quality concerns are of particular importance in the maintenance of this important habitat. During dredging in substrates comprising coarser materials and rock, water quality impacts are expected to be minimal. However, where silt and/or silty sand are to be dredged, water quality impacts are expected to occur due to temporarily increased levels of turbidity. Re-suspended materials may interfere with the diversity and concentration of phytoplankton and zooplankton, and therefore could affect foraging success and patterns of schooling fishes and other grazers that comprise prey for managed species. Foraging patterns are expected to return to normal soon after cessation of dredging activities.

The temporary or permanent loss of EFH habitats results in the loss of substrates used by managed species for spawning, nursery, foraging, and migratory/temporary habitats. The most critical losses of EFH would be those areas additionally designated as Habitat Areas of Particular Concern (HAPC) such as seagrass beds, , hardbottoms, and reefs. Coastal inlets are HAPC for shrimps, red drum, and grouper. These species prefer estuarine, inshore habitats such as mangroves, seagrass beds, and mudflats for portions of their life histories. Medium and high profile reefs are also considered HAPC for grouper, and the hardbottom existing in 5 to 30 meters of depth off of Miami-Dade County is listed as HAPC for corals and coral reefs (SAFMC 1998a).

Losses to EFH-HAPC within the areas proposed for dredging under Alternative 1 include impacts to seagrass and hardbottom/reef habitats. Seagrass beds are an important part of the Biscayne Bay ecosystem due to their proximity to reef and hardbottom habitats. Their function is closely coupled with reefs to provide life-stage-specific habitat for certain managed species. Seagrass habitat directly adjacent to the existing Port channels are subjected to daily manmade and natural disturbances that make it a less optimal habitat for managed species relative to the surrounding area. Therefore, the selection of Alternative 2 as the Recommended Plan greatly minimizes the significance of seagrass impacts to managed species in terms of both quantity and quality. Nevertheless, loss of these two habitats (hardbottom/reef and seagrasses) would result in a loss of habitat essential in the spawning and early life-stages for species of the Snapper-Grouper Complex, including blue stripe grunts, French grunts, mahogany snapper, yellowtail snapper, and red grouper. Managed crustaceans including pink shrimp and spiny lobster found in nearby mangrove habitats at Virginia Key also likely use grassbeds for foraging during some life stages.

Impacts to populations of managed species would occur due to dredging unvegetated habitats (sand/silt/rubble, sand), including those that lack seagrasses. Dredging would remove benthic organisms used as prey by managed species and as a result may temporarily impact certain species, such as red drum, that forage largely on such taxa. Dredged habitats are anticipated to recover, in terms of benthic biodiversity and population density, within two years (Taylor et. al 1973; Culter and Mahadevan 1982; Saloman et. al 1982).

The aquatic communities associated with these different bottom types and the water column have been identified as EFH in accordance with the amendment to the Fishery Management Plans of the South Atlantic Region (SAFMC 1998). Impacts associated with widening and deepening of the harbor have been minimized with the Recommended Plan and remaining impacts under that alternative are unavoidable. However, the temporary disruption of the water column, seagrass beds, sand bottom, and hardbottom areas that may provide habitat or contribute to aquatic food chains would be minimized by implementing strict management practices to reduce turbidity. These practices along with the construction of new seagrass and hardbottom habitat should mitigate for any direct impacts.

3.2 Managed Species

Thirty-seven fish species are listed under the Affected Fishery Management Plans and Fish Stocks of the Comprehensive EFH Amendment (SAFMC 1998). Consequently, the project area has been designated as EFH for theses fishes, brown shrimp, white shrimp, pink shrimp, and spiny lobster (Table 4). Six coastal migratory pelagic fish species have been included owing to their distribution patterns along the Florida coast. In addition, the nearshore bottom and offshore reef habitats of South Florida have also been designated as EFH-Habitat Areas of Particular Concern (EFH-HAPC) (SAFMC 1998). Over 60 species of coral can occur off the coast of Florida all of which fall under the protection of the management plan (SAFMC 1998). At least 11 genera of mostly gorgonian corals have been observed in the study area.

Table 4 Managed Species Identified by the South Atlantic Fishery Management Council That Are Known to Occur in Miami-Dade County, Florida

Common Name	Taxa
Balistidae	
Gray Triggerfish	*Balistes capriscus*
Queen Triggerfish	*Balistes vetula*
Ocean Triggerfish	*Canthidermis sufflamen*
Carangidae	
Yellow Jack	*Caranx bartholomaei*
Blue Runner	*Caranx crysos*
Crevalle Jack	*Caranx hippos*
Bar Jack	*Caranx rubber*
Greater Amberjack	*Seriola dumerili*
Coryphaenidae	
Dolphin [1]	*Coryphaena hippurus*
Ephippidae	
Spadefish	*Chaetodipterus faber*
Haemulidae	
Black Margate	*Anisotremus surinamensis*
Porkfish	*Anisotremus virginicus*
Margate	*Haemulon album*
Tomtate	*Haemulon aurolineatum*
Smallmouth Grunt	*Haemulon chrysargyreum*
French Grunt	*Haemulon flavolineatum*
Spanish Grunt	*Haemulon macrostomum*
Cottonwick	*Haemulon melanurum*
Sailors Choice	*Haemulon parra*
White Grunt	*Haemulon plumieri*
Blue Stripe Grunt	*Haemulon sciurus*
Labridae	
Puddingwife	*Halichoeres radiatus*
Hogfish	*Lachnolaimus maximus*
Lutjanidae	

Common Name	Taxa
Mutton Snapper	*Lutjanus analis*
Schoolmaster	*Lutjanus apodus*
Gray Snapper	*Lutjanus griseus*
Dog Snapper	*Lutjanus jocu*
Mahogany Snapper	*Lutjanus mahogoni*
Lane Snapper	*Lutjanus synagris*
Yellowtail Snapper	*Ocyurus chrysurus*
Rachycentridae	
Cobia [1]	*Rachycentron canadum*
Scombridae	
Little Tunny [1]	*Euthynnus alletteratus*
King Mackerel [1]	*Scomberomorus cavalla*
Spanish Mackerel [1]	*Scomberomorus maculates*
Cero [1]	*Scomberomorus regalis*
Serranidae	
Black Sea Bass	*Centropristis striata*
Rock Hind	*Epinephelus adscensionis*
Goliath Grouper	*Epinephelus itajara*
Red Grouper	*Epinephelus morio*
Black Grouper	*Mycteroperca bonaci*
Gag	*Mycteroperca microlepis*
Sparidae	
Sheepshead	*Archosargus probatocephalus*
Jolthead Porgy	*Calamus arctifrons*
Invertebrates	
Brown Shrimp	*Farfantepenaeus aztecus*
Pink Shrimp	*Farfantepenaeus duorarum*
White Shrimp	*Litopenaeus setiferus*
Spiny Lobster	*Panulirus argus*

[1] Coastal Migratory Pelagic Fish Species

The species addressed in this section consist of fishes and invertebrates of both recreational and commercial importance that are managed under the Magnuson-Stevens Fishery Conservation and Management Act (PL94-265).

3.2.1 Crustacea

3.2.1.1 Life Histories

3.2.1.1.1 Brown Shrimp

Brown shrimp larvae occur offshore and migrate from offshore as post-larvae from January through November with peak migration from February through April. Post-larvae move into the estuaries primarily at night on incoming tides. Once in the estuaries, post-larvae seek out the soft silty/muddy substrate common to both vegetated and non-vegetated, shallow estuarine environments. This environment yields an abundance of detritus, algae, and microorganisms that comprise their diet at this developmental stage. Post-larvae have been collected in salinities ranging from zero to 69 ppt with maximum growth reported between 18° and 25°C, peaking at 32°C (Lassuy 1983). Maximum growth, survival, and efficiency of food utilization have been reported at 26°C (Lassuy 1983). The density of post-larvae and juveniles is highest among emergent marsh and submerged aquatic vegetation (Howe et al. 1999; Howe and Wallace 2000), followed by tidal creeks, inner marsh, shallow non-vegetated water, and oyster reefs. The diet of juveniles consists primarily of detritus, algae, polychaetes, amphipods, nematodes, ostracods, chironomid larvae, and mysids (Lassuy 1983). Although some of their potential prey would initially be lost during dredging activities, recovery would be rapid (Culter and Mahadevan 1982; Saloman et al. 1982) and they can forage in adjacent areas that have not been impacted as they emigrate offshore. Emigration of sub-adults from the shallow estuarine areas to deeper, open water takes place between May through August, with June and July reported as peak months. The stimulus behind emigration appears to be a combination of increased tidal height and water velocities associated with new and full moons. After exiting the estuaries, adults seek out deeper (18 m), offshore waters in search of silt, muddy sand, and sandy substrates. Adults reach maturity in offshore waters within the first year of life.

3.2.1.1.2 Pink Shrimp

Of the three penaeid shrimp species, pink shrimp is the most prevalent in Florida waters. Consequently, the pink shrimp fishery is the most economically important of all fisheries in Florida.

Spawning of pink shrimp occurs in oceanic waters at depths of 4 to 48 m and possibly deeper (Bielsa et al. 1983) where adult females lay demersal eggs. Spawning takes place year round in some areas (e.g., Tortugas Shelf), but peak spawning activity appears to coincide with maximum bottom water temperatures (Bielsa et al. 1983). Recruitment of planktonic post-larvae into estuarine and coastal bay nurseries occur in the spring and late fall during flood tides. Post-larvae become benthic at approximately 10 mm TL and prefer areas with a soft sand or mud substrate mixture containing sea-grasses and turtle-grass (Bielsa et al. 1983; Howe et al. 1999; Howe and Wallace 2000). Pink shrimp spend from 2 to 6 months in the nursery ground prior to emigration. During this time there is a dietary shift from nauplii and microplankton to polychaetes, ostracods, caridean shrimps, nematodes, algae, diatoms, amphipods, mollusks, and mysids, regarding post-larvae and juveniles, respectively (Bielsa et al. 1983). Although some of their potential prey would initially be lost during dredging activities, recovery would be rapid (Culter and Mahadevan 1982; Saloman et al. 1982) and they can forage in adjacent areas that have not been impacted as they emigrate offshore. Emigration from the nursery grounds to offshore occurs year round with a peak during the fall and a smaller peak during the spring. The greatest concentrations of adults have been reported between 9 and 44 m, although some have been found as deep as 110 m in Florida waters. Although detailed dietary studies concerning adults are non-existent, Williams (1955) reported foraminiferans, gastropod shells, squid, annelids, crustaceans, small fishes, plant material, and debris in the stomachs of adults collected in North Carolina estuaries.

3.2.1.1.3 White Shrimp

White shrimp spawn along the South Atlantic coast from March to November, with May and June reported as peak months along the offshore waters of northeast Florida. Spawning takes place in water ≥ 9 m deep and within 9 km from the shore where they prefer salinities of ≥ 27 ppt (Muncy 1984). The increase in bottom water temperature in the spring is thought to trigger spawning. After the demersal eggs hatch, the planktonic post-larvae live offshore for approximately 15 to 20 days. During the second post-larval stage, they enter Florida estuaries in April through early May by way of tidal currents and flood tides and become benthic. During this larval stage, the diet consists of zooplankton and phytoplankton. It has been documented that juvenile white shrimp tend to migrate further upstream than do juvenile pink or brown shrimp; as far as 210 km in northeast Florida (Pérez-Fartante 1969). Juveniles prefer to inhabit shallow estuarine areas with a muddy substrate with loose peat and sandy mud and moderate salinity. Juvenile white shrimp are benthic omnivores (e.g., fecal pellets, detritus, chitin, bryozoans, sponges, corals, algae, annelids) and feed primarily at night. White shrimp usually become sexually mature during the calendar year after they hatched. The emigration of sexually mature adults to offshore waters is influenced primarily by body size, age, and environmental conditions. Studies have shown that a decrease in water temperature in estuaries triggers emigration in the south Atlantic (Muncy 1984). The life span of white shrimp usually does not extend beyond one year.

3.2.1.1.4 Spiny Lobster

The spiny lobster inhabits the coastal waters from North Carolina to Rio de Janeiro, Brazil, including Bermuda and the Gulf of Mexico. The Florida spiny lobster is a valuable species both commercially and recreationally, and supports Florida's second most valuable shellfishery. During its life cycle, the spiny lobster occupies three different habitats (Marx and Herrnkind 1986). The phyllosoma larvae are planktonic and inhabit the epipelagic zone of the Caribbean, Gulf of Mexico, and the Straits of Florida. The duration of the phyllosome stage is approximately 6 to 12 months. A brief (several weeks) non-feeding, oceanic phase follows, where the larva metamorphoses into a puerulus offshore. The pueruli migrate to shore by night using specialized abdominal pleopods. Large concentrations of pueruli have been recorded along the southeast Florida coast and the southern shores of the Florida Keys year round, with a peak in the spring and a lesser peak in the fall. In addition, these large concentrations are usually associated with the new and first quarter lunar phases. When suitable inshore substrate is encountered by pueruli, they rapidly settle out of the water column and within days molt into the first juvenile stage. The specific factors that stimulate post-larval settlement are not well understood. Known nursery areas of young benthic larvae and juveniles consist of macroalgae beds along rocky shorelines interspersed with seagrasses where they live a solitary existence (Marx and Herrnkind 1986). Juveniles larger than 20 mm CL tend to aggregate in biotic (e.g., sponges, small coral heads, sea urchins) and abiotic (ledges) structures in protected bays, including estuaries with high salinity. As adults, spiny lobsters inhabit coral reef crevices, rocky outcroppings, and ledges. Refuge availability plays an important role regarding population distribution because spiny lobsters do not have the ability to construct dens. However, in a study where additional artificial structures were placed in Biscayne Bay, FL, the population was re-distributed, but the number of spiny lobsters in Biscayne Bay did not increase (Marx and Herrnkind 1986). Consequently, the south Florida population may be limited by recruitment, emigration, food, and other factors.

3.2.1.2 Summary of Impacts to Shrimps and Spiny Lobsters

As outlined by SAFMC (1998), EFH-HAPCs for penaeid shrimps include coastal inlets and both state identified overwintering areas and nursery habitats. Seagrass beds common to the bays of Florida are particularly important areas. EFHs for spiny lobster are varied including nearshore shelf/oceanic waters, shallow, benthic subtidal areas, seagrass beds, soft sediment, coral and both live and hardbottom, sponges, algal communities, mangroves, and the Gulf Stream which it uses for dispersion (SAFMC 1998).

The project area includes sand bottom, sand-veneered hardbottom, hardbottom, and water column that may be used by all three penaeid species and spiny lobster as post-larvae, juvenile, and adults. The project would impact a relatively small area of the sand and hardbottoms, and the impacts would be minor. Some possible refuge may be lost in regards to the impact to the hardbottom areas; however, additional refuge would be created by the construction of artificial reefs to serve as replacement habitat. The project would cause localized turbidity during construction; however, turbidity would be minimized using the best management practices so that any impacts would be minor and temporary. Penaeid shrimp and spiny lobster would be temporarily displaced, but would quickly return to the project area.

3.2.2 Habitat Areas of Particular Concern

3.2.2.1 Hardbottom and Reef Habitat

The South Atlantic Fisheries Management Council has designated nearshore hardbottom and offshore reef areas within the study site as EFH. The nearshore bottom and offshore reef habitats of South Florida have also been designated as EFH-HAPC (SAFMC 1998). Over 60 species of coral can occur off the coast of Florida all of which fall under the protection of the management plan (SAFMC 1998).

The warm waters of the Florida current are the most dominant hydrographic feature beginning at Palm Beach, Florida, and continuing south. As a result, the Carolinian corals in the Palm Beach area (> 4 km offshore) are replaced by a highly diverse hardbottom community that is dominated by gorgonian corals off Miami-Dade County (USACE 1989 and 1996a, SAFMC 1998). Observed gorgonians during a recent video survey of the project area were primarily of the genera *Eunicea* (e.g., *E. palmeri)*, *Plexaura* (e.g., *P. homomalla)*, and *Pseudopterogorgia* spp. (DC&A 2001). Other observed genera included *Gorgonia*, *Plexaurella* (*P. dichotoma)*, and *Pterogorgia* (*P. citrina* and *P. anceps),* and *Pseudoplexaura* spp. Hard coral species also make up a significant part of the reef assemblages in this area. The dominant species of hermatypic corals in this area include the large star coral, *Montastraea cavernosa*, the small star coral, *M. annularis*, *Diploria clivosa, Siderastrea siderea,* and *Porites asteroides,* (Blair and Flynn 1989; SAFMC 1998). All five of these dominant species were observed during the 2000 survey (DC&A 2001). Sponges observed within the project area's hardbottoms and reefs during the survey included *Ircinia campana*, *Callyspongia vaginalis*, *Cliona* sp., *Iotrochota* sp. (*I. birotulata*), *Geodia* spp. (*G. gibberosa* and *G. neptuni*) and *Amphimedon compresa*. The biota of the three outer reef tracts are consistent with the overall assemblage of stony corals, sponges, and gorgonians found offshore of Miami-Dade, Broward, and Palm Beach Counties (USACE 2000). Colonizing taxa such as sponges and certain gorgonians were more prevalent in the channel's hardbottom areas then were hard corals. Observed algal species in both channel and offshore areas included *Caulerpa* spp., *Laurencia* spp., *Cladophora* spp., and *Halimeda* spp. Flynn et al. (1991) noted the additional presence of *Dictyota* spp. and *Jania* spp. in the area.

3.2.2.2 Summary of Impacts to Hardbottom and Reef Habitat

Direct impacts to hardbottom and reef communities would occur as a result of the dredging process to deepen and widen channels within the Port. Areas that have been dredged previously would be affected. In total there would be 49.4 acres of impact to hardbottom/reef habitat within the existing channel including 28.7 acres of low relief hardbottom/reef and 20.7 acres of high relief hardbottom/reef. Of this total 49.4 acres of combined hardbottom/reef impacts, 46.1 acres are areas that have been previously dredged and recolonized. In addition, the proposed project would temporarily impact established hardbottom habitat on the limestone walls of the existing channel. Inshore channel walls may also function as hardbottom, in particular the inshore wall habitat of Fisherman's Channel would be impacted with the proposed widening

Due to the lack of research and long-term monitoring on nearshore hardbottom/reef communities, determining what amount of cumulative impact is significant is difficult. Past impacts within the region do not appear to have had any adverse or significant cumulative impact on the resource. Proposed future actions would add cumulatively to the impact and are adverse. Due to the significant amount of adjacent habitat remaining, it is unlikely that the amount of hardbottom habitat would become a limiting resource. Consequently, the impacts are most likely adverse, but not significant, since the adjacent habitat is clearly not limited. Also, addition of new artificial reef proposed as mitigation would replace the proposed losses of high and low relief hardbottom/reef.

3.2.2.3 Seagrass Habitat

Seagrass habitat cover type and characteristics for the study area are described below. Distribution and occurrence observations were surveyed `from approximately 400 feet south of Fisherman's Channel, including the area of the CWA, and the area adjacent to the Coast Guard Station north of the entrance channel at the southern tip of Miami Beach.

Marine seagrass species observed within the study area included *Halodule wrightii, Halophila decipiens, Syringodium filiforme* and *Thalassia testudinum.* Seagrass occurrence in these areas consisted of mixed beds of *H. decipiens* and *H. wrightii,* mixed beds of *H. wrightii, and T. testudinum,* mixed beds of *T. testudinum and S. filiforme,* mixed beds of all species and, monospecific beds of *T. testudinum*, and *H. decipiens*. No *H. johnsonii* was observed while surveying (DCA 2001, nor has any been reported from the study area by resource agencies or other sources.

Review of historic aerial photography over an approximate ten-year period (1989 to 1998) shows that major seagrass coverage patterns have essentially remained the same in the harbor and BSCWA. Site-specific coverage patterns along Fisherman's Channel revealed that the "colonizing" species, especially *H. wrightii* and *H. decipiens* tended to occur along the turning basins and nearshore areas in softer sediments with higher chronic turbidity. In fact some *H. decipiens* beds near the turning basins were covered with heavy silt loads. These colonizing species may predominate closer to shore because they can better withstand daily fluctuations in water quality. Mixed beds of the more climactic species, *T. testudinum* and *S. filiforme*, were predominant in silty sand substrate along Fisherman's Channel. This area may experience more flushing by high tides and a more stable substrate with less chronic resuspension. All seagrass beds were patchy and interspersed with bare substrate and density of individual beds decreased from east to west. The seagrass communities located directly along the channel edge are of moderate quality when compared to the seagrasses in the surrounding area, especially to the south. Daily water quality perturbations from runoff, river flushing, shipping activities and propeller dredging by recreational boaters create a less stable, less diverse habitat although nutrient loads are probably exploited by some marine species at times.

Seagrass communities provide important habitat for many different species of flora and fauna. *Caulerpa prolifera* was observed in video transects associated with *H. wrightii*, and algae of the genera *Udotea* and *Penicillus* were also observed in the field along the channel edge. Many invertebrate species also utilize seagrass communities. There is a prevalence of bottom feeders in the beds directly along the channel edge including queen conch (*Strombus gigas*), urchins such as the sea biscuit (*Clypeaster* spp.), nudibranchs, bivalve mollusks, and crustaceans including the spiny lobster (*Panulirus argus*), and the blue crab (*Callinectes sapidus*). Filter feeders such as soft corals and sponges were observed scattered within adjacent seagrass beds, especially in the BSCWA where increased water clarity appeared to allow a more diverse and higher quality habitat (see species listed in Section 3.2). Many fish species have also been shown to have life cycles dependent on seagrass beds. Of particular importance are the mullet (*Mugil cephalus*), snook (*Centropomis undecimalis*), and many prey species including mojarras and pinfish. Seagrass beds are also important nurseries for many of the fish associated with SAFMS Snapper-Grouper Complex (SAFMC 1998b).

3.2.2.4 Summary of Impacts to Seagrass Habitat

Direct impacts as a result of Components 3B and 5A include the removal and sloughing of seagrass habitat along Fisherman's Channel and Fisher Island Turning Basin during dredging activities. Dredging associated with deepening and widening would impact a total of 0.2 acre of seagrass habitat by removal of substrate, and an estimated additional loss of 6.1 acres due to side slope equilibration of adjacent substrate.

Direct impacts associated with the removal of these seagrass beds include the loss of habitat and functional values attributable to submerged aquatic vegetation. The reduction of seagrass beds in the areas inside the proposed new channel and in areas immediately adjacent to dredging activities may result in the direct loss of forage for manatees. This impact would be significant for Component 6, which includes several acres of seagrass removal from an area of frequent manatee occurrence. Component 6 (see Alternative 1) was therefore rejected. Component 5A has a greatly reduced impact because of the much lower quantity and lower relative quality of the habitat and because of its location directly along the channel. Loss of habitat for seagrass bed resident and transient fish and invertebrates may also result. Mitigation offered for seagrass impacts would result in replacement of lost habitat values.

Deepening/widening of the Fisher Island Turning Basin (Component 3B) would not directly impact seagrass communities but may include some indirect effects on seagrass habitats, particularly those immediately to the northeast (a large mixed-species bed of *H. decipiens* and *H. wrightii*) and southeast (an isolated *H. decipiens* bed associated with the littoral zone of Fisher Island) of the proposed dredging activity. Assuming a three to one cut for the basin widening and deepening and a 1:7 slope equilibrium profile from subsidence of the adjacent sand shelf, the seagrass beds to the northeast would not be directly impacted. For the remaining three project components (1C, 2A, and 4), direct and/or indirect impacts to seagrass beds are not anticipated. No impacts would occur due to Component 2A (widening the channel at the intersection of Government Cut and Fisherman's Channel). Resources within 2,000 feet of the proposed dredge site for that component includes an isolated *H. decipiens* bed (over 500 feet away), and a large mixed-species (*H. decipiens* and *H. wrightii*) bed (over 750 feet away). Since material to be dredged as a part of Component 2A principally comprises limestone, sandstone, and clean quartz sand (USACE 2001) transport and deposition of fine sand/ silt onto the nearby seagrass beds is not expected. Component 1C falls outside Biscayne Bay and inner channels and is not likely to result in any adverse direct or indirect impacts to seagrass. Component 4 does not involve any dredging activity, and would therefore not affect seagrass beds mapped during the 2000 survey (DC&A 2001).

3.2.2.5 Rock/Rubble Habitat

Within the project area there are both naturally occurring rock outcrops and rubble material that has been left from prior dredging events. The most obvious biological features of most of the rock/rubble-based habitats are resident sponges and macroalgae, whereas the remainder of the rock/rubble habitats serves as raw material for reef-building species. The latter case was apparent in the channel zone adjacent to the existing reef tracts. Observed sponge species included *Ircinia campana*, *Callyspongia vaginalis*, and *Iotrochota* sp. (*I. birotulata*). Observed soft corals were similar to those of adjacent reefs, and included the genera *Eunicea*, *Plexaura*, and *Pseudopterogorgia*. Habitats provided by rock and rubble and associated sponges, algae, and soft corals provide significant refugia for many species of juvenile fish.

3.2.2.6 Summary of Impacts to Rock/Rubble Habitat

To implement the Recommended Plan approximately 123.5 acres of combined rock/rubble habitat would be impacted. Of those habitats, 120.5 acres lie within previously dredged areas, and only 3 acres lie outside previously dredged areas. Rock/rubble live bottom habitats composed 51.7 acres of the area to be impacted. All of the rock/rubble live bottom acreage impacted by Alternative 1 has been impacted previously by earlier dredging activity within the Port (Table 12). An additional 68.8 acres of rock/rubble with algae/sponge habitat has been previously dredged and would again be impacted by the Recommended Plan. Three acres of new rock/rubble with sponge/algae habitat impacts would occur with the implementation of Alternative 2.

3.2.2.7 Unvegetated Bottom Habitat

Unvegetated bottom habitat within the study area has been classified as either sand bottom habitat or sand/silt/rubble habitat. Off of Miami-Dade County, unvegetated sand bottom habitats fall between the first and second, and the second and third reef lines within the study area and hence may provide a corridor for reef species to travel between reef lines. They may also be an important foraging area for some fish species (Jones et al. 1991). Other unvegetated sand bottom habitats are located between scattered reef patches and rock/rubble habitats both within and adjacent to the channel and between seagrass beds that occur outside the channel. Areas surveyed along the channel edge in the Port (within 400 feet perpendicular) were classified as unvegetated bottom if no seagrass/algae beds were recorded and mapped. The unvegetated sand bottom just west of the Lummus Island Turning Basin is an example (DC&A 2001. The unvegetated-sand/silt/rubble habitat is found within Fisherman's Channel, and occurs as a patchy mosaic of each of these components.

Softer silty-sand substrates occurred mainly inshore, while unvegetated habitats offshore included some bare sand substrate over rock with sparse algae. During the summer months, the most abundant of these algal species found in the study area belong to the green algae genera *Caulerpa*, *Halimeda*, and *Codium* (USACE 1989 and 1996). The former two taxa were observed during summer 2000 surveys (DC&A 2001. In winter months, brown algae (*Dictyota* spp. and *Sargassum* spp.) dominate (USACE 1989 and 1996). In addition, several species of sponges (e.g., *I. campana*, *C. vaginalis*, and *Iotrochota* sp.) and gorgonians (e.g., *Eunicia* spp. and *Gorgonia* sp.) were observed along transects through unvegetated habitats. Individual colonies of algae, soft corals, and sponges that occasionally occur in these areas where little structure is available may serve to provide temporary refugia for small, motile species. Invertebrate fauna utilizing sand bottom areas include the Florida fighting conch (*Strombus alatus*), milk conch (*Strombus costatus*), king helmet (*Cassia tuberosa*), and the queen helmet (*Cassia madagascariensis*) (USACE 1996).

The most ubiquitous infauna of inshore softer sand/silt/rubble communities include polychaete and sipunculan worms, oligochaetes, platyhelminthes, nemerteans, mollusks, and peracarid crustaceans. Compared to shallow sand flats, seagrass communities, and areas adjacent to reef tracts, the deeper, dredged areas of the channel and Port likely support a less diverse infaunal species assemblage and are a lower quality habitat.

3.2.2.8 Summary of Impacts to Unvegetated Bottom Habitat

Unvegetated sand/silt/rubble and sandy bottom habitats comprise a significant proportion or the total area proposed for dredging. In areas where these habitats may comprise minor associates of other major habitat categories (such as seagrass beds, rock/rubble, or reef), substrata were not categorized as “unvegetated softbottom” during recent surveys (see DC&A 2001) unless the condition was clearly dominant. Wide expanses of this type of community in its natural state are found only in the area comprising Component 1C, but smaller tracts are also presented adjacent to seagrass habitats along the south side of Fisherman's Channel and between the Lummus and Dodge Island Turning Basins. Direct impacts to unvegetated communities (due to dredging operations) in all three of these areas would mainly include impacts to benthic epifauna and infauna with the magnitude of impacts differing according to location. In total there would be 68.2 acres of unvegetated habitat impacted during dredging under Component 1C and the vast majority of this acreage, comprises previously dredged substrate (66.9 ac). The USACE believes that benthic infaunal populations in these areas would recolonize after dredging operations are complete. The degree to which the substrate remains viable for benthos may depend on light attenuation relative to additional eight feet of depth. Increased depth may not promote the growth of macroalgae and epipsammic algae.

In comparison, impacts to unvegetated habitats within Component 3B would entail direct removal of 24.4 acres of unvegetated habitat, 19.1 acres of which has been dredged previously.

The largest impact acreages in the Recommended Plan to unvegetated communities occur with Component 5A mainly within the previously dredged channel. Approximately 143.8 acres of the area proposed for dredging under Component 5A includes unvegetated bottom. Of this, 127.1 acres is from previous dredging activities, while an additional impact of 16.73 acres of habitat that has not been dredged previously is also required to complete this part of the project of which 39.3 is from previous dredging activities.

Impacts to benthic infaunal and epifaunal communities would be considered as relatively minimal when examined on a spatial scale. Infaunal communities in particular have very high reproductive potential and recruitment. Adjacent areas that have not been impacted would most likely be the primary source of recruitment to the impacted areas. Previous studies have shown a relatively short recovery time for infaunal communities following dredging (Taylor et. al 1973, Culter and Mahadevan 1982; Saloman et. al 1982). Succession of infaunal communities post dredging should begin within days following construction. This initial settlement usually consists of pelagic larval recruits settling within the impact area. Later recruitment from adjacent non-impacted areas would be more gradual, and involve less opportunistic species. Saloman et al. (1982) stated that communities would be close to pre-dredge conditions within one year and potentially as quickly as 8 to 9 months. Culter and Mahadevan (1982) found similar results and no long-term effects to benthic communities resulting from dredging activities. Based on these previous studies infaunal communities would most likely be re-established within 1 to 2 years post dredging.

3.2.3 South Atlantic Snapper-Grouper Complex

Miami-Dade County, Florida is designated as EFH for 37 species of reef fishes (Table 1) that are listed under the Affected Fishery Management Plans and Fish Stocks of the Comprehensive EFH Amendment (SAFMC 1998). Collectively, these 37 species, representing eight different families, are all members of the 73 species Snapper-Grouper Complex as outlined by SAFMC (1998). The association of these fishes with coral or hardbottom structure, vegetated and unvegetated inshore areas during some period of their life cycle, and their contribution to a reef fishery ecosystem is why they are included in the snapper-grouper plan. A discussion of how these fishes utilize the different inshore habitats and the hardbottom and reef communities follows.

3.2.3.1 Life History

3.2.3.1.1 Balistidae

Miami-Dade County is designated as EFH for three species of triggerfishes (Table 1). Collectively, these triggerfishes inhabit shallow inshore areas (e.g., bays, harbors, lagoons, sandy areas, grassy areas, rubble rock, coral reefs, artificial reefs, or dropoffs adjacent to offshore reefs) to offshore waters as deep as 275 m. These triggerfishes, especially the gray and queen triggerfish are an important component of the reef assemblage of both natural and artificial reefs (Vose and Nelson 1994). Information regarding balistid reproduction is limited and varied (Thresher 1984). The basic balistid (e.g., gray triggerfish) spawning behavior involves the production of dermersal, adhesive eggs that are thought to stick to corals and algae near or on the bottom. On the other hand, spawning of both the ocean and queen triggerfish takes place well off the bottom over relatively deep water where pelagic eggs are released. Unfortunately, egg and larval development is poorly understood regarding most species; however, a long ($\geq$ 1 yr) planktonic stage appears common for many species. As juveniles, it has been suggested that they are planktonic, taking refuge among floating masses of *Sargassum* (Johnson and Saloman 1984). During this stage of development, the diet consists of primarily zooplankton associated with the *Sargassum* or drifting in the water column. The exact timing or the environmental cues that trigger settlement is not well understood. However, juvenile gray triggerfish as small as 16 - 17 cm SL have been reported to colonize hardbottom habitats (Thresher 1984). After juveniles take on a benthic existence, their diet shifts to benthic fauna including algae, hydroids, barnacles, and polychaetes. All triggerfish feed diurnally and are well adapted to prey upon hard-shell invertebrates, especially adults. The diet of adult ocean triggerfish includes large zooplankton and possibly drifting seagrasses, algae, mollusks, and echinoderms. Adult gray and queen triggerfish feed primarily on sea urchins, but in their absence, would shift to other benthic invertebrates such as crabs, chiton, and sand dollars (Frazer et al. 1991; Vose and Nelson 1994). All three triggerfishes are commercially important (especially the queen triggerfish) in the aquarium trade and to some extent as a gamefish.

3.2.3.1.2 Carangidae

Miami-Dade County is designated as EFH for five carangids (Table 1) because they utilize the offshore and possibly inshore areas adjacent to the study area. Spawning of the bar jack, yellow jack, blue runner, and the crevalle jack takes place in offshore waters associated with a major current system such as the Gulf Stream from February through September (Berry 1959). Consequently, these four species have an offshore larval existence. Data indicates that peak spawning months for blue runners is May through July (Shaw and Drullinger 1990). Although spawning data regarding the greater amberjack doesn't exist, it is assumed that it is similar to the other four species. As young juveniles, crevalle jack migrate into inshore waters at about 20 mm SL whereas blue runners don't migrate into inshore areas until their late juvenile stage (Berry 1959). Young bar jacks have a tendency to remain offshore and yellow jacks occur inshore only occasionally as juveniles (Berry 1959). Based on collections of juveniles regarding these four species, there is some indication that there is a mobile, northward population of developing young in the Gulf Stream that developed from spawning that occurred in more southern waters (Berry 1959).

As juveniles and sub-adults, blue runners occur singly or in schools while juveniles have a high affinity for *Sargassum* and other floating objects in the Gulf Stream off southeast Florida (Goodwin and Finucane 1985). Blue runners are a fast growing, long-lived specie which attains 75 percent of its maximum size in its first 3 to 4 years of life (Goodwin and Johnson 1986). The greater amberjack is a far ranging species that inhabits inlets, shallow reefs, rock outcrops, and wrecks with reef fishes such as snappers, sea bass, grunts, and porgies (Manooch and Potts 1997a). They are generally restricted to the continental shelf to depths as great as 350 m (Manooch and Haimovici 1983). Small individuals (< 1 m SL) are usually found in water < 10 m deep while larger individuals frequent waters 18 - 72 m deep (Manooch and Potts 1997b). Greater amberjack are a fast growing species and are recruited to the headboat fishery in the Gulf by age 4 and fully recruited to the fishery by age 8 (Manooch and Potts 1997a; Manooch and Potts 1997b).

All five carangids are popular sport fishes among recreational fishers, but not as popular commercially where they are harvested using handlines, bottom longlines, and in some cases traps and trawls. Some Florida fishers feel that amberjack are being exposed to too much fishing pressure, especially owing to their attraction to reefs which make them an easy target for overfishing (Manooch and Potts 1997a). However, as of 1997 there is no evidence of overfishing in both the Gulf of Mexico and southeast Florida (Manooch and Potts 1997b).

3.2.3.1.3 Ephippidae

Miami-Dade County is designated as EFH for the spadefish because as juveniles it inhabits shallow sandy beaches, estuaries, jetties, wharves, and other inshore areas, as well as deeper offshore habitats as adults. Spawning which takes place from May to September involves an offshore migration as far as 64.4 km (Chapman 1978; Thresher 1984). Although no data exists regarding egg and larvae development in nature, small individuals (~ 1-2 cm TL) appear inshore in early summer (Walker 1991). These small juveniles are commonly observed drifting motionless along side vegetation (e.g., *Sargassum*). It has been suggested that they mimic floating debris and vegetation to escape predation. As spadefish mature they move further offshore where large schools would take residence around wrecks, oil and gas platforms, reefs, and occasionally open water. Spadefish are opportunistic feeders, preying upon a variety of items including small crustaceans, worms, hydroids, sponges, sea cucumbers, salps, anemones, and jellyfish. In certain areas, the spadefish is an important game fish.

3.2.3.1.4 Haemulidae

Miami-Dade County is designated as EFH for eleven species of grunts (Table 1). Collectively, these grunts inhabit shallow inshore areas (e.g., estuaries, mangroves, jetties, piers, seagrass beds), coral reefs, rock outcrops, and offshore waters as deep as 110 m. Although most of the life history data concerning grunts (Cummings et al. 1966; Manooch and Barans 1982; Darcy 1983; McFarland et al. 1985; Sedberry 1985) are from studies of tomtate, white grunt, French grunt, blue stripe grunt, and the margate, the general information can probably be applied to the other species as well. As a reef-dwelling species, grunts are probably similar to other roving benthic predators such as snappers and groupers that migrate to select spawning sites along the outer reef and participate in group spawning at dusk. Some data suggests that spawning takes place over much of the year, while other suggests spawning peaks in later winter and spring (Manooch and Barans 1982; Darcy 1983). The eggs are pelagic as well as the planktonic larvae. After this pelagic larval stage that may last several weeks, they settle to the bottom as benthic predators (Darcy 1983). The juveniles are commonly found in seagrass beds, near mangroves, and other inshore, shallow areas. Studies in the Caribbean regarding French grunt, suggested that fertilization and settlement was associated with the lunar cycle (quarter moon, rather than the full or new moon) and daily tidal cycles (rising and falling tides), respectively (McFarland et al. 1985). Juveniles are diurnal planktivores that tend to feed higher in the water column than adults on amphipods, copepods, decapods, and small fishes (Darcy 1983; Sedberry 1985). The transformation to adult involves a change in feeding strategy from diurnal planktivore to nocturnal benthic foraging. Most grunts take refuge near the reef in schools, but at dusk they disperse and forage over the reef, along sandy flats, and grass beds for crustaceans, fishes, mollusks, polychaetes, and ophiuroids. Because of these nocturnal foraging migrations, grunts are a major source of food for higher tropic level, piscivorous fishes. In addition, they are very important to hardbottom reef-related fisheries regarding the energy transfer from sandy expanses to these reefs (Darcy 1983). Several species of grunt such as the tomtate and white grunt have some commercial and recreational importance. Tomtate are commonly caught by sport fishermen from shore, bridges, jetties, and inshore waters by boat. In the southeastern United States, the hook and line fishery is the most important method of commercial harvest regarding tomtate (Darcy 1983). In addition, tomtate are collected using traps, trawls, and seines off southeast Florida. Commercially, tomtate are usually discarded or cut up and used as bait for the grouper or snapper fishery. Similarly, white grunt are commercially harvested by hook and line along the southeast United States and is also a common sport species.

3.2.3.1.5 Labridae

Miami-Dade County is designated as EFH for two species of wrasse (Table 1). The EFH for both species ranges from shallow reef and patch reefs, areas of hard sand and rock, and/or along areas inshore or offshore of the main reef. The puddingwife appears to be depth restricted as it is rare to find this species in waters deeper than 13.3 m, while the hogfish inhabits areas as shallow as 3.3 m deep (Thresher 1980). Reproduction in wrasses involves a complex reproductive system based on protogynous hermaphroditism which features a complex socio-sexual system involving sex reversal, alternate spawning systems and variable color patterns (Thresher 1980). Both species participate in group (the dominant or terminal male with a harem of females) broadcast spawning that occurs along the outer edge of a patch reef or on an extensive reef complex along the outer shelf during the summer months (Thresher 1984). Hogfish spawn during the late afternoon or early evening hours, while puddingwife spawning is synchronized with strong tidal or shoreline currents. Although the exact duration of both the planktonic egg and larval stage is unknown, some records suggest that the latter may be as short as one month before the larvae settle out. Newly settled hogfish and puddingwifes use common areas around grass flats and the shallow reef, respectively. The smallest juvenile on record collected on reefs is approximately 10 mm SL. Other data suggests that puddingwife as small as 30 mm SL may be sexually active. As a benthic predator, the diet of adult hogfish consists of mollusks, echinoderms, and small crustaceans (primarily crabs). Owing to their large size, hogfish are popular with sport fishers.

3.2.3.1.6 Lutjanidae

Miami-Dade County is designated as EFH for seven species of snapper (Table 1). Collectively, the EFH of these snappers ranges from shallow estuarine areas (e.g., vegetated sand bottom, mangroves, jetties, pilings, bays, channels, mud bottom) to offshore areas (e.g., hard and live bottom, coral reefs, rocky bottom) as deep as 400 m (Allen 1985; Bortone and Williams 1986). Like most snappers, these seven species participate in group spawning, which indicates either an offshore migration or a tendency for larger, mature individuals to take residency in deeper, offshore waters. Data suggests that adults tend to remain in one area. Both the eggs and larvae of these snappers are pelagic (Richards et al. 1994). After an unspecified period of time in the water column, the planktivorous larvae move inshore and become demersal juveniles. The diet of these newly settled juveniles consists of benthic crustaceans and fishes. Juveniles inhabit a variety of shallow, estuarine areas including vegetated sand bottom, bays, mangroves, finger coral, and seagrass beds. As adults, most are common to deeper offshore areas such as live and hardbottoms, coral reefs, and rock rubble. However, adult mutton, gray, and lane snapper also inhabit vegetated sand bottoms with gray snapper less frequently occurring in estuaries and mangroves (Bortone and Williams 1986). The diet of adult snappers includes a variety fishes, shrimps, crabs, gastropods, cephalopods, worms, and plankton. All seven species are of commercial and/or recreational importance In particular, the mutton, gray, lane, and yellowtail snapper comprise the major portion of Florida's snapper fishery (Bortone and Williams 1986).

3.2.3.1.7 Serranidae

Miami-Dade County is designated as EFH for six species of sea bass (Table 1). Collectively, the EFH of these sea bass ranges from shallow estuarine areas (e.g., seagrass beds, jetties, mangrove swamps) to offshore waters as deep as 300 m (Heemstra and Randall 1993; Jory and Iverson 1989; Mercer 1989). Like all other serranids, these six species are protogynous hermaphrodites; functioning initially as females only to undergo a sexual transformation at a later time to become functional males. In addition, like all other serrranids, these six species produce offshore planktonic eggs, moving into shallow, inshore water during their post-larval benthic stage. Juveniles inhabit estuarine, shallow areas such as seagrass beds, bays, harbors, jetties, piers, shell bottom, mangrove swamps, and inshore reefs. Juveniles feed on estuarine dependent prey such as invertebrates, primarily crustaceans, that comprise the majority of their diet at this developmental stage. As sub-adults and adults, they migrate further offshore taking refuge along rocky, hard, or live bottom, on artificial or coral reefs, in crevices, ledges, or caverns associated with rocky reefs. During this stage in their lives, the bulk of their diet consists of fishes, supplemented with crustaceans, crabs, shrimps, and cephalopods. Except for the Goliath grouper, the other species discussed in this section have some importance to commercial and/or recreational fisheries.

3.2.3.1.8 Sparidae

Miami-Dade County is designated as EFH for two species of porgy (Table 1). The EFH regarding both species ranges from shallow inshore waters (e.g., vegetated areas, jetties, piers, hard and rock bottoms), to deeper offshore waters with natural or artificial reefs, offshore gas and oil platforms, or live bottom habitat (Darcy 1986). Although nothing is known regarding the sexuality of the jolthead porgy, it is most likely a hermaphroditic species which is widely documented in sparids (Thresher 1984). On the other hand, the sheepshead has been determined to be a protogynous hermaphrodite through histological investigations (Render and Wilson 1992). Information regarding tropical sparids is limited, but in general, it suggests long spawning seasons. Little is known about spawning behavior, but it is presumed that both the sheepshead and the jolthead porgy produce pelagic eggs some distance off the bottom. Whether or not spawning takes place in pairs or in spawning aggregations has not been documented. Settlement of sheepshead larvae to the bottom occurs at about 25 mm TL (Thresher 1984). Based on their dentition, both species are well suited for benthic feeding of sessile and motile invertebrates (e.g., copepods, amphipods, mysids, shrimp, bivalves, gastropods) which are bitten off from hard substrates and vegetation. Neither sparid is considered a schooling species, although they will form small groups composed of several individuals occasionally. There is no direct commercial or sport fishery associated with either sparid; however, both are fished in coastal waters. Both species are an important constituent of grassbed communities in shallow water and live bottom communities in deeper water (Darcy 1986).

3.2.3.2 Summary of the Impacts to the Snapper-Grouper Complex Fishes

The project area includes sand bottom, sand-veneered hardbottom, hardbottom, and water column that may be used by these managed fishes and their prey. The project would impact a relatively small area of the sand and hardbottoms, and the impacts would be minor and short-term. Some possible refuge and related prey may be lost in regards to the impact to the hardbottom, seagrass and sand areas; however, additional refuge would be created by the construction of the artificial reef and seagrass mitigation areas to serve as replacement habitat. The project would cause localized turbidity during construction; however, turbidity would be minimized using the best management practices so that any impacts would be minor and temporary. These fishes and possible prey would be temporarily displaced, but should quickly return to the project area.

3.2.4 Coastal Migratory Pelagics Complex

Miami-Dade County, Florida is designated as EFH for six species of coastal migratory pelagic fishes that are listed under the Affected Fishery Management Plans and Fish Stocks of the Comprehensive EFH Amendment (SAFMC 1998). Collectively, these six species, representing three different families, are all members of the Coastal Migratory Pelagics Fish Species as outlined by SAFMC (1998). The association of these fishes or their prey with coral or hardbottom structure, or inshore waters during some period of their life cycle and their contribution to a reef fishery ecosystem is why they are included in this complex. A discussion of how these fishes utilize the different inshore habitats and the hardbottom and reef communities follows.

3.2.4.1 Life History

3.2.4.1.1 Coryphaenidae

The dolphin is oceanic and distributed worldwide in both tropical and subtropical waters. Data suggest that this species may be involved in northward migrations during the spring and summer with some occasional movements and migrations being controlled by drifting objects in open waters. Spawning which is poorly documented, it thought to take place in oceanic waters where pairing of the sexes occurs (Ditty et al. 1994). Based on the occurrence of young dolphin in the Florida Current, spawning may be almost year round (November - July) with peak activity in January through March (Palko et al. 1982). Owing to the oceanic distribution of this species, its not surprising that both the egg and larval stages are pelagic. Upon hatching, this species experiences rapid growth throughout its life with both sexes reaching sexually maturity within the first year (Palko et al. 1982). In the Straits of Florida, female dolphin begin to mature at 350 mm FL and become fully mature at 550 mm FL. On the other hand, the smallest, mature male on record is 427 mm FL. The maximum life span of dolphin is estimated at 4 years. The diet of dolphin alters throughout its life cycle (Palko et al. 1982). As larvae, they feed primarily on crustaceans, with copepods as the primary prey item. Adult dolphin are opportunistic, top-level predators. They feed upon a variety of fishes (e.g., flyingfish) and crustaceans, especially those species commonly associated with drifting flotsam and *Sargassum* in the Florida Current. As a prized food, dolphin are sought by both commercial and sport fishers. They are most commonly taken using hook and line around the edges of the continental shelf. In southern Florida, based on recreational catches, they appear most frequently March through August and then again September through February (Palko et al. 1982).

3.2.4.1.2 Rachycentridae

Cobia are distributed worldwide in tropical, subtropical, and warm temperate waters where they inhabit estuarine and shelf waters depending of their life stage. They appear to associate with structures such as pilings, wrecks and other forms of vertical relief (e.g. oil and gas platforms) and favor the shade from these structures (Mills 2000). Cobia spawn offshore where external fertilization takes place in large spawning aggregations; however, the pelagic eggs have been collected at both inshore and offshore stations. Based on past collections of gravid females, spawning takes place from mid May, extending through the end of August off South Carolina (Shaffer and Nakamura 1989). Consequently, spawning may start slightly early off the southeast coast of Florida. Eggs have been collected in the lower Chesapeake Bay inlets, North Carolina estuaries, in coastal waters 20 - 49 m deep, and near the edge of the Florida Current and the Gulf Stream (Ditty and Shaw 1992). Ditty and Shaw (1992) suggested that cobia spawn during the day since all the embryos they examined were at similar stages of development. Cobia exhibit rapid growth and may attain a length of 2 m FL and are known to live 10 years (Shaffer and Nakamura 1989). Although females grow faster than males, they attain sexual maturity later in life. Sexual maturity is attained by males at approximately 52 cm FL during the second year and at approximately 70 cm FL for females during their third year (Shaffer and Nakamura 1989). They are adaptable to their environment and can utilize a variety of habitats and prey. Cobia are voracious predators that forage primarily near the bottom, but on occasion do take some prey near the surface. Their favorite benthic prey are crabs, and to a much less extent other benthic invertebrates and fishes. No predator studies have been conducted, but dolphin fish have been known to feed on small cobia. Adults may be found solitary or in small groups and are known to associate with rays, sharks, and other larger fishes. Cobia is fished both commercially and recreationally; however, the commercial harvest is mostly incidental in both the hook and line and net fisheries. The recreational harvest is primarily through charter boats, party boats and fishers fishing from piers and jetties. Tagging studies have documented a north-south, spring-fall migration along the southeast United States and an inshore-offshore, spring-fall migration off South Carolina (Ditty and Shaw 1992).

3.2.4.1.3 Scombridae

Miami-Dade County is designated as EFH for six scombrid species (Table 1). Collectively, the EFH of these epipelagic scombrids ranges from clear waters around coral reefs, and inshore and continental shelf waters (Collette and Nauen 1983). Spawning of king and Spanish mackerel takes place May through September with peaks in July and August. The cero is thought to spawn year round with peaks in April through October, whereas little tunny spawn from April to November. Batch spawning takes place in tropical and subtropical waters, frequently inshore. The eggs are pelagic and hatch into planktonic larvae. Both king and Spanish mackerel are involved in migrations along the western Atlantic coast. With increasing water temperatures, Spanish mackerel move northward from Florida to Rhode Island between late February and July, and back in the fall (Collette and Nauen 1983). King mackerel have been reported to migrate along the western Atlantic coast in large schools; however, there appears to be a resident population in south Florida as this species is available to sport fishers year round (Collette and Nauen 1983). Although the little tunny is epipelagic, it typically inhabits inshore waters in schools of similar size fish and/or with other scombrids (Collette and Nauen 1983). The diet of these scombrids consists of primarily fishes and to a lesser extent penaeid shrimp and cephalopods. The fishes that make up the bulk of their diet are small schooling clupeids (e.g., menhaden, alewives, thread herring, anchovies), atherinids, and to a lesser extent jack mackerels, snappers, grunts, and half beaks (Collette and Nauen 1983). The king and Spanish mackerel are important both commercially and recreationally. The king mackerel is a valued sport fish year round in Florida while the sport fisheries for Spanish mackerel in southern Florida is concentrated in the winter months. The cero is a valued sport fish that is taken primarily by trolling. The little tunny is not of commercial or recreational interest.

3.2.5 Summary of Impacts to the Coastal Migratory Pelagics Complex Fishes

The project area includes sand bottom, sand-veneered hardbottom, hardbottom, and water column that may be used by these managed fishes and their prey. Some possible refuge and related prey may be lost in regards to the impact to the hardbottom and sand areas; however, additional refuge would be created by the construction of an acre artificial reef to serve as replacement habitat. The project would cause localized turbidity during construction; however, turbidity would be minimized using the best management practices so that any impacts would be minor and temporary. These fishes and possible prey would be temporarily displaced, but should quickly return to the project area.

3.3 Associated Species

Associated species consists of living resources that occur in conjunction with the managed species discussed earlier. These living resources would include the primary prey species and other fauna that occupy similar habitats.

3.3.1 Invertebrates

Dredging and blasting associated with widening and deepening would result in direct adverse effects on invertebrate species in the area. Initially this would result in a significant, but localized reduction in the abundance, diversity, and biomass of the immediate fauna. Species affected most are those that have limited capabilities or are incapable in avoiding the dredging activities due to a sedentary lifestyle. The fauna most affected would include predominantly invertebrates such as crustaceans, echinoderms, mollusks, and annelids. However, due to the relatively small area that would be impacted as viewed on a spatial scale, impacts to the benthic community would be minimal due to the relatively short period of recovery following dredging activities (Culter and Mahadevan 1982; Saloman et al. 1982). Adjacent areas not impacted would most likely be the primary source of recruitment to the impacted area.

Zooplankton are primarily filter feeders and suspended inorganic particles can foul the fine structures associated with the feeding appendages. Zooplankton that feed by ciliary action (e.g., echinoderm larvae) would also be susceptible to mechanical affects of suspended particles (Sullivan and Hancock 1977). Zooplankton mortality is assumed from the physical trauma associated with dredging activities (Reine and Clark 1998). The overall impact on the zooplankton community should be minimal due to the limited extent and transient nature of the sediment plume.

3.3.2 Fishes

The larvae of the managed fish species discussed in this document are hatched from planktonic eggs (excluding the gray triggerfish) and the larvae are also planktonic. The primary source of larval food is microzooplankton with a dietary overlap in many species and specialization (Sale 1991). Algae are most likely food for only the youngest larval stages of certain species or for those larvae that are very small after hatching, and then only for a short time. The algae-eating larvae eventually switch to animal food while they are still small. At this time, varying life history stages of copepods become the dominant food and to a lesser extent cladocerans, tunicate and gastropod larvae, isopods, amphipods, and other crustacea.

Larval feeding efficiency depends on many factors such as light intensity, temperature, prey evasiveness, food density, larva experience, and olfaction (Gerking 1994). Larval fishes are visual feeders that depend on adequate light levels in the water column which reduces the reaction distance between larval fish and prey. Suspended sediment and dispersion due to dredging activities would increase turbidity levels in the project area temporarily. This would reduce light levels within the water column, which may have a short-term negative effect on feeding efficiency. In addition, turbidity can affect light scattering, which would impede fish predation (Benfield and Minello 1996). However, because the sediment plumes are transient and temporary, and the area to be impacted is relatively small when examined on a spatial scale, the overall impact to the larval fish population and consequently, the adult population should be minimal (Sale 1991). The majority of larval fish mortality would be attributed to the physical trauma associated with the dredging activities.

Similar to larval fishes, both juvenile and adult fishes are primarily visual feeders. Consequently, the visual effects of turbidity as outlined above will apply. Also, suspended sediment can impair feeding ability by clogging the interraker space of the gill raker or the mucous layer of filter feeding species

(Gerking 1994). However, because these fishes have the ability to migrate away from the dredging activities, the impact of the sediment plumes that are transient and temporary should be minimal. Although few adult fishes have been entrained by dredging operations (McGraw and Armstrong 1988; Reine and Clark 1998), most juvenile and adult fishes again have the ability to migrate away from the dredging activities. Consequently, dredging operations would have minimal effects on juvenile and adult fishes in the area. In addition, the reduction of benthic epifaunal and infaunal prey, and pelagic prey in the immediate area would have little affect on juvenile and adult fishes because they can migrate to adjacent areas that have not been impacted to feed.

In addition to the managed fish species discussed in this document, many other inshore and pelagic fishes in various stages of life occur in the project area (Gilmore 1977; Vare 1991; Lindeman and Snyder 1999). A total of 192 species have been recorded in association with nearshore hardbottom habitats in southeast Florida (Lindeman and Snyder 1999). In the study conducted by Lindeman and Snyder (1999), 80 percent of the fishes collected at all sites were early life stages. In addition, eight of the top ten fish species were consistently represented by early life stages, and the use of hardbottom habitats was recorded for newly settled stages of more than 20 species of fishes. This provided evidence that suggested that these nearshore hardbottom habitats along the mainland coast of east Florida may serve as nursery grounds for a wide diversity of juvenile reef fishes. Lindeman and Snyder (1999) estimated that 34 species of fishes used nearshore hardbottom habitats as a nursery. These nearshore hardbottom habitats may actually serve several nursery-related roles such as, 1) a centrally located refuge for incoming early life stages that would exhibit considerably greater mortality if shelter were not available, 2) habitat for juvenile fishes (e.g., gray snapper, blue stripe grunt) that emigrate out of inlets to offshore waters, and 3) an area to promote growth because of the greater availability of prey at these hardbottom habitats.

3.3.3 Summary of Impacts to Associated Species

Many of the fishes associated with nearshore hardbottom habitats as observed in past studies (Gilmore 1977; Vare 1991; Lindeman and Snyder 1999), would be common along Miami-Miami-Dade County. The majority of juvenile and adult fishes would be displaced to adjacent habitat during dredging operations; consequently, mortality of these fishes should be minimal. Only those species that produce demersal eggs and that comprise the demersal ichthyofauna could potentially be impacted more heavily than their pelagic counterparts. Mortality of demersal eggs and larvae would be expected from the physical trauma associated with dredging operations. Suspended sediments produced by these operations can affect the feeding activity of pelagics as outlined earlier; however, the impact to these fishes should be minimal due to the limited extent and transient nature of the sediment plume.

4.0 CONCLUSIONS

The proposed project would impact seagrass, hardbottom/reef, algae, and water column. Construction of a mitigation reef and restoration of seagrass habitat may create high quality nearshore hardbottom and seagrass habitat similar to what is currently available within the study area. Significant adverse impacts to those species associated with EFH within the project area are not expected.

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