



**UNITED STATES DEPARTMENT OF COMMERCE**  
**National Oceanic and Atmospheric Administration**  
**NATIONAL MARINE FISHERIES SERVICE**  
Southeast Regional Office  
263 13<sup>th</sup> Avenue South  
St. Petersburg, Florida 33701-5505  
<https://www.fisheries.noaa.gov/region/southeast>

F/SER31:KBD  
SERO-2020-01301  
SERO-2020-01643

Chief, Miami Permits Section  
Jacksonville District Corps of Engineers  
Department of the Army  
9900 Southwest 107<sup>th</sup> Avenue, Suite 203  
Miami, Florida 33176

Ref.: SAJ-2019-04582, Ariel Haroush Riprap, North Miami, Miami-Dade County, Florida  
SAJ-2019-01931, 1645 Cleveland Road LLC Dock, Miami Beach, Miami-Dade County, Florida

Dear Sir or Madam:

The enclosed Biological Opinion (Opinion) was prepared by the National Marine Fisheries Service (NMFS) pursuant to Section 7(a)(2) of the Endangered Species Act (ESA). The Opinion considers the effects of 2 proposals by the Jacksonville District of the United States Army Corps of Engineers (USACE) to authorize the following proposed actions at separate locations: 1) installation of riprap and maintenance dredging and 2) construction of a wood dock and terminal platform. NMFS concludes that the proposed actions may affect, but are not likely to adversely affect, green sea turtle (North and South Atlantic distinct population segments [DPSs]), hawksbill sea turtle, Kemp's ridley sea turtle, loggerhead sea turtle (Northwest Atlantic DPS), giant manta ray, and smalltooth sawfish (United States DPS). NMFS concludes that the proposed actions are likely to adversely affect, but will not destroy or adversely modify, Johnson's seagrass designated critical habitat.

Please direct questions regarding this Opinion to Kay Davy, Consultation Biologist, by phone at (727) 415-9271, or by email at [Kay.Davy@noaa.gov](mailto:Kay.Davy@noaa.gov).

Sincerely,

Andrew J. Strelcheck  
Acting Regional Administrator

Enc.: Biological Opinion  
File: 1514-22.F.4



**Endangered Species Act - Section 7 Consultation  
Biological Opinion**

**Action Agency:** United States Army Corps of Engineers (USACE), Jacksonville District

**Applicants:** Ariel Haroush  
Permit Number SAJ-2019-04582

1645 Cleveland Road LLC  
Permit Number SAJ-2019-01931

**Activities:** Riprap Installation and Dock Installation, Miami-Dade County, Florida

**Consulting Agency:** National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS), Southeast Regional Office, Protected Resources Division, St. Petersburg, Florida

Tracking Number SERO-2020-01301, Ariel Haroush Riprap  
Tracking Number SERO-2020-01643, 1645 Cleveland Road LLC  
Dock

**Approved By:**

---

Andrew J. Strelcheck, Acting Regional Administrator  
NMFS, Southeast Regional Office  
St. Petersburg, Florida

**Date Issued:**

---

## Table of Contents

---

1	CONSULTATION HISTORY .....	6
2	DESCRIPTION OF THE PROPOSED ACTION AND ACTION AREA .....	6
3	STATUS OF LISTED SPECIES AND CRITICAL HABITAT .....	9
4	ENVIRONMENTAL BASELINE.....	15
5	EFFECTS OF THE ACTION ON CRITICAL HABITAT .....	17
6	CUMMULATIVE EFFECTS.....	19
7	DESTRUCTION/ADVERSE MODIFICATION ANALYSIS .....	20
8	CONCLUSION.....	21
9	INCIDENTAL TAKE STATEMENT.....	22
10	CONSERVATION RECOMMENDATIONS.....	22
11	REINITIATION OF CONSULTATION.....	23
12	LITERATURE CITED.....	23

## List of Figures

---

Figure 1. Image showing the 2 project sites in relation to each other in Biscayne Bay, Miami-Dade County, Florida (©2020 Google). .....	7
Figure 2. Image showing the Ariel Haroush project site in Biscayne Bay at 1989 NE 119 Road, North Miami, Miami-Dade County, Florida (©2020 Google). .....	8
Figure 3. Image showing the 1645 Cleveland Road LLC project site in Biscayne Bay at 1645 Cleveland Road, Miami Beach, Miami-Dade County, Florida (©2020 Google). .....	9
Figure 4. Johnson’s seagrass critical habitat Unit J (©2015 Google, Data SIO, NOAA, U.S. Navy, NGA, GEBCO) .....	14

## List of Tables

---

Table 1. Effects Determinations for Species the Action Agency and/or NMFS Believe May Be Affected by the Proposed Action.....	10
Table 2. Effects Determinations for Designated Critical Habitat the Action Agency and/or NMFS Believe May Be Affected by the Proposed Action .....	10
Table 3. Designated Critical Habitat Units for Johnson’s Seagrass.....	13

## Acronyms and Abbreviations

---

CFR	Code of Federal Regulations
DPS	Distinct Population Segment
ECO	NMFS Environmental Consultation Organizer
ESA	Endangered Species Act
MLW	Mean Low Water
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
Opinion	Biological Opinion
PRD	NMFS Southeast Regional Office Protected Resources Division
U.S.	United States
USACE	U.S. Army Corps of Engineers

---

## Units of Measurement

---

ac	acre(s)
ft	foot/feet
ft <sup>2</sup>	square foot/feet
in	inch(es)
km	kilometer(s)
m	meters

## Introduction

---

Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. § 1531 et seq.), requires that each federal agency ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species. Section 7(a)(2) requires federal agencies to consult with the appropriate Secretary in carrying out these responsibilities. The National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) and the United States Fish and Wildlife Service share responsibilities for administering the ESA.

Consultation is required when a federal action agency determines that a proposed action “may affect” listed species or designated critical habitat. Informal consultation is concluded after NMFS determines that the action is not likely to adversely affect listed species or critical habitat. Formal consultation is concluded after NMFS issues a Biological Opinion (“Opinion”) that identifies whether a proposed action is likely to jeopardize the continued existence of a listed species, or destroy or adversely modify critical habitat, in which case reasonable and prudent alternatives to the action as proposed must be identified to avoid these outcomes. The Opinion states the amount or extent of incidental take of the listed species that may occur, develops measures (i.e., reasonable and prudent measures) to reduce the effect of take, and recommends conservation measures to further the recovery of the species.

This document represents NMFS’s Opinion based on our review of impacts associated with the proposed actions within Miami-Dade County, Florida. This Opinion analyzes the proposed actions’ effects on threatened and endangered species and designated critical habitat, in accordance with Section 7 of the ESA. We based our Opinion on individual project information provided by the Jacksonville District of the U.S. Army Corps of Engineers (USACE) and other sources of information, including the published literature cited herein.

## 1 CONSULTATION HISTORY

---

The following is the consultation history for ECO identifier number SERO-2020-01301, Ariel Haroush Riprap. NMFS received a request for formal consultation under Section 7 of the ESA from the USACE for construction permit application SAJ-2019-04582 in a letter dated May 4, 2020, and initiated consultation that day.

The following is the consultation history for ECO identifier number SERO-2020-01643, 1645 Cleveland Road LLC Dock. On June 18, 2020, NMFS received a request for formal consultation under Section 7 of the ESA from the USACE for construction permit application SAJ-2019-01931 on June 18, 2020, and initiated consultation that day.

NMFS batched the 2 consultations into 1 Opinion due to the similarities in project location, scope, and scale, and effects to ESA-listed species and designated critical habitat.

## 2 DESCRIPTION OF THE PROPOSED ACTIONS AND ACTION AREAS

---

### 2.1 Proposed Actions

#### 2.1.1 Ariel Haroush Riprap

The USACE proposes to permit the placement of 520 ft<sup>2</sup> of new limestone boulder riprap along 65 linear ft of new seawall that was previously permitted, and to maintenance dredge 1,237 ft<sup>2</sup> of a slip area for a marginal dock located in the adjacent residential canal. Limestone boulders measuring 1-3 ft would be placed at the foot of the previously permitted seawall. All work will be completed from a barge. In-water work is expected to take 1 month to complete during daylight hours only. The applicant will comply with NMFS's *Sea Turtle and Smalltooth Sawfish Construction Conditions*<sup>1</sup> and will use turbidity curtains. The maintenance dredging portion of this proposed action has been determined to comply with JAXBO<sup>2</sup> and therefore is covered by that programmatic biological opinion. This Opinion relies on JAXBO by reference for effects of maintenance dredging activities already evaluated in JAXBO, to avoid providing for duplicate takes or impacts to ESA-managed resources. Nonetheless, this Opinion still ensures that the entire project being implemented avoids jeopardizing listed species or destroying or adversely modifying critical habitat by evaluating the full scope of effects.

#### 2.1.2 1645 Cleveland Road LLC Dock

The USACE proposes to permit the installation of a 67 ft by 4 ft wood dock access walkway and a 29 ft by 8 ft wood terminal platform with 20 new 12-in diameter wood piles, and install 2 new 12 in diameter wood mooring piles. There will be no spacing between the deck boards. The

---

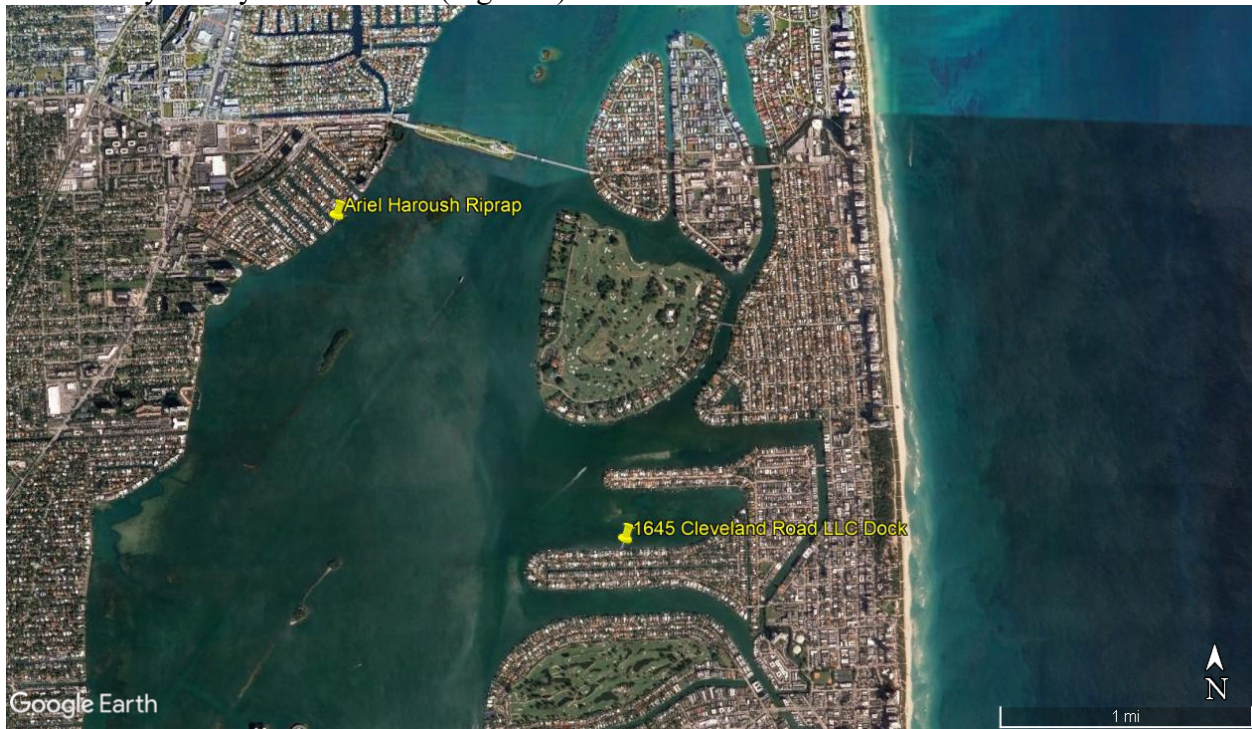
<sup>1</sup> NMFS. 2006. *Sea Turtle and Smalltooth Sawfish Construction Conditions* revised March 23, 2006. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southeast Regional Office, Protected Resources Division, Saint Petersburg, Florida. ([Sea Turtle and Smalltooth Sawfish Construction Conditions](#))

<sup>2</sup> U.S. Army Corps of Engineers Jacksonville District's Programmatic Biological Opinion (JAXBO) issued by NMFS on November 20, 2017 (SER-2015-17616)

wood piles will be installed with an impact hammer. All work will be completed from uplands and a barge. A maximum of 10 piles will be driven per day. One new vessel slip will be added. In-water work is expected to take up to 4 weeks to complete during daylight hours only. The applicant will comply with NMFS's *Sea Turtle and Smalltooth Sawfish Construction Conditions* and will use turbidity curtains.

## 2.2 Action Areas

Both project sites fall within the boundaries of Johnson's seagrass designated critical habitat Unit J, which encompasses the northern portion of Biscayne Bay from Northeast 163<sup>rd</sup> Street south to Central Key Biscayne at 25°45' N (Figure 1).



**Figure 1. Image showing the 2 project sites in relation to each other in Biscayne Bay, Miami-Dade County, Florida (©2020 Google).**

### 2.2.1 Ariel Haroush Riprap

The proposed project site is located on an upland lot developed for a single family residence with an existing dock and seawall at 1989 NE 119 Road, North Miami, Miami-Dade County, Florida (25.883603°N, 80.155812°W [North American Datum 1983 (NAD83)]) in Biscayne Bay approximately 2.4 mi from the nearest inlet to the Atlantic Ocean (Figure 2).



**Figure 2. Image showing the Ariel Haroush project site in Biscayne Bay at 1989 NE 119 Road, North Miami, Miami-Dade County, Florida (©2020 Google).**

The action area is defined by regulation as “all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action” (50 CFR 402.02). For the purposes of this Federal action, the action area includes the shoreline and submerged habitat within the immediate vicinity of the project site that will be affected by the proposed action, including the submerged habitat within the boundary of the turbidity curtain.

A benthic survey was performed on August 13, 2018. There were no mangroves within the project footprint. According to the survey, there are small patches of very sparse paddle grass found within the riprap placement area and adjacent to the project area approximately 22 ft seaward of the existing dock. Water depths where the riprap is to be placed adjacent to the existing seawall range from 1.5 ft to 3.0 ft MLW. The project area has a silty substrate.

#### 2.2.2 1645 Cleveland Road LLC Dock

The proposed project site is located on an upland lot developed for a single family residence with an existing concrete seawall. There are no boat slips. The site is located at 1645 Cleveland Road, Miami Beach, Miami-Dade County, Florida (25.864806°N, 80.137183°W [NAD83]) in Biscayne Bay approximately 3.6 mi from the nearest inlet to the Atlantic Ocean (Figure 3).





**Figure 3. Image showing the 1645 Cleveland Road LLC project site in Biscayne Bay at 1645 Cleveland Road, Miami Beach, Miami-Dade County, Florida (©2020 Google).**

The action area is defined by regulation as “all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action” (50 CFR 402.02). For the purposes of this Federal action, the action area includes the shoreline and submerged habitat within the immediate vicinity of the project site that will be affected by the proposed action, including the submerged habitat within the boundary of the turbidity curtain. The action area here is equivalent to the largest radius of effects to ESA-listed species based on the proposed action’s installation of 12-in wood piles using impact hammer (i.e., 705-ft behavioral noise radius).

A benthic survey was performed on October 12, 2016. There were no mangroves within the project footprint. According to the survey, there are patches of shoal, manatee, turtle, and paddle grasses found adjacent to the project area beginning at approximately 7 ft to 9 ft seaward of the existing seawall. One coral colony of *Siderastrea* was noted beyond the project footprint. Water depths adjacent to the existing seawall range from 1.2 ft to 1.8 ft MLW. The project area has a silty substrate.

### **3 STATUS OF LISTED SPECIES AND CRITICAL HABITAT**

---

We believe the species listed in Table 1 may be present within the action area.

**Table 1. Effects Determinations for Species the Action Agency and/or NMFS Believe May Be Affected by the Proposed Action**

Species	ESA Listing Status <sup>3</sup>	Action Agency Effect Determination	NMFS Effect Determination
<b>Sea Turtles</b>			
Green (North Atlantic [NA] DPS)	T	NLAA	NLAA
Green (South Atlantic [SA] DPS)	T	NLAA	NLAA
Kemp's ridley	E	NLAA	NLAA
Leatherback	E	NLAA	NE
Loggerhead (Northwest Atlantic [NWA] DPS)	T	NLAA	NLAA
Hawksbill	E	NLAA	NLAA
<b>Fish</b>			
Smalltooth sawfish (U.S. DPS)	E	NLAA	NLAA
Giant manta ray	T	*	NLAA

\*USACE did not provide a determination

We believe the project will have no effect on leatherback sea turtles due to the species' very specific life history strategy, which is not supported at the site. Leatherback sea turtles have pelagic, deepwater life history, where they forage primarily on jellyfish.

Table 2 provides the effects determinations for designated critical habitat occurring in the action area that the USACE and/or NMFS believe may be affected by the proposed actions.

**Table 2. Effects Determinations for Designated Critical Habitat the Action Agency and/or NMFS Believe May Be Affected by the Proposed Action**

Critical Habitat	Unit	USACE Effect Determination	NMFS Effect Determination
Johnson's seagrass	Unit J	Likely to adversely affect	Likely to adversely affect

### 3.1 Potential Routes of Effect Not Likely to Adversely Affect Listed Species

We believe that sea turtles (green, loggerhead, hawksbill, and Kemp's ridley), giant manta rays, and smalltooth sawfish may be found in or near the action areas and may be affected by the proposed actions covered in this Opinion. We have identified the following potential adverse effects to these species and concluded that these species are not likely to be adversely affected by the proposed action for the reasons described below.

The action areas contain shallow water habitat that may be used by sea turtle species, giant manta rays, and smalltooth sawfish for foraging and refuge. Sea turtles, giant manta rays, and smalltooth sawfish may be affected by their inability to access the action areas due to their

<sup>3</sup> E = endangered; T = threatened; NLAA = may affect, not likely to adversely affect; NE = no effect

avoidance of construction activities and physical exclusion from the project area due to blockage by turbidity curtains. We believe habitat displacement effects to sea turtles, giant manta rays, and smalltooth sawfish will be insignificant because the proposed action will be temporary and intermittent (i.e., in-water work will last up to 1 month for each project and construction for all proposed actions will occur during daylight hours only) and will only occur within a small area adjacent to otherwise open water. In addition, because these species are mobile, we expect that they will move away from construction activities and forage in adjacent areas with similar habitat in Biscayne Bay.

Effects to sea turtles, giant manta rays, and smalltooth sawfish include the potential for injury from construction equipment or materials. We believe this effect is extremely unlikely to occur. Because these species are highly mobile, we expect these species to move away from the action area if disturbed. The applicants have also agreed to adhere to NMFS's *Sea Turtle and Smalltooth Sawfish Construction Conditions*, which will further reduce the risk by requiring all construction personnel to watch for sea turtles and smalltooth sawfish. Operation of any mechanical construction equipment will cease immediately if a sea turtle or smalltooth sawfish is seen within a 50-ft radius of moving equipment. Activities will not resume until the protected species has departed the project area of its own volition.

An increase in vessel traffic in the area may result from the addition of 1 new vessel slip at the 1645 Cleveland Road project. Sea turtles and the giant manta ray could be affected by increased vessel traffic in the area, as it may increase the risk of collision with these species. We believe the potential effect on sea turtles and manta rays resulting from increased vessel traffic associated with the proposed action is discountable based on a recent NMFS analysis.<sup>4</sup> It would take an introduction of at least 300 new vessels to an area to result in a take of 1 sea turtle in any single year. Due to the limited available information on the giant manta ray, and because we expect the circumstances and factors resulting in vessel strike injury are similar between sea turtles and the giant manta ray, we also rely on the more robust available data on sea turtle vessel strike injury to serve as a proxy for the giant manta ray. Because this project will result in far less than 300 new vessels, we believe it is extremely unlikely that sea turtles or manta rays will be killed or injured by new or increased vessel traffic.

Noise created by pile driving activities can physically injure animals or change animal behavior in the affected areas. Injurious effects can occur in 2 ways. First, immediate adverse effects can occur to listed species if a single noise event exceeds the threshold for direct physical injury. Second, effects can result from prolonged exposure to noise levels that exceed the daily cumulative exposure threshold for the animals, and these can constitute adverse effects if animals are exposed to the noise levels for sufficient periods. Behavioral effects can be adverse if such effects interfere with animals migrating, feeding, resting, or reproducing, for example. Our evaluation of effects to listed species as a result of noise created by construction activities is based on the analysis prepared in support of the Opinion for SAJ-82.<sup>5</sup> The noise analysis in this

---

<sup>4</sup> Barnette, M. 2018. Threats and Effects Analysis for Protected Resources on Vessel Traffic Associated with Dock and Marina Construction. NMFS Southeast Regional Office Protected Resources Division Memorandum. October 31, 2018.

<sup>5</sup> NMFS. Biological Opinion on Regional General Permit SAJ-82 (SAJ-2007-01590), Florida Keys, Monroe County, Florida. June 10, 2014.

consultation evaluates effects to sea turtles, giant manta rays, and smalltooth sawfish identified by NMFS as potentially affected in the table above. While we have no information regarding noise effects specific to giant manta ray, we believe that effects to giant manta ray from pile driving noise would be very similar to effects on smalltooth sawfish, which are considered in SAJ-82, because both species are elasmobranchs and lack swim bladders.

Based on our noise calculations for the 1645 Cleveland Road LLC project, installation of 12-in diameter wood piles by impact hammer will not cause single-strike or peak-pressure injurious noise effects. However, the cumulative sound exposure level of multiple pile strikes over the course of a day may cause injury to ESA-listed fish species and sea turtles up to 30 ft (9 m) away from the pile. Due to the mobility of ESA-listed fish species and sea turtles, and because the project construction occurs in open water, we expect them to move away from noise disturbances. Because we anticipate the animal will move away, we believe that an animal's suffering physical injury from noise is extremely unlikely to occur. An animal's movement away from the injurious sound radius is a behavioral response, with the same effects that are discussed below.

The installation of wood piles by impact hammer could also result in behavioral effects at radii 705 ft (215 m) for ESA-listed fishes and 151 ft (46 m) for sea turtles. Due to the mobility of ESA-listed fish species and sea turtles, we expect them to move away from noise disturbances in this open-water environment. Because there is similar habitat nearby, we believe behavioral effects will be insignificant. If an individual animal chooses to remain within the behavioral response zone, it could be exposed to behavioral noise impacts during pile installation. Since installation will occur only during the day, these species will be able to resume normal activities during quiet periods between pile installations and at night. Therefore, we anticipate any behavioral effects will be insignificant.

### **3.2 Designated Critical Habitat Likely To Be Adversely Affected**

The term "critical habitat" is defined in Section 3(5)(A) of the ESA as (i) the specific areas within the geographic area occupied by a species, at the time it is listed in accordance with the Act, on which are found those physical or biological features (1) essential to the conservation of the species and (2) that may require special management considerations or protection; and (ii) specific areas outside the geographic area occupied by a species at the time it is listed, upon a determination that such areas are essential for the conservation of the species. "Conservation" is defined in Section 3(3) of the ESA as "...the use of all methods and procedures that are necessary to bring any endangered or threatened species to the point at which listing under [the ESA] is no longer necessary."

#### **3.2.1 Johnson's Seagrass Critical Habitat**

##### *Description*

NMFS designated Johnson's seagrass critical habitat on April 5, 2000 (65 FR 17786; see also, 50 CFR 226.213). The specific areas occupied by Johnson's seagrass and designated by NMFS as critical habitat are those with 1 or more of the following criteria:

1. Locations with populations that have persisted for 10 years
2. Locations with persistent flowering populations
3. Locations at the northern and southern range limits of the species
4. Locations with unique genetic diversity
5. Locations with a documented high abundance of Johnson’s seagrass compared to other areas in the species’ range

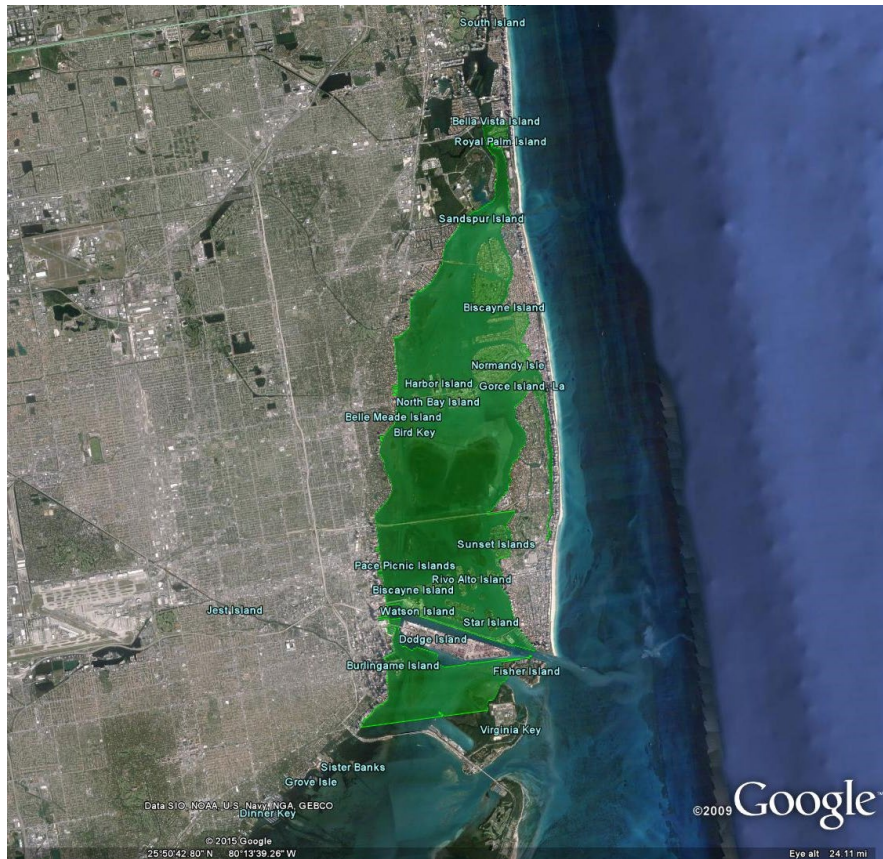
Ten areas (Units) within the range of Johnson’s seagrass (approximately 200 km of coastline from Sebastian Inlet to northern Biscayne Bay, Florida) are designated as Johnson’s seagrass critical habitat (Table 3). The total range-wide acreage of critical habitat for Johnson’s seagrass is roughly 22,574 ac (NMFS 2002).

**Table 3. Designated Critical Habitat Units for Johnson’s Seagrass**

<b>Unit</b>	<b>Location/Area</b>
<b>A</b>	A portion of the Indian River, Florida, north of the Sebastian Inlet Channel
<b>B</b>	A portion of the Indian River, Florida, south of the Sebastian Inlet Channel
<b>C</b>	A portion of the Indian River Lagoon, Florida, in the vicinity of the Fort Pierce Inlet
<b>D</b>	A portion of the Indian River Lagoon, Florida, north of the St. Lucie Inlet
<b>E</b>	A portion of Hobe Sound, Florida, excluding the federally marked navigation channel of the Intracoastal Waterway
<b>F</b>	A portion of the south side of Jupiter Inlet, Florida
<b>G</b>	A portion of Lake Worth, Florida, north of Bingham Island
<b>H</b>	A portion of Lake Worth Lagoon, Florida, located just north of the Boynton Inlet
<b>I</b>	A portion of northeast Lake Wyman, Boca Raton, Florida, excluding the federally marked navigation channel of the Intracoastal Waterway
<b>J</b>	A portion of northern Biscayne Bay, Florida, including all parts of the Biscayne Bay Aquatic Preserve excluding the Oleta River, Miami River, and Little River beyond their mouths, the federally marked navigation channel of the Intracoastal Waterway, and all existing federally authorized navigation channels, basins, and berths at the Port of Miami to the currently documented southernmost range of Johnson’s seagrass, Central Key Biscayne

*Critical Habitat Unit Impacted by this Action*

This consultation focuses on activities that occurs in Unit J, which encompasses the northern portion of Biscayne Bay from Northeast 163<sup>rd</sup> Street south to Central Key Biscayne at 25°45’N (Figure 4). This portion of Biscayne Bay is bound by heavy residential and commercial development, though a few areas of mangrove shoreline remain. Dredge and fill projects have resulted in a number of spoil islands and channels too deep for seagrass growth. Biscayne Bay supports a diversity of biological communities including intertidal wetlands, seagrasses, hard bottom, coral assemblages, and open water. Unit J is wholly within the Biscayne Bay Aquatic Preserve.



**Figure 4. Johnson's seagrass critical habitat Unit J (©2015 Google, Data SIO, NOAA, U.S. Navy, NGA, GEBCO)**

#### *Essential Features of Critical Habitat*

NMFS identified 4 habitat features essential for the conservation of Johnson's seagrass: (1) adequate water quality, defined as being free from nutrient over-enrichment by inorganic and organic nitrogen and phosphorous or other inputs that create low oxygen conditions; (2) adequate salinity levels, indicating a lack of very frequent or constant discharges of fresh or low-salinity waters; (3) adequate water transparency, which would allow sunlight necessary for photosynthesis; and (4) stable, unconsolidated sediments that are free from physical disturbance. All 4 essential features must be present in an area for it to function as critical habitat for Johnson's seagrass.

#### *Status and Threats*

A wide range of activities, many funded, authorized, or carried out by federal agencies, have and will continue to affect the essential habitat requirements of Johnson's seagrass. These are generally the same activities that may affect the species itself, and include: (1) vessel traffic and the resulting propeller dredging; (2) dredge and fill projects; (3) dock, marina, and bridge construction; (4) water pollution; and (5) land use practices (shoreline development, agriculture, and aquaculture).

Vessel traffic has the potential to affect Johnson's seagrass critical habitat by reducing water transparency. Operation of vessels in shallow water environments often leads to the suspension

of sediments due to the spinning of propellers on or close to the bottom. Suspended sediments reduce water transparency and the depth to which sunlight penetrates the water column. Populations of Johnson's seagrass that inhabit shallow water and water close to inlets where vessel traffic is concentrated are likely to be most affected. This effect is expected to worsen with increases in boating activity.

The dredging of bottom sediments to maintain, or in some cases create, inlets, canals, and navigation channels can directly affect essential features of Johnson's seagrass critical habitat. Dredging results in turbidity through the suspension of sediments. As discussed previously, the suspension of sediments reduces water transparency and the depth to which sunlight can penetrate the water column. The suspension of sediments from dredging can also resuspend nutrients, which could result in over-enrichment and/or reduce dissolved oxygen levels. Further, dredging can destabilize sediments and alter both the shape and depth of the bottom within the dredged footprint. This may affect the ability of the critical habitat to function through the removal or modification of essential features.

Dock, marina, and bridge construction leads to loss of habitat via construction impacts (e.g., pile installation) and shading. Similar to dredging, installation of piles for docks or bridges can result in increased turbidity that can negatively impact water transparency over short durations. Additionally, installed piles also replace the stable, unconsolidated bottom sediments essential for the species. Completed structures can have long-term effects on critical habitat in the surrounding area because of the shade they produce. While shading does not affect water transparency directly, it does affect the amount and/or duration of sunlight that can reach the bottom. The threat posed by dock, marina, and bridge construction is especially apparent in coastal areas where Johnson's seagrass is found.

Other threats include inputs from adjacent land use. Johnson's seagrass critical habitat located in proximity to rivers, canal mouths, or other discharge structures is affected by land use within the watershed. Waters with low salinity that are highly colored and often polluted are discharged to the estuarine environment. This can impact salinity, water quality, and water transparency, all essential features of Johnson's seagrass critical habitat. Frequent pulses of freshwater discharge to an estuarine area may decrease salinity of the habitat and provoke physiological stress to the species. Nutrient over-enrichment, caused by inorganic and organic nitrogen and phosphorous loading via urban and agricultural land run-off, stimulates increased algal growth, decreased water transparency, and diminished oxygen content within the water. Low oxygen conditions have a demonstrated negative impact on seagrasses and associated communities. Discharges can also contain colored waters stained by upland vegetation or pollutants. Colored waters released into these areas reduce the amount of sunlight available for photosynthesis by rapidly reducing the amount of shorter wavelength light that reaches the bottom. In general, threats from adjacent land use will be ongoing, randomly occurring events that follow storm events.

#### **4 ENVIRONMENTAL BASELINE**

---

By regulation, the environmental baseline for an Opinion refers to the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical habitat caused by the proposed action. The environmental baseline

includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions that are contemporaneous with the consultation in process. The consequences to the listed species or designated critical habitat from ongoing agency activities or existing agency facilities that are not within the agency's discretion to modify are part of the environmental baseline (50 CFR 402.02).

#### **4.1 Status of Johnson's Seagrass Critical Habitat Within the Action Areas**

As discussed above, this Opinion focuses on activities occurring in Unit J of Johnson's seagrass designated critical habitat, which encompasses the northern portion of Biscayne Bay from North East 163<sup>rd</sup> Street south to Central Key Biscayne at 25°45'N. The proposed actions will occur at residential properties in Biscayne Bay Aquatic Preserve located approximately 2.4 and 3.6 mi from the nearest inlet to the Atlantic Ocean. The Haroush project has an existing seawall and dock. The Cleveland Road project has an existing seawall. They are adjacent to other residential properties with existing seawalls, docks, and boat slips. One or more species of seagrass in varying densities was observed at the project sites, but Johnson's seagrass was not documented within either of the project footprints.

#### **4.2 Factors Affecting Johnson's Seagrass and its Designated Critical Habitat in the Action Areas**

##### **Federal Actions**

A wide range of activities funded, authorized, or carried out by federal agencies may affect Johnson's seagrass and its designated critical habitat. These include actions permitted or implemented by the USACE such as dredging, dock/marina construction, bridge/highway construction, residential construction, shoreline stabilization, breakwaters, and the installation of subaqueous lines or pipelines. These projects are located in Miami-Dade County. The Miami-Dade programmatic general permit (SAJ-42) authorizes docks that may affect Johnson's seagrass and its designated critical habitat. NMFS issued an Opinion concerning the Programmatic General Permit on February 10, 2011, and the USACE issued the permit on April 29, 2013. Other federal activities that may affect Johnson's seagrass critical habitat include actions by the Environmental Protection Agency and the USACE to manage freshwater discharges into waterways, management of Biscayne Bay Aquatic Preserve, regulation of vessel traffic to minimize propeller dredging and turbidity, and/or other activities by the U.S. Coast Guard and U.S. Navy. Although these actions have adversely affected Johnson's seagrass critical habitat, none of these past actions have destroyed or adversely modified Johnson's seagrass critical habitat. As per a review of NMFS PRD's completed consultation database by the consulting biologist on December 2, 2020, there are no other projects subject to consultation with adverse effects to Johnson's seagrass critical habitat within the action areas. The Haroush project includes a proposal to maintenance dredge 1,237 ft<sup>2</sup> of a slip area for a marginal dock located in the adjacent residential canal authorized under the JAXBO programmatic biological opinion.

##### **Private Recreational Vessel Traffic**

Marina and dock construction increases recreational vessel traffic within areas of Johnson's seagrass critical habitat, which increases suspended sediments from propellers and could result in



propeller dredging. As mentioned above, suspended sediments are known to adversely affect Johnson's seagrass critical habitat by reducing the water transparency essential feature. Shading from docks and vessels also affects the water transparency essential feature of the designated critical habitat. Propeller dredging and installation of piles and bridge support structures may adversely affect Johnson's seagrass and permanently removes the unconsolidated sediments essential feature of the critical habitat.

### **Marine Pollution and Environmental Contamination**

The projects are all located in a highly developed coastal area with extensive canal systems. This can lead to freshwater discharges and nutrient over-enrichment due to coastal runoff and man-made canal discharges into the Bay. Freshwater discharge from canals may affect the salinity essential feature of the designated critical habitat while excess nutrients can lead to decreased water transparency and decreased dissolved oxygen content in the water.

### **State and Federal Activities That May Benefit Johnson's Seagrass Critical Habitat in the Action Area**

State and federal conservation measures exist to protect Johnson's seagrass and its habitat under an umbrella of management and conservation programs that address seagrasses in general (Kenworthy et al. 2006). These conservation measures must be continually monitored and assessed to determine if they will ensure the long-term protection of the species and the maintenance of environmental conditions suitable for its continued existence throughout its geographic distribution.

## **5 EFFECTS OF THE ACTIONS ON CRITICAL HABITAT**

---

Effects of the action are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (50 CFR 402.02). The proposed actions are within the boundary of Johnson's seagrass critical habitat (Unit J).

### **5.1 Johnson's Seagrass Critical Habitat**

The 4 habitat features essential for the conservation of Johnson's seagrass: (1) adequate water quality, defined as being free from nutrient over-enrichment by inorganic and organic nitrogen and phosphorous or other inputs that create low oxygen conditions; (2) adequate salinity levels, indicating a lack of very frequent or constant discharges of fresh or low-salinity waters; (3) adequate water transparency, which would allow sunlight necessary for photosynthesis; and (4) stable, unconsolidated sediments that are free from physical disturbance. All 4 essential features must be present in an area for it to function as critical habitat for Johnson's seagrass and the loss of 1 essential feature of Johnson's seagrass critical habitat will result in a total loss in the conservation function of the critical habitat in that area.

The projects are located within Johnson's seagrass critical habitat and all 4 essential features are present at both project sites. We believe the proposed actions will have no effect on the adequate salinity levels essential feature of Johnson's seagrass critical habitat because the proposed actions lack any potential to affect adequate salinity levels in the action areas.

The adequate water quality and adequate water transparency essential features of Johnson's seagrass critical habitat may be affected by increased turbidity due to riprap and pile installation; however, we believe this effect will be insignificant. Turbidity is expected to be minor and temporary (not more than 1 month for each project) and contained to the immediate area by the use of turbidity curtains.

Next, we consider loss of the adequate water transparency essential feature by shading from the dock. We only expect adverse effects in the area immediately underneath the docks, as any other shading to nearby areas or from mooring piles will be temporary in nature (i.e., shading and light transmission will change over the course of the day) and therefore insignificant. The 1645 Cleveland Road LLC project will effect 500 ft<sup>2</sup> by shading caused by the new dock. The homeowner was unwilling to comply with the dock construction guidelines. Shading from docks not built to the dock construction guidelines mentioned in Section 3 results in the complete loss of the water transparency essential feature of Johnson's seagrass critical habitat; therefore, we believe the installation of the new dock and floating platform is likely to adversely affect Johnson's seagrass designated critical habitat. The project will contribute to a loss of 500 ft<sup>2</sup> of the adequate water transparency feature by shading impacts.

Next, we consider the potential impact of shading from the storage of a new vessel. We believe that shading due to a new vessel will adversely affect the adequate water transparency essential feature of Johnson's seagrass designated critical habitat. When we do not know the size of the new vessels, but we estimate the vessel to be 176 ft<sup>2</sup>, based on the average vessel size in Florida used in the analysis for the Statewide Programmatic Biological Opinion (SWPBO).<sup>6</sup> Since the proposed actions will result in 1 new vessel slip, the impact by shading from vessel storage will be 176 ft<sup>2</sup>. Therefore, the total effect to the adequate water transparency essential feature from the proposed action will be the sum of the area impacted by the new dock (500 ft<sup>2</sup>) plus the shading from the vessel (176 ft<sup>2</sup>) for a total of 676 ft<sup>2</sup>. Thus, we believe the new dock will adversely affect 676 ft<sup>2</sup> of Johnson's seagrass critical habitat through removal of the adequate water transparency essential feature.

Next, we consider loss of the stable, unconsolidated sediments essential feature from the installation of dock support piles and riprap. Per the applicant's information, 12 of the wood piles at the 1645 Cleveland Road LLC project location will be subsumed by the wood decking on the dock walkway. Because all 4 essential features must be present for the critical habitat to be functional, we do not add effects to the stable, unconsolidated sediments essential feature from piles underneath the dock when estimating the amount of critical habitat affected. This avoids double-counting the effects to critical habitat. Half of the diameter (0.5 ft) of the 8 new 12-in

---

\*Area of 12 inch circular pile is 0.785 ft<sup>2</sup>. Therefore,  $(8 \times 0.785 \text{ ft}^2)/2 = 3.14 \text{ ft}^2$

\*\*Area of 12 inch circular pile is 0.785 ft<sup>2</sup>. Therefore,  $(2 \times 0.785 \text{ ft}^2) = 1.57 \text{ ft}^2$

<sup>6</sup> Florida Statewide Programmatic Biological Opinion (SWPBO) issued by NMFS on December 4, 2015 (SER-2013-12540).

wood piles supporting the terminal dock will extend beyond the wood decking and will affect an area of 3.14 ft<sup>2\*</sup>. The 2 new 12-in wood mooring piles will affect 1.57 ft<sup>2\*\*</sup>. Thus, effects from the installation of the 1645 Cleveland Road LLC project dock piles will be 4.71 ft<sup>2</sup> and the riprap at the Haroush project will be 520 ft<sup>2</sup> for a total of 524.71 ft<sup>2</sup> of critical habitat affected. Therefore, we believe the proposed actions will adversely affect 524.71 ft<sup>2</sup> of Johnson's seagrass critical habitat by removal of the stable, unconsolidated sediments essential feature.

Combining the total impacts to Johnson's seagrass critical habitat from the loss of the adequate water transparency essential feature (676 ft<sup>2</sup>), and the loss of the stable, unconsolidated sediments essential feature (524.71 ft<sup>2</sup>), we believe the projects will adversely affect 1,200.71 ft<sup>2</sup> (0.0276 ac)<sup>7</sup> of Johnson's seagrass critical habitat.

## 6 CUMMULATIVE EFFECTS

---

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

No categories of effects beyond those already described are expected in the action area, and we are not aware of any other future state, tribal or local private actions that are reasonably certain to occur within the action area. Dock and marina construction will likely continue at current rates, with associated loss and degradation of seagrass habitat, including Johnson's seagrass critical habitat. Because these activities are subject to USACE permitting and thus, the ESA Section 7 consultation requirement, they do not lead to cumulative non-federal effects to be discussed in this section. NMFS and the USACE have developed protocols to encourage the use of light-transmitting materials in future construction of docks constructed in or over submerged aquatic vegetation (SAV), marsh or mangrove habitat.<sup>8,9,10</sup> Even if all new docks are constructed in full compliance with the NMFS and USACE's guidance, NMFS acknowledges that shading impacts (and thus, impacts to the water transparency essential feature) to Johnson's seagrass will continue via dock construction. As NMFS and the USACE continue to encourage permit applicants to design and construct new docks in full compliance with the construction guidelines discussed above, and the recommendations in (Adam 2012), Landry et al. (2008b) and Shafer et al. (2008), NMFS believes that shading impacts to Johnson's seagrass critical habitat will be reduced in the short- and long-term. Moreover, even with some shading from grated construction materials, researchers have found all 4 essential features necessary for Johnson's seagrass to persist under docks constructed of grated decking (Landry et al. 2008b).

---

<sup>7</sup> 1 square foot = 0.0000229568 acre. Therefore, 1,200.71 ft<sup>2</sup> x (0.0000229568 ac/1ft<sup>2</sup>) = 0.027565 ac.

<sup>8</sup> Project Design Criteria A2.17 in U.S. Army Corps of Engineers Jacksonville District's Programmatic Biological Opinion (JAXBO) issued by NMFS on November 20, 2017 (SER-2015-17616)

<sup>9</sup> Dock Construction Guidelines in Florida for Docks or Other Minor Structures Constructed in or over Submerged Aquatic Vegetation (SAV), Marsh or Mangrove Habitat U.S. Army Corps of Engineers/National Marine Fisheries Service, dated August 2001

<sup>10</sup> Key for Construction Conditions for Docks or Other Minor Structures Constructed in or Over Johnson's Seagrass (*Halophila johnsonii*) National Marine Fisheries Service/U.S. Army Corps of Engineers, dated October 2002

Upland development and associated runoff will continue to affect the water quality and water clarity essential features of Johnson's seagrass critical habitat. Flood control and imprudent water management practices will continue to result in freshwater inputs into estuarine systems, thereby degrading and altering the water quality and salinity essential features of Johnson's seagrass critical habitat.

Increased recreational vessel traffic will continue to result in damage to Johnson's seagrass and its designated critical habitat by improper anchoring, propeller scarring, and accidental groundings. Nonetheless, we expect that ongoing boater education programs and posted signage about the dangers to seagrass habitat from propeller scarring and improper anchoring may reduce impacts to Johnson's seagrass designated critical habitat, including that in Unit J.

## **7 DESTRUCTION/ADVERSE MODIFICATION ANALYSIS**

---

NMFS's regulations define *destruction or adverse modification* to mean "a direct or indirect alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species" (50 CFR § 402.02). NMFS will generally conclude that a Federal action is likely to "destroy or adversely modify" designated critical habitat if the action results in an alteration of the quantity or quality of the essential physical or biological features of designated critical habitat, or that precludes or significantly delays the capacity of that habitat to develop those features over time, and if the effect of the alteration is to appreciably diminish the value of critical habitat for the conservation of the species. This analysis takes into account the geographic and temporal scope of the proposed action, recognizing that "functionality" of critical habitat necessarily means that it must now and must continue in the future to support the conservation of the species and progress toward recovery. Destruction or adverse modification does not depend strictly on the size or proportion of the area adversely affected, but rather on the role the action area serves with regard to the function of the overall designation, and how that role is affected by the action.

Recovery for Johnson's seagrass as set forth in the final recovery plan (NMFS 2002), will be achieved when the following recovery objectives are met:

- (1) The species' present geographic range remains stable for at least 10 years, or increases.
- (2) Self-sustaining populations are present throughout the range at distances less than or equal to the maximum dispersal distance to allow for stable vegetative recruitment and genetic diversity.
- (3) Populations and supporting habitat in its geographic range have long-term protection (through regulatory action or purchase acquisition).

We evaluated the proposed actions' expected effects on critical habitat to determine whether it will be able to continue to provide its intended functions in achieving these recovery objectives and supporting the conservation of the species.

The first recovery objective for Johnson's seagrass is for its present range to remain stable for 10 years or to increase during that time. NMFS's 5-year review (2007) of the status of the species concluded that the first recovery objective had been achieved as of 2007. In fact, the species

range had increased slightly northward at that time. We have no information indicating range stability has decreased since then. We determined that the proposed actions will adversely affect a total of 1,200.71 ft<sup>2</sup> (0.0276 ac) of Johnson's seagrass critical habitat. However, the action areas are not at a boundary of the species' range. The action areas that will be impacted are very small relative to available critical habitat. Therefore, we believe that the loss of these areas for potential colonization will not affect the stability of the species' range now or in the future. Thus, we believe the proposed actions' effects will not appreciably diminish the critical habitat's ability to contribute to range stability for Johnson's seagrass.

The second recovery objective for Johnson's seagrass requires that self-sustaining populations be present throughout the range at distances less than or equal to the maximum dispersal distance for the species. Due to its asexual reproductive mode, self-sustaining populations are present throughout the range of species. As discussed in Designated Critical Habitat Likely To Be Adversely Affected section, there are approximately 22,574 ac of Johnson's seagrass critical habitat. The loss of 1,200.71 ft<sup>2</sup> (0.0276 ac) of designated critical habitat for Johnson's seagrass would equate to a loss of 0.000122% of Johnson's seagrass critical habitat (0.0276 ac x 100 / 22,574 ac). In addition, the loss of 1,237 ft<sup>2</sup> (0.028 ac) of designated critical habitat for Johnson's seagrass due to maintenance dredging of a slip area for a marginal dock located in the Haroush project's adjacent residential canal would equate to a loss of 0.000124% of Johnson's seagrass critical habitat ( $[0.028 \text{ ac} \times 100] \div 22,574 \text{ ac}$ ). Together, these actions would equate to a loss of 0.000246% of Johnson's seagrass critical habitat. This loss will not affect the conservation value of available critical habitat to an extent that it would impact Johnson's seagrass self-sustaining populations by adversely affecting the availability of suitable habitat in which the species can spread/flow in the future. Drifting fragments of Johnson's seagrass can remain viable in the water column for 4-8 days (Hall et al. 2006), and can travel several km under the influence of wind, tides, and waves. Functioning critical habitat will remain in both action areas. Because of this, we believe that the removal of critical habitat for these projects combined will not appreciably diminish the conservation value of critical habitat in supporting self-sustaining populations.

The third, and final, recovery objective is for populations of Johnson's seagrass and supporting habitat in the geographic range of Johnson's seagrass to have long-term protection through regulatory action or purchase acquisition. Though the affected portions of the project sites will not be available for the long-term, thousands of acres of designated critical habitat are still available for long-term protection, which would include areas surrounding the action areas.

Based on the above analysis, we conclude that the adverse effects on Johnson's seagrass critical habitat due to the proposed actions will not impede achieving the 3 recovery objectives listed above and, therefore will not appreciably diminish the value of critical habitat for the conservation of the species.

## **8 CONCLUSION**

---

After reviewing the current status of Johnson's seagrass designated critical habitat, the environmental baseline, the effects of the proposed actions, and the cumulative effects, it is our opinion that the loss of 1,200.71 ft<sup>2</sup> (0.0276 ac) associated with the proposed actions will not

interfere with achieving the relevant habitat-based recovery objectives for Johnson's seagrass. It is our opinion that the proposed actions will not impede the critical habitat's ability to support Johnson's seagrass conservation, despite permanent adverse effects. Therefore, we conclude that the actions, as proposed, are likely to adversely affect, but are not likely to destroy or adversely modify, Johnson's seagrass designated critical habitat.

## **9 INCIDENTAL TAKE STATEMENT**

---

NMFS does not anticipate that the proposed action will incidentally take any species and no take is authorized. Nonetheless, any take of any ESA-listed species shall be immediately reported to [takereport.nmfs@noaa.gov](mailto:takereport.nmfs@noaa.gov). Refer to the present Biological Opinion by title, issuance date, NMFS ECO identifier numbers SERO-2020-01301 or SERO-2020-01643. At that time, consultation must be reinitiated.

## **10 CONSERVATION RECOMMENDATIONS**

---

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

NMFS believes the following conservation recommendations are reasonable, necessary, and appropriate to conserve and recover Johnson's seagrass. NMFS strongly recommends that these measures be considered and adopted.

1. NMFS recommends that the USACE, in coordination with seagrass researchers and industry, support ongoing research on light requirements and transplanting techniques to preserve and restore Johnson's seagrass, and on collection of plants for genetics research, tissue culture, and tissue banking.
2. NMFS recommends that the USACE continue promoting the use of the October 2002 *Key for Construction Conditions for Docks or other Minor Structures Constructed in or over Johnson's Seagrass* as the standard construction methodology for proposed docks located in the range of Johnson's seagrass.
3. NMFS recommends that the USACE review and implement the recommendations in the July 2008 report, *The Effects of Docks on Seagrasses, With Particular Emphasis on the Threatened Seagrass, Halophila johnsonii* (Landry et al. 2008a).
4. NMFS recommends that the USACE review and implement the Conclusions and Recommendations in the October 2008 report, *Evaluation of Regulatory Guidelines to Minimize Impacts to Seagrasses from Single-family Residential Dock Structures in Florida and Puerto Rico* (Shafer et al. 2008).
5. NMFS recommends that a report of all current and proposed USACE projects in the range of Johnson's seagrass be prepared and used by the USACE to assess impacts on

the species from these projects, to assess cumulative impacts, and to assist in early consultation that will avoid and/or minimize impacts to Johnson's seagrass and its critical habitat. Information in this report should include location and scope of each project and identify the federal lead agency for each project. The information should be made available to NMFS.

6. NMFS recommends that the USACE conduct and support research to assess trends in the distribution and abundance of Johnson's seagrass. Data collected should be contributed to the Florida Fish and Wildlife Conservation Commission's Florida Wildlife Research Institute to support ongoing geographic information system mapping of Johnson's seagrass and other seagrass distribution.
7. NMFS recommends that the USACE prepare an assessment of the effects of other actions under its purview on Johnson's seagrass for consideration in future consultations.

## **11 REINITIATION OF CONSULTATION**

---

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

## **12 LITERATURE CITED**

---

- Adam, T. 2012. Mutualistic cleaner fish initiate trait-mediated indirect interactions by influencing the behaviour of coral predators. *Journal of Animal Ecology* 81(3):692-700.
- Hall, L. M., M. D. Hanisak, and R. W. Virnstein. 2006. Fragments of the seagrasses *Halodule wrightii* and *Halophila johnsonii* as potential recruits in Indian River Lagoon, Florida. *Marine Ecology Progress Series* 310:109-117.
- Kenworthy, W. J., S. Wyllie-Echeverria, R. Coles, G. Pergent, and C. Pergent-Martini. 2006. Seagrass Conservation Biology: An Interdisciplinary Science for Protection of the Seagrass Biome. Pages 595-623 in A. W. D. Larkum, R. J. Orth, and C. M. Duarte, editors. *Seagrasses: Biology, Ecology and Conservation*. Springer Netherlands.
- Landry, J. B., W. J. Kenworthy, and G. D. Carlo. 2008a. The effects of docks on seagrasses, with particular emphasis on the threatened seagrass, *Halophila johnsonii*. Report submitted to NMFS Office of Protected Resources.
- Landry, J. B., W. J. Kenworthy, and G. Di Carlo. 2008b. The effects of docks on seagrasses, with particular emphasis on the threatened seagrass, *Halophila johnsonii*. Report submitted to NMFS Office of Protected Resources.

- NMFS. 2002. Recovery plan for Johnson's seagrass (*Halophila johnsonii*). National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Office of Protected Resources, Silver Spring, Maryland.
- NMFS. 2006. Sea Turtle and Smalltooth Sawfish Construction Conditions revised March 23, 2006. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southeast Regional Office, Protected Resources Division, Saint Petersburg, Florida. <https://www.fisheries.noaa.gov/webdam/download/92937961>
- NMFS. 2014. Biological Opinion on Regional General Permit SAJ-82 (SAJ-2007-01590), Florida Keys, Monroe County, Florida. June 10, 2014.
- Shafer, D. J., J. Karazsia, L. Carrubba, and C. Martin. 2008. Evaluation of regulatory guidelines to minimize impacts to seagrasses from single-family residential dock structures in Florida and Puerto Rico. U.S. Army Engineer Research and Development Center, Vicksburg, Mississippi.