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**National Oceanic and Atmospheric Administration**
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F/SER31:NB

DEC 19 2012

Mr. Donald W. Kinard
Chief, Regulatory Division
U.S. Army Corps of Engineers
P.O. Box 4970
Jacksonville, FL 32232-0019

Re: 12 USACE SAJ General Permits Renewal

Dear Mr. Kinard:

Enclosed is the National Marine Fisheries Service's (NMFS') biological opinion based on our review of the impacts associated with the renewal and revision of the U.S. Army Corps of Engineers Jacksonville District's (USACE) Regional General Permits (RGPs) SAJ-5, SAJ-12, SAJ-13, SAJ-14, SAJ-17, SAJ-20, SAJ-33, SAJ-34, SAJ-46, SAJ-72 and Programmatic General Permits (PGPs) SAJ-91 and SAJ-96 for use throughout the state of Florida.

The opinion analyzes the project's effects on sea turtles (loggerhead, leatherback, Kemp's ridley, hawksbill, and green); smalltooth sawfish; Johnson's seagrass; sturgeon (Gulf, shortnose, and Atlantic); corals (elkhorn and staghorn); and designated critical habitat for Johnson's seagrass, smalltooth sawfish, Gulf sturgeon, and elkhorn and staghorn corals, and is based on project-specific information provided by the USACE and NMFS' review of published literature. It is NMFS' biological opinion that the action, as proposed, is likely to adversely affect but is not likely to jeopardize the continued existence of sea turtles (loggerhead, leatherback, Kemp's ridley, hawksbill, and green) and is likely to adversely affect but is not likely to destroy or adversely modify critical habitat for smalltooth sawfish and Johnson's seagrass.

We look forward to further cooperation with you on other USACE projects to ensure the conservation and recovery of our threatened and endangered marine species. If you have any questions regarding this consultation, please contact Nicole Bailey, consultation biologist, at (727) 824-5336, or by e-mail at Nicole.Bailey@noaa.gov.

Sincerely,

Miles M. Croom
for Roy E. Crabtree, Ph.D.
Regional Administrator

Enclosure

File: 1514-22.F.4
Ref: F/SER/2011/01939

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

| | |
|---|---|
| **Agency:** | United States Army Corps of Engineers, Jacksonville District |
| **Applicant:** | United States Army Corps of Engineers, Jacksonville District |
| **Activity:** | 12 USACE SAJ General Permits Renewal |
| **Consulting Agency:** | National Marine Fisheries Service<br>Southeast Regional Office<br>Protected Resources Division<br>(F/SER/2011/01939) |
| **Date Issued:** | DEC 19 2012 |
| **Approved By:** | Miles M. Croom<br>for Roy E. Crabtree, Ph.D.<br>Regional Administrator |

## ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| °C | Degrees Celsius |
| CWA | Clean Water Act |
| CHEU | Charlotte Harbor Estuary Unit |
| CPUE | Catch per Unit Effort |
| DERM | Department of Environmental Resource Management |
| DMV | Department of Motor Vehicles |
| DPS | Distinct Population Segment |
| DWH | Deep Water Horizon |
| EFH | Essential Fish Habitat |
| ESA | Endangered Species Act |
| FDEP | Florida Department of Environmental Protection |
| GMFMC | Gulf of Mexico Fishery Management Council |
| HMS | Highly Migratory Species |
| ICW | Intracoastal Waterway |
| ITS | Incidental Take Statement |
| MHWL | Mean High Water Line |
| MLW | Mean Low Water |
| MLLW | Mean Lower Low Water |
| NGVD | National Geodetic Vertical Datum |
| NMFS | National Marine Fisheries Service |
| NOAA | National Ocean and Atmospheric Association |
| NRC | Nuclear Regulatory Commission |
| NSED | National Sawfish Encounter Database |
| NWA DPS | Northwest Atlantic Distinct Population Segment |
| NWP | Nationwide Permit |
| OHWL | Ordinary High Water Line |
| PGP | Programmatic General Permit |
| PDC | Project Design Criteria |
| RGP | Regional General Permit |
| SAJ | South Atlantic Jacksonville |
| SARBO | South Atlantic Regional Biological Opinion |
| SAV | Submerged Aquatic Vegetation |
| SPGP IV-RI | State Programmatic General Permit IV-RI |
| TED | Turtle Excluder Device |
| USACE | U.S. Army Corps of Engineers |
| USFWS | U.S. Fish and Wildlife Service |

**Background**

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 the 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 those species. When the action of a federal agency may affect a protected species or its critical habitat, that agency is required to consult with either the National Marine Fisheries Service (NMFS) or the U.S. Fish and Wildlife Service (USFWS), depending upon the protected species that may be affected.

Consultations on most listed marine species and their designated critical habitat are conducted between the action agency and NMFS. Consultations are concluded after NMFS determines the action is not likely to adversely affect listed species or critical habitat or issues a biological opinion ("opinion") that determines whether a proposed action is likely to jeopardize the continued existence of a federally-listed species, or destroy or adversely modify federally-designated critical habitat. The opinion also states the amount or extent of listed species incidental take that may occur and develops non-discretionary measures that the action agency must take to reduce the effects of said anticipated/authorized take. The opinion may also recommend discretionary conservation measures. No incidental destruction or adverse modification of critical habitat may be authorized. The issuance of an opinion detailing NMFS' findings concludes ESA Section 7 consultation.

This document represents NMFS' opinion based on our review of impacts associated with the renewal and revision of the U.S. Army Corps of Engineers Jacksonville District's (USACE) Regional General Permits (RGPs) SAJ-5, SAJ-12, SAJ-13, SAJ-14, SAJ-17, SAJ-20, SAJ-33, SAJ-34, SAJ-46, SAJ-72 and Programmatic General Permits (PGPs) SAJ-91 and SAJ-96 for use throughout the state of Florida. Activities covered under these general permits include the installation and/or repair or replacement of specific types of docks, piers, and minor structures; maintenance dredging; transmission line installation; boat ramps; and shoreline protection.

This opinion analyzes project effects on sea turtles (loggerhead, leatherback, Kemp's ridley, hawksbill, and green); smalltooth sawfish; Johnson's seagrass; sturgeon (Gulf, shortnose, and Atlantic); corals (elkhorn and staghorn); and designated critical habitat for Johnson's seagrass, smalltooth sawfish, Gulf sturgeon, and elkhorn and staghorn corals in accordance with Section 7 of the ESA. The analysis begins with a description of the types of the actions covered under the general permits and the action area in which they can occur, how the projects will be reviewed, and the requirements they must meet to be permitted. This is followed by the status of listed species and critical habitat within the action area, the environmental baseline conditions of the action area, and an analysis of the effects of the proposed action on species likely to be affected. A discussion of cumulative effects precedes the jeopardy analysis, which is based on the status of the affected species and on the information presented in the environmental baseline, effects of the action, and cumulative effects sections of this opinion. Last, we present our conclusions and conservation recommendations. This opinion is based on project information provided by the USACE. NMFS also utilized published literature.

*Programmatic Consultations*

NMFS and the USFWS have developed a range of techniques to streamline the procedures and time involved in consultations for broad agency programs or numerous similar activities with well-understood predictable effects on listed species and critical habitat. Some of the more common of these techniques and the requirements for ensuring that streamlined consultation procedures comply with Section 7 of the ESA and its implementing regulations are discussed in the October 2002 joint Services memorandum, *Alternative Approaches for Streamlining Section 7 Consultation on Hazardous Fuels Treatment Projects* (http://www.fws.gov/endangered/pdfs/MemosLetters/streamlining.pdf; see also, 68 FR 1628 (January 13, 2003)). Provided below is a generalized discussion about programmatic consultations. The specific requirements set forth for this programmatic consultation are provided in Section 2.

Programmatic consultations can be used to evaluate the expected effects of groups of related agency actions expected to be implemented in the future, where specifics of individual projects such as project location are not definitively known. It is important to note that the term programmatic is defined differently by NMFS when discussing a programmatic consultation than it is by the USACE when discussing a programmatic general permit (see Section 2.2). According to NMFS, a programmatic consultation must identify project design criteria (PDCs) or standards that will be applicable to all future projects implemented under the consultation document. PDCs serve to prevent adverse effects to listed species, or to limit adverse effects to predictable levels that will not jeopardize the continued existence of listed species or destroy or adversely modify critical habitat, at the individual project level or in the aggregate from all projects implemented under the programmatic opinion. Programmatic consultations allow for streamlined project-specific consultations because much of the effects analysis is completed up front in the programmatic consultation document. At the project-specific consultation stage, a proposed project is reviewed to determine if it can be implemented according to the PDCs, and to evaluate or tally the aggregate effects that will have resulted by implementing projects under the programmatic consultation to date, including the proposed project. The following elements should be included in a programmatic consultation to ensure its consistency with ESA Section 7 and its implementing regulations:

1. PDCs to prevent or limit future adverse effects on listed species and critical habitat;

2. Description of the manner in which projects to be implemented under the programmatic consultation may affect listed species and critical habitat and evaluation of expected level of effects from covered projects;

3. Process for evaluating expected, and tracking actual aggregate or net additive effects of all projects expected to be implemented under the programmatic consultation. The programmatic consultation document must demonstrate that when the PDCs are applied to each project, the aggregate effect of all projects will not adversely affect listed species or their critical habitat, or will not jeopardize species or destroy or adversely modify their critical habitat, as applicable;

4. Procedures for streamlined project-specific consultation. As discussed above, if an approved programmatic consultation document is sufficiently detailed, project-specific consultations ideally will consist of certifications and concurrences between action agency biologists and consulting agency biologists, respectively. An action agency biologist or team will provide a description of a proposed project, or batched projects, and a certification that the project(s) will be implemented in accordance with the PDCs. The action agency also provides a description of anticipated project-specific effects and a tallying of net effects to date resulting from projects implemented under the program, and certification that these effects are consistent with those anticipated in the programmatic consultation document. If a project is likely to result in prohibited take of a listed species, a project-specific incidental take statement must be developed. The consulting agency biologist reviews the submission and provides concurrence, or adjustments to the project(s) necessary to bring it (them) into compliance with the programmatic consultation document. The project-specific consultation process must also identify any effects that were not considered in the programmatic consultation. Finally, the project-specific consultation procedures must provide contingencies for proposed projects that cannot be implemented in accordance with the PDCs; full stand-alone consultations may be performed on these projects if they are too dissimilar in nature or in expected effects from those projected in the programmatic consultation document.

5. Procedures for monitoring projects and validating effects predictions; and

6. Comprehensive review of the program, generally conducted annually.

## 1. Consultation History

In May 2011, we received multiple requests for consultation pursuant to Section 7 of the ESA on the renewal and revision of the USACE's general permits. Through discussions with the USACE, it was determined that these permits should be grouped into two separate consultations based on whether the general permit allows construction within or outside of critical habitat. This resulted in grouping SAJ-5, SAJ-12, SAJ-13, SAJ-14, SAJ-18, and SAJ-46 together since these general permits exclude work within critical habitat. SAJ-17, SAJ-20, SAJ-33, and SAJ-34 would be grouped in a separate consultation, since these general permits all include piling structures and are allowed within critical habitat in Florida. These permits were originally issued in the mid-1970s and have been renewed every five years since then. The USACE determined that all of these proposed general permits may affect but are not likely to adversely affect five species of sea turtles, smalltooth sawfish, and sturgeon (Gulf, shortnose, and Atlantic). The USACE determined that the general permits that allow construction in critical habitat also may affect but are not likely to affect smalltooth sawfish critical habitat, Gulf sturgeon critical habitat, and Johnson's seagrass critical habitat. The USACE also determined that of the general permits under review in this consultation, only SAJ-17 may affect but is not likely to adversely affect elkhorn or staghorn coral critical habitat. NMFS did not concur with the USACE's not likely to adversely affect determinations; therefore, we initiated formal consultation on May 16, 2011.

However, formal consultation was delayed while the details regarding procedures for monitoring projects, validating effects predictions, and reporting requirements as required by the PDCs were resolved between the two agencies. During this time period, the USACE and NMFS coordinated the reissuance of the State Programmatic General Permit (SPGP IV-R1), which gives general authority to the State of Florida Department of Environmental Protection (FDEP) to administer SPGP IV-R1 on behalf of the USACE for several types of in-water construction activities throughout the state of Florida. Since many of the actions covered under the SPGP IV-R1 are similar in nature to those covered under these general permits, their renewal was delayed so that the requirements for SPGP IV-R1 and these general permits could be consistent.

On May 26, 2011, the USACE stated that the number of projects permitted under SAJ-17 during the last permit do not reflect actual impacts to *Acropora* critical habitat. These projects are typically "boat lifts, boat whips, davits, etc." and are placed "only in canals" (pers. comm. S. Santos, USACE to N. Bailey, NMFS).

On July 15, 2011, NMFS received a request for consultation for SAJ-72.

On September 16, 2011, the USACE requested consultation on SAJ-72 for projects in Citrus County. They requested this permit be added to the combined programmatic consultation for general permits not allowed within critical habitat.

On October 26, 2011, the USACE decided to withdraw its request for consultation on SAJ-18 and to let this general permit expire.

On November 7, 2011, the following general permits expired: SAJ- 5, 12, 13, 14, 17, 34, and 46.

On November 28, 2011, USACE agreed to add a PDC to SAJ-17 excluding impacts to *Acropora* critical habitat essential features.

On December 21, 2011, NMFS completed its opinion for SPGP IV-RI (NMFS tracking number F/SER/2009/05980).

On January 26, 2012, NMFS received a request for consultation on SAJ-91 for in-water work in the City of Cape Coral.

On February 2, 2012, NMFS sent a request for information to the USACE for SAJ-91. NMFS noted that bulkheads, riprap placement, and maintenance dredging had been removed from this general permit renewal.

On May 31, 2012, NMFS and the USACE met with the City of Cape Coral and local congressional representatives to discuss SAJ-91. During this meeting, we outlined the informational requirements to complete consultation. The City of Cape Coral agreed to provide additional information.

On June 8, 2012, NMFS and the USACE met to discuss the reinitiation of all of their general permits. It was decided that the most logical approach to analyzing these permit renewals would be to group all of the expired and expiring permits into one programmatic consultation. This would include a number of general permits already in review by NMFS that had been grouped.

In addition, SAJ-91 and SAJ-96 would be added to the combined group. This new programmatic consultation will now include SAJ- 5, 12, 13, 14, 17, 20, 33, 34, 46, 72, 91, and 96.

On June 13, 2012, we sent USACE a formal request for information letter regarding questions discussed during the May 31, 2012, meeting for SAJ-91.

On July 3, 2012, NMFS received a request for consultation for SAJ-96 for in-water construction in Pinellas County. The USACE requested that this consultation be included in the present programmatic consultation.

On July 17, 2012, we met with the City of Cape Coral to discuss our progress on SAJ-91 and informed the City that it would be grouped with the rest of the general permits in this programmatic consultation. This meeting was attended by staff members from the USACE, NMFS, City of Cape Coral, Lee County, local industry leaders from the Cape Coral Construction Industry Association and Honc Marine, staff from Representative Connie Mack's office, and staff from Senator Marco Rubio's office. During this meeting, the USACE stated that an ESA Section 7(a)(2)-7(d) memo would be provided to extend for SAJ-91 beyond the scheduled expiration date of the general permit to allow for completion of the NMFS opinion. It was also decided to add construction of bulkheads back into the SAJ-91 general permit. Bulkheads were included as part of the action in the last issuance of SAJ-91 but had been removed from this proposed re-issuance. The USACE stated that a new public notice for SAJ-91 would be necessary to address the change in the proposed action.

On July 20, 2012, the USACE sent NMFS an e-mail confirming that bulkheads would be included in proposed action for SAJ-91.

On September 27, 2012, the USACE posted the updated the public notice for SAJ-91.

On September 28, 2012, NMFS requested additional information regarding the pilings activities associated with these general permits.

On October 9, 2012, the USACE sent an e-mail to NMFS, the City of Cape Coral, Lee County, and the offices of Representative Connie Mack and Senator Marco Rubio stating that the Section 7(a)(2)-7(d) memo would not be provided to the City of Cape Coral to continue SAJ-91 past the expiration date of October 12, 2012. Therefore, the general permit would expire.

## 2. Description of the Proposed Action

### 2.1 Authorities Under Which the Action will be Conducted

Pursuant to Section 404 of the Clean Water Act (33 U.S.C. 1344) and Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403), the USACE has authority to issue general permits[1] (regional, programmatic, and nationwide) for any category of projects that are substantially similar in nature, and result in no more than minimal adverse effects on the environment, either individually or cumulatively. Section 10 of the Rivers and Harbors Act authorizes all structures

[1] The term "general permit" is defined at 33 CFR 322.2(f) and 33 CFR 323.2(h). PGPs are a type of general permit, and are defined at 33 CFR 325.5(c)(3).

or work in navigable water of the United States while Section 404 of the Clean Water Act covers the discharge of dredged or fill materials in waters of the United States. The USACE uses a combination of all three types of these general permits when authorizing activities within the state of Florida, provided it has been determined that the environmental consequences of the action are individually and cumulatively minimal (see 33 CFR 325.2(e) and 33 CFR Part 330). PGPs are used to avoid unnecessary duplication of the regulatory control exercised by another Federal, state, or local agency. All general permits are valid for a maximum of five years (33 CFR 325.2(e)(2)), and must be reevaluated prior to reissuance. Below is a description of the three types of general permits used by the USACE to authorize activities within the state of Florida.

1. **Regional General Permit:** RGPs are a type of general permit specific to a given region (in this case, Florida). Within the state of Florida, USACE staff individually review permit applications to determine if it meets the PDCs defined by an RGP. All RGPs require an applicant to submit a preconstruction notification and cannot begin construction until they have received a written verification from the USACE that their project is authorized in accordance with the terms and conditions of the RGP. The following RGPs under NMFS purview are used within the state of Florida: SAJ-5, 12, 13, 14, 17, 20, 33, 34, and 46.
2. **Nationwide permits:** NWPs are a type of general permit issued for activities that occur throughout the United States. The USACE authorizes activities in Florida under NWPs when the permit specific conditions are met then the specified activities can take place without the need for an individual or regional permit. These NWPs were reissued and published under the federal registry dated February 12, 2012, and became effective March 19, 2012.
3. **Programmatic general permits:** PGPs are a type of general permit issued by the USACE that authorize, for the purposes of Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act, certain activities that are also regulated by another federal, tribal, state, or local regulatory authority. The purpose of PGPs is to improve the regulatory process for applicants, enhance environmental protection, reduce unnecessary duplicative procedures and evaluations, and make more efficient use of limited resources. In this case, the USACE provides delegated authorization to the following agencies to permit activities under the listed permit: SAJ-91 provides administrative limited authority to the City of Cape Coral, SAJ-96 provides administrative limited authority to Pinellas County, SAJ-42 provides administrative limited authority to Miami-Dade County, and SPGP IV-RI provides administrative limited authority to Florida's Department of Environmental Protection.

The USACE retains the authority to modify, suspend, or revoke any PGP when the USACE believes that appropriate protection is not being afforded to the environment or any other aspect of the public interest, or when the USACE concludes that adverse environmental effects are more than minimal, either individually or cumulatively. Additionally, the USACE always retains its authority to require an individual USACE permit in any given case for any particular project, even if the project otherwise meets all the requirements of the PGP. The USACE exercises this authority when it concludes that the processing of an individual USACE permit is necessary to protect the environment or any other aspect of the public interest, or when impacts are more than minimal, either individually or cumulatively. Last, the USACE retains the full range of its enforcement authority and options where it believes that a project does not comply with the terms or conditions of the PGP, regardless of whether the project has been permitted by the federal, tribal, state, or local regulatory authority. Implementing regulations for permits issued by the USACE can be found at 33 CFR 320-332.

**Individual permits:** If a project is not covered by an RGP, NWP, or PGP because the effects of the action will be more than minor in nature or if the project needs an additional level of review, then it is addressed as an individual permit. Individual permits include authorization that is issued following a case-by-case evaluation by the USACE for a specific structure or work in accordance with the procedures of this regulation and 33 CFR Part 325, and a determination that the proposed structure or work is in the public interest pursuant to 33 CFR Part 320. Individual permits require Section 7 coordination with NMFS for projects involving in-water work that may affect listed species under our purview.

## 2.2 Types of Projects

This opinion addresses the reissuance of 12 USACE general permits listed in Table 1, which give general authority for several in-water construction activities throughout the state of Florida. Every in-water construction activity permitted under the conditions of these permits is subject to non-discretionary requirements that avoid or reduce the potential effects of permitted activities on listed species. Permits issued have a 5-year expiration date (maximum) from the date of issuance. The number of times that each permit was used to authorize activities during the last renewal period is provided below (see Table 1) with a breakdown of how often it was issued in critical habitat. This is followed by a description of the activities authorized under each general permit. These general permits will be re-issued for 5 years with an comprehensive review conducted by NMFS, USACE, and, for PGPs, the delegated permitting agencies (e.g., City of Cape Coral and Pinellas County), as defined in the Tier 2 discussion below. The following permits expired November 7, 2011: SAJ- 5, 12, 13, 14, 17, 34, 46, and 72. SAJ-20 and 33 expired May 1, 2012. SAJ-96 expired July 13, 2012. SAJ-91 expired on October 12, 2012.

**Table 1: Number of times each general permit was issued in the last five years.**

| **Project Type** | Smalltooth sawfish critical habitat | Gulf sturgeon critical habitat | Johnson's seagrass critical habitat | Elkhorn & staghorn coral critical habitat | **5-Year Total**[2] |
|---|---|---|---|---|---|
| SAJ-5 Maintenance dredging | N/A | N/A | N/A | N/A | 84 |
| SAJ-12 Private single-family boat ramps | N/A | N/A | N/A | N/A | 8 |
| SAJ-13 Aerial transmission lines | N/A | N/A | N/A | N/A | 41 |
| SAJ-14 Sub-aquatic transmission lines | N/A | N/A | N/A | N/A | 167 |
| SAJ-17 Minor structures | 156 | 22 | 27 | 58 | 1,488 |
| SAJ-20 Single-family docks | 547 | 183 | 27 | 0 | 3,256 |
| SAJ-33 Private multi-family docks | 7 | 10 | 2 | 0 | 149 |
| SAJ-34 Commercial docks | 2 | 1 | 0 | 0 | 28 |
| SAJ-46 Bulkheads and backfills | N/A | N/A | N/A | N/A | 395 |
| SAJ-72 Residential docks in Citrus County | N/A | N/A | N/A | N/A | 156 |
| SAJ-91 Docks and minor structures in the City of Cape Coral | 2,382 | N/A | N/A | N/A | 2,382 |
| SAJ-96 Docks and minor structures in Pinellas County | N/A | N/A | N/A | N/A | 3,224 |
| Total | 3,094 | 216 | 56 | 58 | 11,378 |

[2] 5-year totals are from 2006-2010 except SAJ-96 which is 2007-2012 and SAJ-91 which is an average five year total based on 4 years of data from 2008-2011.

_General permits and actions excluded from all critical habitat:_
**SAJ-5:** ***Maintenance dredging activities in residential (man-made) canals*** in navigable waters of the United Sates.

- A residential canal is defined as a man-made waterway, historically dug from uplands, and surrounded on both sides by uplands adjacent to principally residential properties.
- Federally-maintained navigation and/or flood control projects are not considered to be residential canals and SAJ-5 is not authorized for use within them.
- No additional dredging or excavation is allowed under this permit other than is necessary to restore the canal to its original excavated depth; however, in no case shall the depth of canal be greater than -5 feet mean low water (MLW).
- The material dredged/excavated under each authorization shall not exceed 4,000 cubic yards per project per year.
- SAJ-5 does not authorize the removal of plugs or the connection of any canal or other non-connected waterbody to navigable waters of the United States or to any other waters of the United States.

**SAJ-12:** Installation and maintenance of ***private single-family boat ramps***, including appurtenant structures (bulkheads, rub-rails, and tie-up piers) requiring less that 100 cubic yards of fill material.

- The boat ramp should extend no further than 1 to 2 feet waterward of the mean high water line (MHWL) or the ordinary high water line (OHWL), but in no case shall they exceed 5 feet waterward of the MHWL or the OHWL.
- Tie-up piers shall not exceed the length of the boat ramp or a width of 4 feet; and may have a single catwalk or terminal platform not to exceed 20 feet in length and 4 feet in width.
- Navigational access to navigable waters of the United States must already exist. No dredging of navigational access channels is permitted.

**SAJ-13:** Installation, construction, maintenance, replacement, and/or repair of ***aerial transmission lines, electrical substations, and access roads*** for construction and maintenance of overhead power lines and electrical substations.

- Foundations for overhead transmission line towers, poles, and anchors that provided the foundations shall be the minimum size necessary and have separate footings for each tower leg (rather than a larger single pad) where feasible.
- Access roads are limited to the minimum effects as stated in the special conditions of SAJ-13 including minimizing the width and length of access roads as necessary, that raised access roads be properly bridged or culverted to maintain surface water flows, to minimize surface discharge, and that roads used only for construction be removed upon completion of work and restored to pre-construction conditions.

**SAJ-14:** Installation, construction, maintenance, replacement, and repair of ***subaqueous utility and transmission lines, outfall and intake structures associated with the utility line, substations, and access roads*** for the construction and maintenance of same.

- All subaqueous utility and/or transmission lines shall be installed a minimum of 4 feet below the bottom contour except in federal channels which have deeper criteria as described in special condition #15.
- No utility and/or transmission lines will be embedded in the bottom of state Class I or II waters or aquatic preserves.
- Discharge of dredged or fill material is authorized by this general permit as described in special condition #13.
- Dredged or fill materials must not change the pre-construction bottom contours as described in special condition #17.
- Materials resulting from trench excavation may be temporarily side-cast according to the requirements in special conditions #16 and #17.

**SAJ-46:** Installation of ***bulkheads and backfill from single-family lots*** in residential (man-made) canals in the state of Florida.

- A residential canal is defined as a man-made waterway, historically dug from uplands, and surrounded on both sides by uplands adjacent to principally residential property. Open water areas on bays and lagoons are not considered residential canals, nor are federally-maintained navigational and/or flood control projects, and SAJ-46 is not authorized for use within them.
- The bulkhead and backfill shall not exceed 300 feet in length, and shall not extend waterward of the MHWL or the OHWL, unless necessary to align with existing adjacent seawalls.
- Seawall and/or riprap restoration may be permitted at its previous location, upland of, or within one foot waterward of its previous location.
- New riprap will not be placed more than 4 feet waterward of the MHWL or the OHWL.
- This permit does not authorize fill activities other than placement of riprap previously specified and backfill behind seawalls or bulkhead.
- At no time should this permit be construed to allow filling of waters of the United States for additional development, to impede navigation, or affect flood control.

**SAJ-72:** Installation of ***residential docks in Citrus County, Florida***.

- In-water work is limited to piling placement only. Additional associated structures such as boat lifts, stairway, walkway, or floating platforms shall be constructed out of water.
- All construction shall conform to the Citrus County Comprehensive Plan which limits residential dock construction to 1 slip per 100 feet of shoreline that the applicant controls as part of the lot where his or her residence is located. Therefore, most docks cannot accommodate more than 1 vessel.
- Expansion of existing marinas or other commercial facilities is not authorized under SAJ-72.

General permits allowed in critical habitat:

**SAJ-17:** Installation of ***minor structures***

- Minor structures include single mooring pilings, small mooring dolphins (not to exceed a cluster of four), non-commercial information signage, boat lifts, hoists, davits, or other minor structure that would have less environmental impact than a small dock.

**SAJ-20:** Repair, replacement, or installation of ***single-family docks/piers***

- Docks are to accommodate not more than four vessels and normal appurtenances such as boat hoists, boat shelters with open sides, stairways, walkways, mooring pilings, and dolphins.

**SAJ-33:** Installation of ***private multi-family docks/piers or government docks/piers***

- Dock must be less than 1,000 square feet in surface area and are designed to accommodate not more than five vessels, including dry storage, unless a Florida Fish and Wildlife Conservation Commission approved Manatee Protection Plan is more restrictive.
- This general permit includes normal appurtenances such as boat hoists, boat shelters with open sides, stairways, walkways, mooring pilings, and maintenance of the same.

**SAJ-34:** Installation of ***private commercial piers***

- Piers must be 1,000 square feet or less in surface area and accommodate 5 or fewer boat slips (including dry storage), unless a Florida Fish and Wildlife Conservation Commission approved Manatee Protection Plan is more restrictive.
- This general permit includes normal appurtenances such as boat hoists, boat shelters with open sides, stairways, walkways, mooring pilings, and maintenance of the same. Associated mooring pilings are not included in this surface area.
- The expansion of existing marinas or other commercial facilities is not authorized under this general permit.

PGPs:

**SAJ-91:** ***Minor structures and bulkheads within the man-made canals in Cape Coral***.

- The work authorized is limited to existing canals within the City of Cape Coral and does not include the Caloosahatchee River, Matlacha Pass Aquatic Preserve, and the Cape Coral Spreader Canal.
- The removal of red mangroves is prohibited.
- All residential lots along the canals in the City of Cape Coral have 125 feet to 140 feet of shoreline. The city code requires all properties maintain a bulkheads along the canals if the property has a swimming pool. The City of Cape Coral no longer requires the placement of riprap in front of bulkheads along the canals.
- The City of Cape Coral has stated that they have not used SAJ-91 for the authorization of aerial transmission lines, sub-aqueous transmission lines, or for new stormwater outfalls and do not anticipate the need to use this permit for these activities in the future. They may continue to use this permit for the maintenance of existing stormwater outfalls.

*Aerial Transmission Lines and associated structures*

- No dredging or filling of navigable waters or waters of the United States is permitted.

*Subaqueous and Transmission Lines*

- This includes the installation and maintenance of subaqueous utility and transmission lines placed on, under, or embedded in the bottom of navigable waters of the United Sates within the City of Cape Coral. The installation of utility and transmission lines by direction boring is authorized.
- Dredged or till material placed in backfill or bedding for subaqueous utility and transmission lines must not change the preconstruction bottom contours. Excess material must be removed to an upland disposal area.

*Private Single-Family Docks and Appurtenances*

- Structures authorized under this PGP are private single-family docks not to exceed 4 slips. This would include normal appurtenances such as boat hoists, boat shelters with open sides, stairways, walkways, mooring piles, dolphins, and maintenance of these appurtenances. Construction of upland cut boat slips is not authorized.
- No living (i.e., residential structure), fueling, or storage facilities over navigable waters of the United States are authorized.
- A structure which by its size or location may adversely affect water quality, fish and wildlife habitat, wetlands or submerged aquatic vegetation (SAV) shall not be authorized. Impacts to SAV cannot be authorized.

*Minor Structures associations with Single-Family Docks*

- Minor structures include single mooring piles; small mooring dolphins (limited to one cluster of 4 or fewer pilings); non-commercial information signage, boat lifts, hoists, davits, etc.; and other minor structure that would have less environmental impacts than a small dock.

*Stormwater Outfalls*

- Structures authorized under SAJ-91 are stormwater outfalls and appurtenances.
- Dredging is authorized at stormwater outfalls. Maintenance dredging shall be limited to a depth of no more than 5 feet below MHWL or OHWL. No additional dredging is authorized under this general permit other than that which would be necessary to restore the discharge structure to its original permitted excavated depth.
- Excavated spoil material shall be deposited at self-contained upland areas that will prevent spoil material and/or return water from reentering any water of the United States (including wetlands) or interfering with natural drainage.

*Bulkheads and Backfill in Residential Canals*

- The work herein authorized includes the construction, repair or maintenance of seawalls (bulkheads) and associated backfill in residential canals.
- The seawall shall not exceed 300 feet in length and not extend any farther waterward than 18 inches from the existing seawall or MHWL.
- The backfill must be from upland sources and consist of suitable material free from toxic pollutants in other than trace quantities. The amount of backfill shall not exceed one cubic yard per running foot below the plane of the MHWL.
- This permit does not authorize any filling, except for backfill behind the seawall. New riprap may be placed at the toe of the existing or replacement seawall when the

toe of the seawall is deeper than 3 feet at MLLW. Also, replacement riprap can only be added within the same footprint of existing riprap (i.e., no waterward extension or lateral expansion of riprap beyond the previous footprint) in depths less than or equal to 3 feet at MLLW.

**SAJ-96: *Single-family piers in Pinellas County***

- Single-family piers are not to exceed 2 slips, including personal watercraft lifts and seawall mounted davits.
- This would include normal appurtenances considered minor structures such as boat hoists, boat shelters with open sides, stairways, walkways, lower landings, mooring pilings, dolphins, and maintenance of same, including pier reconfiguration.
- Maintenance dredging around the single family dock.

***Permits not covered under this consultation:***

The only other general permits that the USACE oversees that occur in areas under the jurisdiction of NMFS are listed below in Table 2 and discussed below. These are included for comparison and to explain in Section 2.3, how each permit is used to authorize activities in Florida. The renewal of these permits is not covered by this opinion.

**Table 2: General permits not covered under this consultation.**

| USACE general permit | Description | Date NMFS completed consultation | NMFS project number |
|---|---|---|---|
| SPGP IV-R1 | Variety of activities throughout the state of Florida under FDEP | December 21, 2011 | F/SER/2009/05980 |
| SAJ-42 | Variety of activities in Miami-Dade County | February 10, 2011 | F/SER/2008/01790 |
| SAJ-71 | Live rock aquaculture | October 13, 2010 | I/SER/2010/01366 |
| SAJ-82 | Variety of activities in Florida Keys | On-going | F/SER/2008/02958 |
| SAJ-93 | Maintenance dredging in the Intracoastal Waterway on the east coast of Florida | No consultation on record | No consultation on record |
| SAJ-99 | Live rock and marine bivalve aquaculture | August 29, 2012 | I/SER/2012/01303 |

**SPGP IV-RI:** This PGP that gives limited general authority to the ***FDEP for several in-water construction activities in all of the counties in the state of Florida***, except for Miami-Dade County. In-water construction activities covered by this SPGP are: shoreline stabilization projects; construction of boat ramps, boat launch areas and structures associated with such ramps or launch areas; docks, piers associated facilities, and other minor piling-supported structures, and; maintenance dredging of canals and channels. NMFS completed a programmatic consultation for SPGP IV-R1 on December 21, 2011.

**SAJ-42:** This PGP that gives limited general authority ***to Miami-Dade County for several in-water construction activities*** and serves as an operating agreement between Miami-Dade County's DERM and the USACE to administer SAJ-42. Specifically, SAJ-42 covers the majority of Johnson's seagrass critical habitat, located in Biscayne Bay within Miami-Dade County. For the intent of the present programmatic consultation, only those areas of Johnson's seagrass critical habitat outside of Miami-Dade County will be discussed in terms of effects analyses to both the species and its critical habitat. NMFS completed a programmatic consultation for SAJ-42 on February 10, 2011.

**SAJ-71:** This PGP that will authorize the deposition of materials for ***live rock aquaculture*** within federal waters off the state of Florida. PGP SAJ-71 will be administered by NMFS through an operating agreement between the USACE and NMFS that gives general authority to NMFS to administer SAJ-71 for the purposes of live rock aquaculture, in navigable waters of the United States which are within federal waters off the state of Florida. NMFS completed a programmatic consultation for SAJ-71 on October 10, 2010.

**SAJ-82:** This RGP for ***single-family residential projects in Monroe County*** including lot fills; construction of minor structures, minor piling-supported structures and marginal docks, including repair or replacement of said structures; boat ramps; and riprap revetments, bulkheads and backfill in residential canals. Activities will be located in waters of the United States on, or within existing wetland lots in platted subdivisions within Monroe County, Florida, excluding federally-maintained navigation channels, flood control projects, and the Marvin D. Adams Waterway (Adam's Cut). NMFS is currently working on a programmatic consultation for SAJ-82 and its effects on corals and *Acropora* critical habitat.

**SAJ-93:** This RGP that gives limited general authority to the Florida Inland Navigation District for ***maintenance dredging*** activities along the east coast of Florida. Dredging is authorized in federal channels located in the Atlantic Intracoastal Waterway, the Intracoastal Waterway, the Okeechobee Waterway, and along the east coast of Florida.

**SAJ-99:** This PGP that gives limited general authority to the Florida Department of Agriculture and Consumer Services to authorize the deposition of materials for live rock aquaculture within the jurisdictional waters of the State of Florida. Additionally, this permit also authorizes discharges of dredged or fill material (i.e., shell hash, bags seeded with clams, rock, etc.) necessary for shellfish and live rock aquaculture such as seeding, rearing, cultivating, relaying, transplanting, and harvesting activities. NMFS completed a programmatic consultation for SAJ-99 on August 29, 2012.

***Nationwide Permits (NWP) not covered under this consultation:***

These are included for comparison and to explain in Section 2.3, how each permit is used to authorize activities in Florida. The renewal of these permits is not covered by this opinion. These NWPs were reissued and published under the federal registry dated February 12, 2012, and became effective March 19, 2012.

**NWP-2 Structures in Artificial Canals:** Structures constructed in artificial (i.e., man-made) canals within principally residential developments where the connection of the canal to a navigable water of the United States has been previously authorized (see 33 CFR 322.5(g)). (Section 10)

**NWP-3 Maintenance:** (a) The repair, rehabilitation, or replacement of any previously authorized, currently serviceable structure, or fill, or of any currently serviceable structure or fill authorized by 33 CFR 330.3, provided that the structure or fill is not to be put to uses differing from those uses specified or contemplated for it in the original permit or the most recently authorized modification. (b) This NWP also authorizes the removal of accumulated sediments and debris in the vicinity of existing structures (e.g., bridges, culverted road crossings, water intake structures, etc.) and/or the placement of new or additional riprap to protect the structure. The removal of sediment is limited to the minimum necessary to restore the waterway in the vicinity of the structure to the approximate dimensions that existed when the structure was built, but cannot extend farther than 200 feet in any direction from the structure. (c) This NWP also authorizes temporary structures, fills, and work necessary to conduct the maintenance activity. Appropriate measures must be taken to maintain normal downstream flows and minimize flooding to the maximum extent practicable, when temporary structures, work, and discharges, including cofferdams, are necessary for construction activities, access fills, or dewatering of construction sites. Temporary fills must consist of materials, and be placed in a manner, that will not be eroded by expected high flows. (d) This NWP does not authorize maintenance dredging for the primary purpose of navigation. This NWP does not authorize beach restoration. This NWP does not authorize new stream channelization or stream relocation projects. (Sections 10 of the Clean Water Act and Section 404 of the Rivers and Harbors Act)

**NWP-9 Structures in Fleeting and Anchorage Areas**: Structures, buoys, floats and other devices placed within anchorage or fleeting areas to facilitate moorage of vessels where the U.S. Coast Guard has established such areas for that purpose. (Section 10)

**NWP-10 Mooring Buoys:** Non-commercial, single-boat, mooring buoys. (Section 10)

**NWP-13 Bank Stabilization**: Bank stabilization activities necessary for erosion prevention, provided the activity meets all of the following criteria (a) No material is placed in excess of the minimum needed for erosion protection; (b) The activity is no more than 500 feet in length along the bank, unless the district engineer waives this criterion by making a written determination concluding that the discharge will result in minimal adverse effects; (c) The activity will not exceed an average of one cubic yard per running foot placed along the bank below the plane of the ordinary high water mark or the high tide line, unless the district engineer waives this criterion by making a written determination concluding that the discharge will result in minimal adverse effects; (d) The activity does not involve discharges of dredged or fill material into special aquatic sites, unless the district engineer waives this criterion by making a written determination concluding that the discharge will result in minimal adverse effects; (e) No material is of a type, or is placed in any location, or in any manner, that will impair surface water flow into or out of any waters of the United States; (f) No material is placed in a manner that will be eroded by normal or expected high flows (properly anchored trees and treetops may be used in low energy areas); and, (g) The activity is not a stream channelization activity. This NWP also authorizes temporary structures, fills, and work necessary to construct the bank stabilization activity. (Sections 10 of the Clean Water Act and 404 of the Rivers and Harbors Act)

**NWP-19 Minor Dredging:** Dredging of no more than 25 cubic yards below the plane of the ordinary high water mark or the mean high water mark from navigable waters of the United States (i.e., Section 10 waters). This NWP does not authorize the dredging or degradation through siltation of coral reefs, sites that support submerged aquatic vegetation (including sites where submerged aquatic vegetation is documented to exist but may not be present in a given year), anadromous fish spawning areas, or wetlands, or the connection of canals or other artificial waterways to navigable waters of the United States (see 33 CFR 322.5(g)). (Sections 10 of the Rivers and Harbors Act and 404 of the Clean Water Act)

**NWP-28 Modifications of Existing Marinas:** Reconfiguration of existing docking facilities within an authorized marina area. No dredging, additional slips, dock spaces, or expansion of any kind within waters of the United States is authorized by this NWP. (Section 10)

**NWP-35 Maintenance Dredging of Existing Basins:** Excavation and removal of accumulated sediment for maintenance of existing marina basins, access channels to marinas or boat slips, and boat slips to previously authorized depths or controlling depths for ingress/ egress, whichever is less, provided the dredged material is deposited at an area that has no waters of the United States site and proper siltation controls are used. (Section 10)

**NWP-36 Boat Ramps:** Activities required for the construction of boat ramps, provided the activity meets all of the following criteria (a) The discharge into waters of the United States does not exceed 50 cubic yards of concrete, rock, crushed stone or gravel into forms, or in the form of precast concrete planks or slabs, unless the district engineer waives the 50 cubic yard limit by making a written determination concluding that the discharge will result in minimal adverse effects; (b) The boat ramp does not exceed 20 feet in width, unless the district engineer waives this criterion by making a written determination concluding that the discharge will result in minimal adverse effects; (c) The base material is crushed stone, gravel or other suitable material; (d) The excavation is limited to the area necessary for site preparation and all excavated material is removed to an area that has no waters of the United States; and, (e) No material is placed in special aquatic sites, including wetlands. (Sections 10 of the Rivers and Harbors Act and 404 of the Clean Water Act ).

## 2.3 **Project Specific Review**

This section describes the required second-tier review for this consultation, other than projects proposing installation of any type of piling greater than 24" in diameter, or installation of any size of metal piling or sheet piling by impact hammer. Because of the noise levels generated, projects proposing installation of any type of piling greater than 24" in diameter, or installation of any size of metal piling or sheet piling by impact hammer cannot be authorized until project-specific consultation has been reinitiated and concluded with the NMFS. In the state of Florida, there are two different ways in which an applicant can apply for an in-water permit. Applicants either apply directly to a regional delegated authority or to the FDEP through the SPGP IV-RI. Below is a description of the way that individual projects are received, reviewed, and processed. A flow chart demonstrating the application process for a dock construction project is provided at the end of this section.

1. **Project Application**: In areas with PGPs in place, the regional delegated authority receives the permit applications directly (i.e., Cape Coral for SAJ-91, Miami-Dade County for SAJ-42, and Pinellas County for SAJ-96). All other applications within the state of Florida are submitted to the FDEP under SPGP IV-R1.
2. **Authorization of PGPs**: Since these agencies have delegated authority to process applications that meet the terms and conditions of the applicable PGP for the USACE, each application is assessed to see that it meets the PDCs defined by the PGP. If the PDCs are met then it is submitted to NMFS as stated in step 4 below. If the proposed project is not authorized under one of the PGPs (e.g., does not meet all of the PDCs, is outside of the defined action area for the PGP, requires greater review), then the application is forwarded to the USACE for review. (NMFS has already completed consultation on the SAJ-42 and SPGP IV-R1, as discussed earlier. This consultation only applies to PGPs SAJ-91 and 96)
3. **Authorization of RGPs**: Permit applications forwarded to the USACE from FDEP or the other PGP delegated authorities are then individually reviewed by the USACE. Projects may then be authorized under an RGP or NWP based on the type of activity requested in the application, the level of impact expected, and/or the location of the project. Projects authorized under NWPs are not covered under this consultation. Before a project can be authorized under a RGP, the USACE must conduct a project specific review to ensure that all of the PDCs are met. If the PDCs are met then it is submitted to NMFS as stated in step 4 below.
4. **Submission to NMFS:** The USACE or its delegated authority must email NMFS the following information to *nmfs.ser.SAJgeneralpermits@noaa.gov*:
    a. A completed Excel spreadsheet attachment in the format shown below in Table 3. Table 3 provides the necessary headings along with three examples for demonstration. Below Table 3 are descriptions and formatting requirements for each of the columns.
    b. A completed form stating how each of the PDCs is met or is not applicable and why. The USACE and NMFS will develop a standardized form for each of the general permits.
    c. Any other supporting documentation necessary to support the determination made by the USACE or its delegated authority. This may include project application,

site survey (e.g., benthic, seagrass, hardbottom, etc), photos, environmental assessment, and more.

NMFS will acknowledge receipt of the USACE or the PGPs delegated authority's email submission through an auto reply e-mail. NMFS will review each e-mail submission sent to us by the USACE. If the USACE or PGPs delegated authority receives acknowledgement of NMFS' receipt of the application package, and receives no subsequent notification within the 10-day review period that the project does not comply with the programmatic consultation, then the USACE or designated authority may proceed with processing the project application.

5. **Tier III review**: If a project does not meet the PDCs defined in this document for any of the general permits, it must undergo separate Section 7 consultation with NMFS. This review is referred to as Tier III review by the USACE. After this review, if NMFS provides a may affect but not likely to adversely affect determination, then the USACE may authorize the activity either under the original general permit or separately as an individual permit. Projects authorized by the USACE that require separate Section 7 consultation are not covered by this consultation.

Table 3: USACE project specific review provided to NMFS (shown below with examples).

| Date sent to NMFS | Permit used | Permit Tracking Number | Project Address | County | Latitude | Longitude | Critical Habitat Unit | Total In-water impact | Shallow In-water impact | Overwater area | Impact type | New Construction, Repair, Replacement | All PDCs met |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1/1/13 | SAJ-91 | 12-11111 | 123 Main St., Cape Coral | Lee | 26.12345 | -81.12345 | STSF CH CHEU | 123 | 12 | 210 | dock, seawall | replacement | yes |
| 1/2/13 | SAJ-96 | Unknown format | 123 Main St., Dunedin | Pinellas | 28.12345 | -82.12345 | N/A | 50 | 0 | 75 | dock, dredge | new construction | yes |
| 1/3/13 | SAJ-20 | SAJ-2012-250 | 123 Main St., Jupiter Island | Martin | 17.12345 | -80.12345 | JSG CH Unit E | 8 | 0 | 80 | Dock | replacement | yes |

Formatting requirements:

1. Date sent to NMFS: This is the date the email was provided to NMFS.
2. Permit used: This is the general permit used to authorize the activity.
3. USACE permit number: This is the permit number assigned by the USACE to the project.
4. Project Address: This is the address of the project location. Any formatting is fine in this category, though the state and zip code are not required.
5. County
6. Latitude: This shall be formatted in decimal degrees to five places as shown in the examples.
7. Longitude: This shall be formatted in decimal degrees to five places as shown in the examples. Please provide a negative symbol before the longitude to denote the western hemisphere.
8. Critical habitat unit: These shall be provided in the following acronym style with no spaces or hyphens as shown in the examples. This allows for accurate sorting in excel.
   - STSF CH CHEU (smalltooth sawfish critical habitat Charlotte Harbor Estuary Unit)
   - STSF CH TTIU (smalltooth sawfish critical habitat Ten Thousand Island Unit),
   - GS CH Unit 9 (gulf sturgeon critical habitat - specify the unit)
   - A CH (*Acropora* critical habitat)
   - JSG CH Unit A (Johnson's seagrass critical habitat - specify the unit)
   - N/A (not applicable because the project is not located within a critical habitat unit)
9. Total in-water impact is defined as the total area of in-water substrate that is permanently changed below MHW. This loss is calculated in square feet and includes seawall placement, riprap, and dredging. This does not include temporary impacts such as side casting while installing sub-aquatic transmission lines. Piling placements are also included for the following counties: Bay, Broward, Dixie, Escambia, Franklin, Gulf, Indian River, Levy, Martin, Miami-Dade Okaloosa, Palm Beach, St. Lucie, Santa Rosa, and Walton.
10. Shallow in-water impact is the sub-set of the total in-water impact listed in number 9 above between MHW and 3 feet MLLW.
11. Overwater area includes the total square footage of all overwater structures including docks, boats, canopies, etc. This is not limited to just Johnson's seagrass critical habitat but includes the entire State of Florida.
12. New construction, repair, or replacement: Please note which type of activity is being authorized. Repair and replacement are defined as occurring within the same footprint as the existing structure. New construction is defined as a partial or completely new project footprint.
13. All PDCs met: Answer "yes" or "no", if all of the applicable PDCs defined in this document are being met by the proposed project.

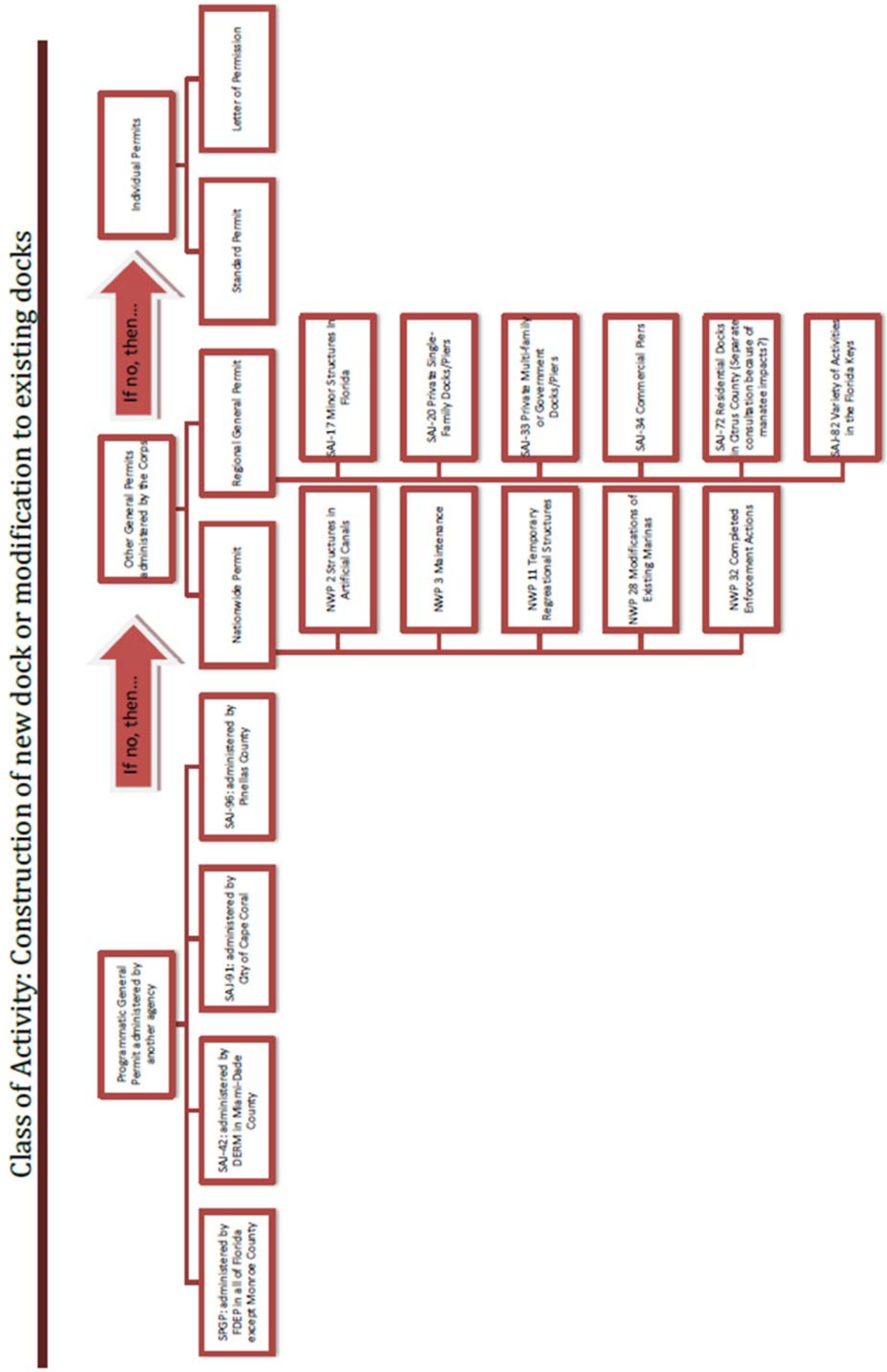


**Figure 1: USACE decision making tree.**

## 2.4 Programmatic Review

NMFS and USACE will conduct programmatic reviews to evaluate, among other things, whether the nature and scale of the assumptions and effects predicted continue to be valid; whether the PDCs continue to be appropriate; and whether the project-specific consultation procedures are being complied with and are effective. The purpose of this is to verify conclusions and assumptions regarding the potential effects to ESA-listed species and critical habitat, review data on the cumulative impacts of the combined projects from the previous year, evaluate and suggest any procedural changes prompted by the review of data. For the two PGPs (SAJ-91 and 96), the agency authorizing authority may be involved in the reviews conducted between the USACE and NMFS. If the results of the programmatic review show that the anticipated impacts to listed species or critical habitat defined in this document are being exceeded, reinitiation of consultation may be required.

**In-depth project review**: This in-depth project review is in addition to the project review, PDC verification, and documentation requirement in Section 2.3. Periodically, NMFS will conduct a detailed review of a random sample of projects authorized under the general permits covered under this consultation. During this detailed review, NMFS may request additional information from the USACE or its delegated authority for individual projects beyond the required information submitted to NMFS described in Section 2.3.

1. In the first year of the permit authorization, NMFS will review 10 randomly selected projects authorized under each of the 12 general permits for a total of 120 projects. This review will be conducted quarterly for a total of 480 (120 projects x 4 quarterly reviews) projects
2. If the projects reviewed in the first year meet the assumptions and PDCs defined by this opinion, then the review for years 2-5 will be conducted semi-annually (every 6 months). Again, 10 randomly selected projects authorized under each of the 12 general permits will be reviewed for a total of 120 projects. This will result in 240 reviews annually.

If this review results in questions or concerns by NMFS, an in-person meeting or conference call will be scheduled with the USACE to resolve any issues.

**Annual programmatic review**: The annual review will determine if the PDCs, assumptions, and effects analysis continue to be working and relevant as discussed above. As previously stated, if the results of the programmatic review exceed the anticipated impacts to listed species or critical habitat defined in this document, reinitiation of consultation may be required. The annual review will cover all projects that occur within a given calendar year and the review will occur at the end of that year but no later than March 31st of the following year. This review will be conducted as an in-person meeting or conference call between NMFS, USACE, and its delegated authorities, if needed. The meeting will discuss the results of the in-depth project reviews; administrative issues; concerns or necessary changes in the assumptions, PDCs, or effects of this consultation; and any other procedural changes required. NMFS will document the results of the annual review in a formal letter to the USACE.

2.5 **Project Design Criteria**

Based on past permitting practices of the USACE and review of consultations with similar in-water construction activities, PDCs have been identified that typically have been applied to permitted in-water construction activities and that limit adverse effects to those that are minimal in nature and never result in adverse effects to listed species or adverse effects to the essential features of designated critical habitat. The nature of the in-water construction activities involved in a proposed project will dictate which of the PDCs will be applicable to future projects covered by this consultation. The PDCs for several types of in-water construction activities may apply to a single proposed project (e.g., a proposed project may require both shoreline stabilization and installation of a single-family pier). Below is a list of each general permit covered by this consultation and the PDCs required to issue that permit (see Table 4). For projects that utilize the construction guidelines, the USACE shall ensure that applicants are using the current guidelines including any updates. It is important to note that each of these general permits have different action areas within the state of Florida (see Section 2.6). Only SAJ- 17, 20, 33, 34, and 91 authorize activities within critical habitat.

**Table 4: PDCs for General Permits covered under this Consultation.**

| | |
|---|---|
| All Projects | All projects and activities shall meet the following conditions:<br>• For projects in waters accessible to sea turtles, smalltooth sawfish, or sturgeon (Gulf, shortnose, or Atlantic), the permittee will utilize the "*Sea Turtle and Smalltooth Sawfish Construction Conditions*," and any added requirements, as appropriate for the proposed activity. Under these guidelines, all construction activities will cease if sea turtles or smalltooth sawfish, are observed in the area. These construction conditions shall also apply to sturgeon (Gulf, shortnose, or Atlantic).<br>• All projects are required to use turbidity curtains for the smallest practicable area, that are monitored daily to ensure listed species are not being impacted by their presence, and be removed upon project completion, and that will not appreciably interfere with use of the area by any listed species. Turbidity control measures, including best management practices, shall be used throughout construction to control erosion and siltation to ensure there are no violations of state Water Quality Standards as established in Sections 62-4.242 and 62-4.244 of the Florida Administrative Code and Chapters 62-302, 62-520, 62-522, and 62-550 of the Florida Administrative Code.<br>• All projects are prohibited on or contiguous to ocean beaches.<br>• |

| | |
|---|---|
| SAJ-5<br>Maintenance Dredging of Residential Canals | • This permit cannot be used to authorize projects in the following designated critical habitat: Gulf sturgeon critical habitat, Johnson's seagrass critical habitat, smalltooth sawfish critical habitat, North Atlantic right whale critical habitat, and elkhorn and staghorn coral critical habitat.<br>• Projects authorized under these permits will have no adverse impacts to hard or soft corals, mangroves, and/or seagrasses (including Johnson's seagrass).<br>• Maintenance dredging activities are limited to residential (man-made) canals in navigable waters of the United Sates.<br>• Excavated spoil material shall be deposited in a self-contained upland (i.e., non-wetland pursuant to current federal criteria) disposal site that will prevent spoil material and/or return water from reentering any water of the United States or interfering with natural drainage<br>• No additional dredging or excavation is allowed under this permit other than is necessary to restore the canal to its original excavated depth; however, in no case shall the depth of canal be greater than -5 feet MLW.<br>• The material dredged/excavated under each authorization shall not exceed 4,000 cubic yards per project per year.<br>• SAJ-5 does not authorize the removal of plugs or the connection of any canal or other non-connected waterbody to navigable waters of the United States or to any other waters of the United States. |
| SAJ-12<br>Boat Ramps | • This permit cannot be used to authorize projects in the following designated critical habitat: Gulf sturgeon critical habitat, Johnson's seagrass critical habitat, smalltooth sawfish critical habitat, North Atlantic right whale critical habitat, and elkhorn and staghorn coral critical habitat.<br>• Projects authorized under these permits will have no adverse impacts to hard or soft corals, mangroves, and/or seagrasses (including Johnson's seagrass).<br>• Excavated spoil material shall be deposited in a self-contained upland (i.e., non-wetland pursuant to current federal criteria) disposal site that will prevent spoil material and/or return water from reentering any water of the United States or interfering with natural drainage<br>• Installation and maintenance of private single-family boat ramps, including appurtenant structures (bulkheads, rub-rails, and tie-up piers) must require less than 100 cubic yards of fill material.<br>• These boat ramps typically extend no further than 1 to 2 feet waterward of the MHWL or OHWL, but in no case shall they exceed 5 feet waterward of the MHWL or the OHWL.<br>• Tie-up piers shall not exceed the length of the boat ramp or a width of 4 feet; and may have a single catwalk or terminal platform not to exceed 20 feet in length and 4 feet in width.<br>• Navigational access to navigable waters of the United States must already exist. No dredging of navigational access channels is permitted. |

| | |
|---|---|
| SAJ-13<br>Aerial<br>Transmission<br>Lines | □ This permit cannot be used to authorize projects in the following designated critical habitat: Gulf sturgeon critical habitat, Johnson's seagrass critical habitat, smalltooth sawfish critical habitat, North Atlantic right whale critical habitat, and elkhorn and staghorn coral critical habitat.<br>□ Projects authorized under these permits will have no adverse impacts to hard or soft corals, mangroves, and/or seagrasses (including Johnson's seagrass).<br>□ Foundations for overhead transmission line towers, poles, and anchors that provided the foundations shall be the minimum size necessary and have separate footings for each tower leg (rather than a larger single pad) where feasible.<br>□ Permanent impacts (e.g., foundation towers, transmission line poles, etc.) must be less than 1 acre per 2 miles in-water segment. |
| SAJ-14<br>Sub-Aqueous<br>Transmission<br>Lines | □ This permit cannot be used to authorize projects in the following designated critical habitat: Gulf sturgeon critical habitat, Johnson's seagrass critical habitat, smalltooth sawfish critical habitat, North Atlantic right whale critical habitat, and elkhorn and staghorn coral critical habitat.<br>□ Projects authorized under these permits will have no adverse impacts to hard or soft corals, mangroves, and/or seagrasses (including Johnson's seagrass).<br>□ All subaqueous utility and/or transmission lines shall be installed a minimum of 4 feet below the bottom contour except in federal channels which have deeper criteria as described in the draft special condition #15 of SAJ-14.<br>□ Discharge of dredged or fill material is authorized by this general permit as described in the draft special condition #13 of SAJ-14.<br>□ Dredged or fill materials must not change the pre-construction bottom contours as described in the draft special condition #17 of SAJ-14.<br>□ Materials resulting from trench excavation may be temporarily side-cast according to the requirements in the draft special conditions #16 and #17 of SAJ-14.<br>□ Permanent impacts (e.g., foundation towers, transmission line poles, etc.) must be less than 1 acre per 2 miles in-water segment. |

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|---|---|
| SAJ-17<br>Minor<br>Structures | - The following guidelines shall be followed: *"Dock Construction Guidelines in Florida for Docks or Other Minor Structures Constructed in or over Submerged Aquatic Vegetation (SAV), Marsh or Mangrove Habitat* - *August 2001."* Because of concerns about adverse impacts to Johnson's seagrass, dock construction in the lagoon (as well as canal) systems on Florida's east coast from Sebastian Inlet (Brevard County) south to and including central Biscayne Bay (Miami-Dade County) must also comply with the construction guidelines titled "*Key for Construction Conditions for Docks or Other Minor Structures Constructed in or Over Johnson's Seagrass (Halophila johnsonii) NMFS/USACE – February 2002."*<br>- Projects authorized under these permits will have no adverse impacts to hard or soft corals, mangroves, and/or seagrasses (including Johnson's seagrass).<br>- No dredging associated with dock/pier construction is authorized.<br>- No work shall be authorized by SAJ-17 which causes adverse impact to hardbottom or other essential features within staghorn or elkhorn coral designated critical habitat. Essential features are natural consolidated hard substrate or dead coral skeleton that is free from fleshy or turf macroalgae cover and sediment cover.<br>- Projects proposing installation of any type of piling greater than 24" in diameter, or installation of any size of metal piling or sheet piling by impact hammer cannot be authorized until project-specific consultation has been reinitiated and concluded with the NMFS.<br>- Impact hammer installation of piles or sheet piles is prohibited from March 1 to June 30 in the areas defined in the noise restriction areas defined in Table 5 and shown in Figures 2-5. |

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| SAJ-20<br>Private Single-family Docks/Piers | • This permit cannot be used to authorize projects in the following designated critical habitat: elkhorn and staghorn coral critical habitat.<br>• The following guidelines shall be followed: *"Dock Construction Guidelines in Florida for Docks or Other Minor Structures Constructed in or over Submerged Aquatic Vegetation (SAV), Marsh or Mangrove Habitat - August 2001."* Because of concerns about adverse impacts to Johnson's seagrass, dock construction in the lagoon (as well as canal) systems on Florida's east coast from Sebastian Inlet (Brevard County) south to and including central Biscayne Bay (Miami-Dade County) must also comply with the construction guidelines titled *"Key for Construction Conditions for Docks or Other Minor Structures Constructed in or Over Johnson's Seagrass (Halophila johnsonii) NMFS/USACE – February 2002."*<br>• Projects authorized under these permits will have no adverse impacts to hard or soft corals, mangroves, and/or seagrasses (including Johnson's seagrass).<br>• No dredging associated with dock/pier construction is authorized under this permit.<br>• Projects proposing installation of any type of piling greater than 24" in diameter, or installation of any size of metal piling or sheet piling by impact hammer cannot be authorized until project-specific consultation has been reinitiated and concluded with the NMFS.<br>• Impact hammer installation of piles or sheet piles is prohibited from March 1 to June 30 in the areas defined in the noise restriction areas defined in Table 5 and shown in Figures 2-5. |

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| SAJ-33<br>Private Multi-family or Government Docks/Piers | - This permit cannot be used to authorize projects in the following designated critical habitat: elkhorn and staghorn coral critical habitat.<br>- The following guidelines shall be followed: *"Dock Construction Guidelines in Florida for Docks or Other Minor Structures Constructed in or over Submerged Aquatic Vegetation (SAV), Marsh or Mangrove Habitat - August 2001."* Because of concerns about adverse impacts to Johnson's seagrass, dock construction in the lagoon (as well as canal) systems on Florida's east coast from Sebastian Inlet (Brevard County) south to and including central Biscayne Bay (Miami-Dade County) must also comply with the construction guidelines titled *"Key for Construction Conditions for Docks or Other Minor Structures Constructed in or Over Johnson's Seagrass (Halophila johnsonii) NMFS/USACE – February 2002."*<br>- Projects authorized under these permits will have no adverse impacts to hard or soft corals, mangroves, and/or seagrasses (including Johnson's seagrass).<br>- Municipal or commercial fishing piers are not authorized under this permit.<br>- No dredging associated with dock/pier construction is authorized.<br>- Water depths may not be altered in association with dock/pier construction.<br>- Projects proposing installation of any type of piling greater than 24" in diameter, or installation of any size of metal piling or sheet piling by impact hammer cannot be authorized until project-specific consultation has been reinitiated and concluded with the NMFS.<br>- Impact hammer installation of piles or sheet piles is prohibited from March 1 to June 30 in the areas defined in the noise restriction areas defined in Table 5 and shown in Figures 2-5. |

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| SAJ-34 Commercial Piers | - This permit cannot be used to authorize projects in the following designated critical habitat: elkhorn and staghorn coral critical habitat.<br>- The following guidelines shall be followed: *"Dock Construction Guidelines in Florida for Docks or Other Minor Structures Constructed in or over Submerged Aquatic Vegetation (SAV), Marsh or Mangrove Habitat - August 2001."* Because of concerns about adverse impacts to Johnson's seagrass, dock construction in the lagoon (as well as canal) systems on Florida's east coast from Sebastian Inlet (Brevard County) south to and including central Biscayne Bay (Miami-Dade County) must also comply with the construction guidelines titled *"Key for Construction Conditions for Docks or Other Minor Structures Constructed in or Over Johnson's Seagrass (Halophila johnsonii) NMFS/USACE – February 2002."*<br>- Projects authorized under these permits will have no adverse impacts to hard or soft corals, mangroves, and/or seagrasses (including Johnson's seagrass).<br>- Municipal or commercial fishing piers are not authorized under this permit.<br>- No dredging associated with dock/pier construction is authorized.<br>- Water depths may not be altered in association with dock/pier construction.<br>- Projects proposing installation of any type of piling greater than 24" in diameter, or installation of any size of metal piling or sheet piling by impact hammer cannot be authorized until project-specific consultation has been reinitiated and concluded with the NMFS.<br>- Impact hammer installation of piles or sheet piles is prohibited from March 1 to June 30 in the areas defined in the noise restriction areas defined in Table 5 and shown in Figures 2-5. |

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| SAJ-46 Bulkheads and Backfill in Man-made Canals | - This permit cannot be used to authorized projects in the following designated critical habitat: Gulf sturgeon critical habitat, Johnson's seagrass critical habitat, smalltooth sawfish critical habitat, North Atlantic right whale critical habitat, and elkhorn and staghorn coral critical habitat.<br>- Projects authorized under these permits will have no adverse impacts to hard or soft corals, mangroves, and/or seagrasses (including Johnson's seagrass).<br>- Fill material used with a project shall be limited to suitable, clean fill material, which excludes materials such as trash, debris, car bodies, asphalt, construction materials, concrete block with exposed reinforcement bars, and any soils contaminated with any toxic amounts (see Section 307 of the CWA) (applies to SAJ-13, SAJ-14, and SAJ-46).<br>- The bulkhead and backfill shall not exceed 300 feet in length, and shall not extend waterward of the MHWL or the OHWL, unless necessary to align with existing adjacent seawalls.<br>- Seawall and/or riprap restoration may be permitted at its previous location, upland of, or within one foot waterward of its previous location.<br>- New riprap will not be placed more than 4 feet waterward of the MHWL or the OHWL.<br>- This permit does not authorize fill activities other than placement of riprap previously specified and backfill behind seawalls or bulkhead.<br>- Projects proposing installation of metal sheet piling by impact hammer cannot be authorized until project-specific consultation has been reinitiated and concluded with the NMFS |
| SAJ-72 Residential Docks in Citrus County | - Projects authorized under these permits will have no adverse impacts to hard or soft corals, mangroves, and/or seagrasses (including Johnson's seagrass).<br>- If a project site supports emergent or submerged aquatic vegetation or is expected to support these though not present at time of survey, the applicants shall adhere to the USACE/NMFS' "*Dock Construction Guidelines in Florida for Docks or Other Minor Structures Constructed in or over Submerged Aquatic Vegetation (SAV), Marsh or Mangrove Habitat - August 2001*."<br>- Projects proposing installation of any type of piling greater than 24" in diameter, or installation of any size of metal piling or sheet piling by impact hammer cannot be authorized until project-specific consultation has been reinitiated and concluded with the NMFS. |

| | |
|---|---|
| SAJ-91 Shoreline Armorment, Docks, and Minor Structures in the City of Cape Coral | - No impacts are allowed to mangrove or submerged aquatic vegetation<br>- Excavated spoil material shall be deposited in a self-contained upland (i.e., non-wetland pursuant to current federal criteria) disposal site that will prevent spoil material and/or return water from reentering any water of the United States or interfering with natural drainage.<br>- Dredging is authorized at stormwater outfalls. Maintenance dredging shall be limited to a depth of no more than 5 feet below MHWL or OHWL. No additional dredging is authorized under this general permit other than that which would be necessary to restore the discharge structure to its original permitted excavated depth.<br>- Minor structures are allowed that would have less environmental impacts than a small dock include single mooring piles; small mooring dolphins (limited to one cluster of 4 or fewer pilings); non-commercial information signage, boat lifts, hoists, davits, etc.; and other minor structure.<br>- Structures authorized under this PGP are private single-family docks not to exceed 4 slips. This would include normal appurtenances such as boat hoists, boat shelters with open sides, stairways, walkways, mooring piles, dolphins, and maintenance of these appurtenances. Construction of upland cut boat slips are not authorized.<br>- The seawall shall not exceed 300 feet in length and not extend any farther waterward than 18 inches from the existing seawall or MHW.<br>- This permit does not authorize any filling, except for backfill behind the seawall. New riprap may be placed at the toe of the existing or replacement seawall when the toe of the seawall is deeper than 3 feet at MLLW. Also, replacement riprap can only be added within the same footprint of existing riprap (i.e., no waterward extension or lateral expansion of riprap beyond the previous footprint) in depths less than or equal to 3 feet at MLLW.<br>- Projects proposing installation of any type of piling greater than 24” in diameter, or installation of any size of metal piling or sheet piling by impact hammer cannot be authorized until project-specific consultation has been reinitiated and concluded with the NMFS.<br>- Impact hammer installation of piles or sheet piles is prohibited from March 1 to June 30 in the areas defined in the noise restriction areas defined in Table 5 and shown in Figures 2-5. |

<table>
<tr>
<td>SAJ-96<br>Pinellas County</td>
<td>
□ This permit cannot be used to authorized projects in the following designated critical habitat: Gulf sturgeon critical habitat, Johnson’s seagrass critical habitat, smalltooth sawfish critical habitat, North Atlantic right whale critical habitat, and elkhorn and staghorn coral critical habitat. Note: there is no designated critical habitat in Pinellas County.<br>
□ Projects involving pilings where mangrove, emergent or submerged aquatic vegetative resources are present must comply with USACE and NMFS’ “Construction Guidelines in Florida for Minor Piling-Supported Structures Constructed in or over Submerged Aquatic Vegetation, Marsh, or Mangrove Habitat” dated August 2001.<br>
□ No impacts are allowed to mangroves or submerged aquatic vegetation.<br>
□ Projects will not be authorized on beach areas used by swimming sea turtles.<br>
□ Projects proposing installation of any type of piling greater than 24” in diameter, or installation of any size of metal piling or sheet piling by impact hammer cannot be authorized until project-specific consultation has been reinitiated and concluded with the NMFS.<br>
<br>
<u>Single-Family Docks:</u><br>
□ No more than 2 slips are allowed (including personal water craft, single davits, seawall mounted davits).<br>
<br>
<u>Multi-use and Commercial Docks:</u><br>
□ No new access for watercraft is allowed (including high and dry).<br>
□ No increase in number of slips is allowed (existing number of slips is not in question).<br>
□ No improvements are allowed that would increase usage.<br>
□ Size of vessels must not be increased.<br>
□ Structures are not allowed to be used for repeat use vessels or special events.<br>
<br>
<u>Shoreline Stabilization:</u><br>
□ New vertical walls are not allowed waterward of MHW/OHW (except between two existing walls and less than 100 feet).<br>
□ Replacement seawalls or riprap are allowed within 1 feet of the existing structure.<br>
□ New riprap is allowed less than 10 feet waterward of MHW/OHW.<br>
□ Riprap cannot be steeper than a 2:1 slope.<br>
<br>
<u>Maintenance Dredging Around Single-Family Docks:</u><br>
□ Dredging is not allowed to be more than -5 feet deep at MLW.<br>
□ Dredging must not exceed previously authorized depth.<br>
□ Dredging must not exceed surrounding controlling depths.<br>
□ Dredging must be less than 5,000 cubic yards.
</td>
</tr>
</table>

## 2.6 **Action Area**

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). The action area includes all waters of the state of Florida except those areas not covered by the permit. All of the proposed actions under these general permits occur within inland waters or do not extend into the Atlantic Ocean or Gulf of Mexico further than a 1,000-square-foot residential dock. Therefore, direct impacts are limited to these areas and the surrounding waters. Indirect impacts include vessel traffic from the dock and boat ramps proposed under these general permits. Since residential vessels typically stay in inland and nearshore waters, the action area includes nearshore waters (Florida state waters) from indirect impacts from vessel traffic.

Though all actions covered under these general permits occur within the state of Florida, below is a list of specific exemptions and exclusions for each of the separate general permits. Since we do not know the specific location of each of the actions that may be authorized under these general permits, we looked at the construction areas allowed by each permit, the PDCs for each permit, and the number of actions authorized under the previous 5-year authorization period to determine whether any action might be located or clumped in any areas of particular importance to listed species.

- Monroe County: Only SAJ-17 and SAJ-82 authorize activities in Monroe County. SAJ-82 is currently under separate NMFS review (see NMFS PCTS reference number F/SER/2008/02958). All other general permits are prohibited for authorization in Monroe County.

- SAJ-5 and SAJ-46 are only authorized in man-made canals.

- All projects are prohibited that are on or contiguous with the ocean beaches.

- SAJ-5, 12, 13, 14, 17, 20, 33, 34, and 46 are allowed throughout the state of Florida except for the following areas which are specifically excluded from authorization of projects under these permits.
    - Motorboat prohibited zones, no entry zones, and federal manatee sanctuaries.
    - All areas regulated under the Lake Okeechobee and Okeechobee Waterway Shoreline Management Plan, located between St. Lucie Lock in Martin County and W.P. Franklin Lock in Lee County.
    - American crocodile designated critical habitat (Miami-Dade); the Biscayne Bay National Park Protection Zone (Dade County); St. Lucie Impoundment (Palm Martin County), and areas identified in the Wild and Scenic Rivers Act (16 U.S.C 1317, et seq.): St. Mary's River from its headwaters to its confluence with the Bells River; the entire Wekiva River, including Wekiva Springs Run, Rock Springs Run, the entire Seminole Creek, and Black Water Creek form the outflow from Lake Norris to the confluence with the Wekiva River; the Loxahatchee River from Riverbend Park downstream to Jonathan Dickinson State Park.

- The following state parks: John Pennekamp Coral Reef State Park, Lignum Vitae Key State Botanical Site and Aquatic Preserve, Long Key State Park, Curry Hammock State Park, and Bahia Honda State Park.
- Kings Bay/Crystal River/Homosassa/Salt River system (Citrus County) and canals connected to these waterways.
- SAJ-5, SAJ-13, and SAJ-14 do not allow projects with the Guana Tolomato Matanzas National Estuarine Research Reserve (St. Johns and Flagler Counties)

- SPGP IV-R1 (NMFS biological opinion dated December 21, 2012; NMFS PCTS reference number F/SER/2009/05980) covers activities in waters of the United States including navigable waters. It is not applicable in the Intracoastal waterways, along beaches, or in upland-dug man-made canals.

- SAJ-72 is only applicable within Citrus County.

- SAJ-91 is only applicable within the man-made canals in the City of Cape Coral. It does not authorize work along the Caloosahatchee River, Matlacha Pass Aquatic Preserve, or within the Cape Coral Spreader Waterway.

- SAJ-96 is only applicable within Pinellas County. The following areas are exempt within Pinellas County: Spring Bayou/TS or Bartow Power plant areas, Harbor Isles, and areas less than 100 feet from a federal channel edge.

Only SAJ-17, 20, 33, 34, and 91 authorize work within ESA-designated critical habitat. Table 1 lists the number of times each of these general permits was used for actions within each of the critical habitats during the last 5-year authorization period. This is used as an estimate of the number of times each permit will be used during this next 5-year period (see assumptions in Section 2.7).

As stated in the PDCs above, all permits are prohibited from impact hammer installation of piles or sheet piles from March 1 to June 30 in the following noise restriction zones defined in Table 5 and shown in Figures 2-5. These areas are based on current data and may not represent all areas necessary to protect reproductive female smalltooth sawfish during pupping (see Section 3.2). If more areas are deemed necessary for protection or if the areas defined below require modification, these changes will be discussed and implemented at the Tier II review meetings (see Section 2.4).

**Table 5: Noise restriction zones in smalltooth sawfish critical habitat.**

| Name | Latitude | Longitude |
|---|---|---|
| **U.S. 41 Bridges** | | |
| US 41 NW | 26.660413° | -81.885243° |
| US 41 NE | 26.666827° | -81.872966° |
| US 41 SW | 26.642991° | -81.873880° |
| US 41 SE | 26.649405° | -81.861605° |
| **Iona Cove** | | |
| IC NW | 26.521437° | -81.991586° |

| | | |
|---|---|---|
| IC NE | 26.521212° | -81.976191° |
| IC SW | 26.511762° | -81.991762° |
| IC SE | 26.511537° | -81.976368° |
| **Glover Bight** | | |
| GB NW | 26.542971° | -81.997791° |
| GB NE | 26.542678° | -81.977745° |
| GB SW | 26.529478° | -81.998035° |
| GB SE | 26.529185° | -81.977992° |
| **Cape Coral** | | |
| CC 1 | 26.551662° | -81.947412° |
| CC 2 | 26.551561° | -81.940683° |
| CC 3 | 26.539075° | -81.940916° |
| CC 4 | 26.539205° | -81.951049° |
| CC 5 | 26.542181° | -81.951047° |
| CC 6 | 26.542133° | -81.947776° |

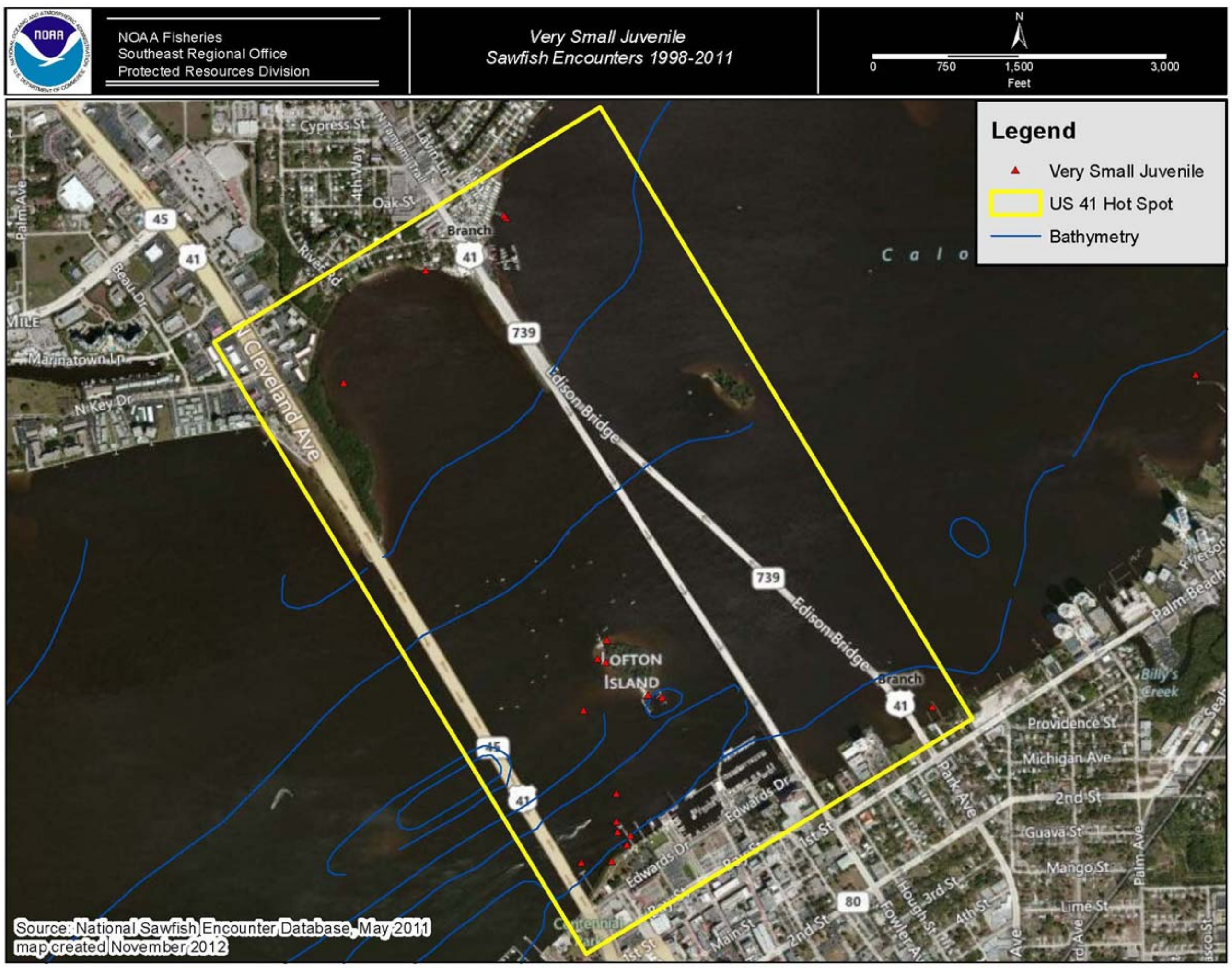


**Figure 2: U.S. 41 Bridges with very small juvenile sawfish encounters**

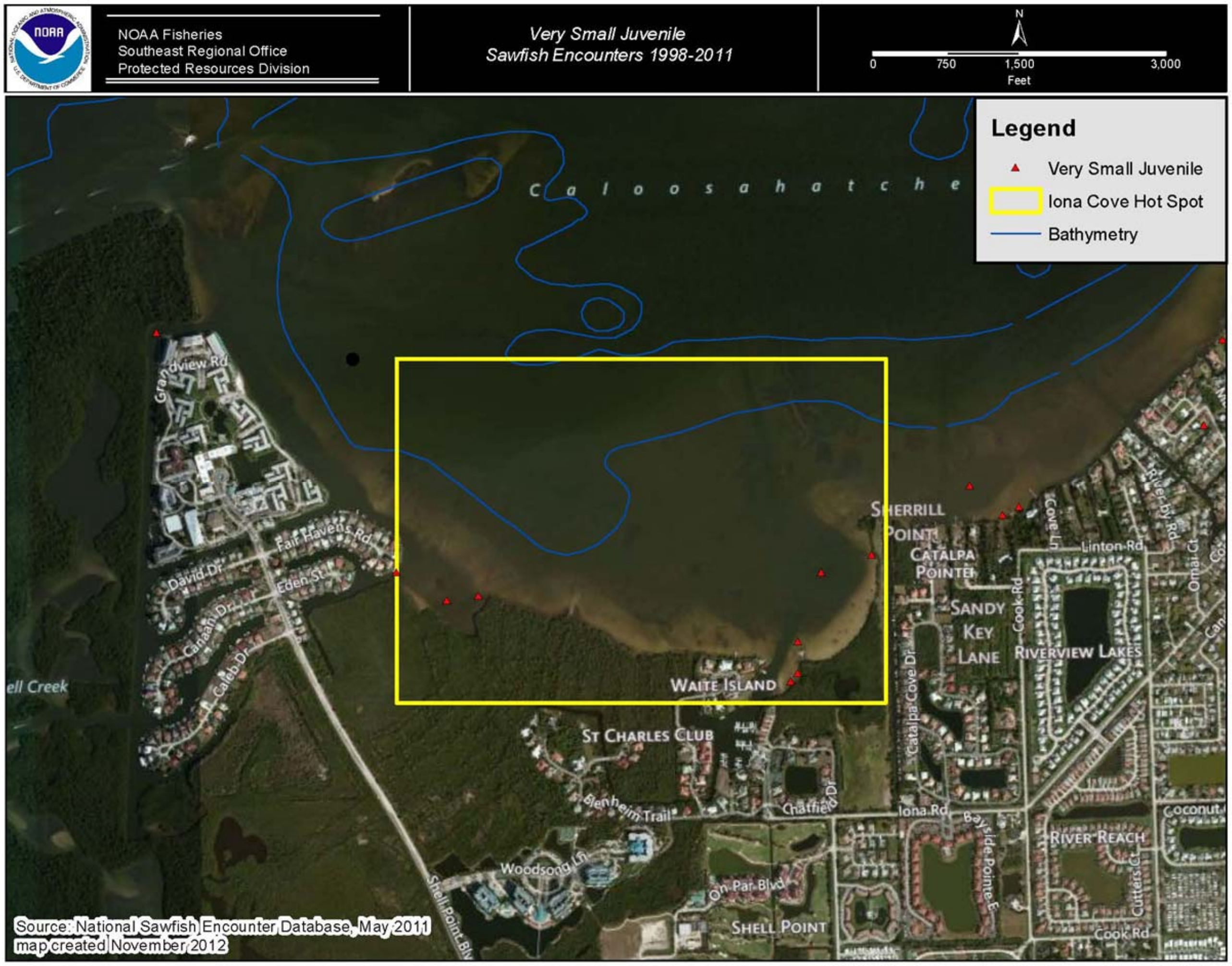


**Figure 3: Iona Cove with very small juvenile sawfish encounters**

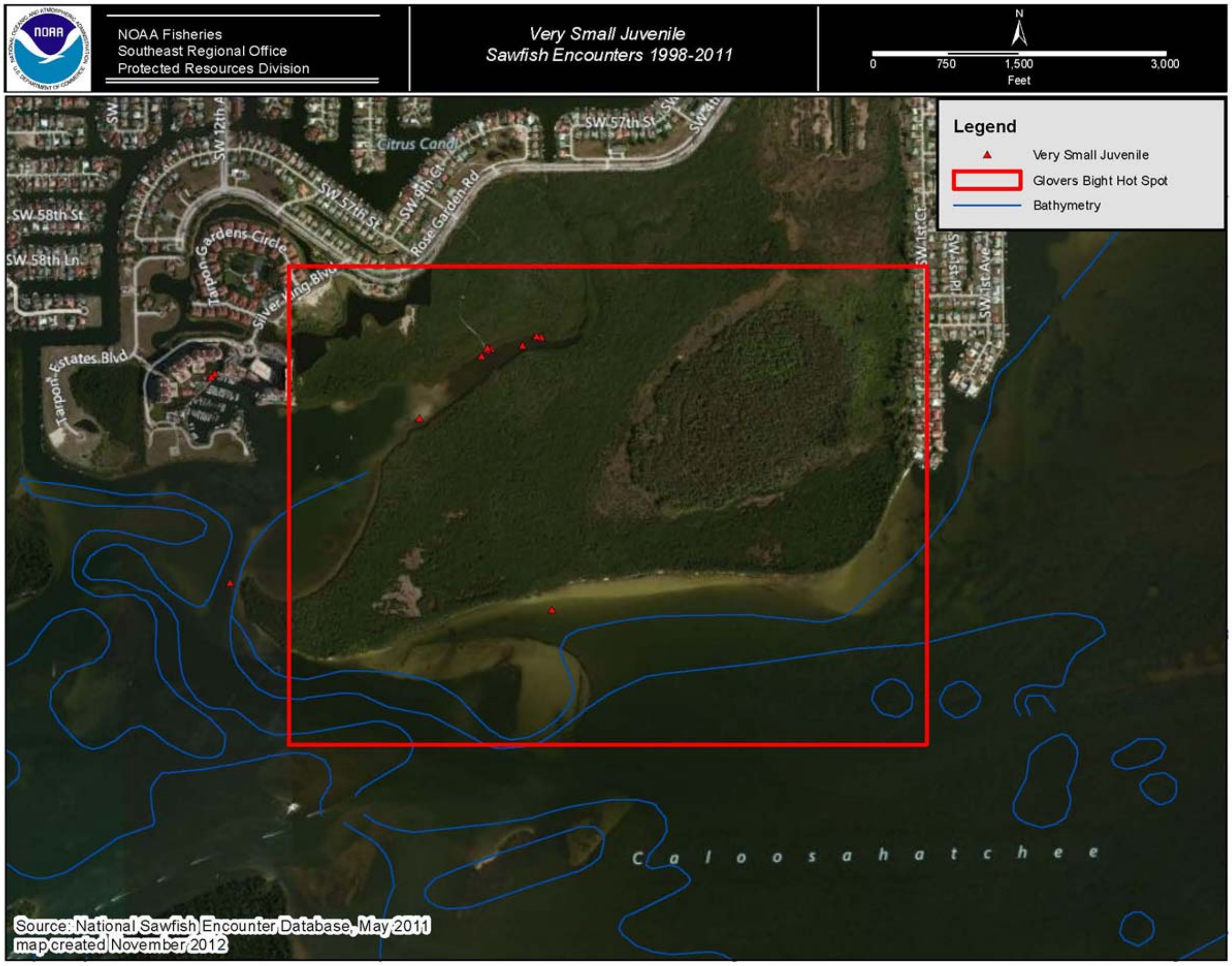


**Figure 4: Glove Bight with very small juvenile sawfish encounters**

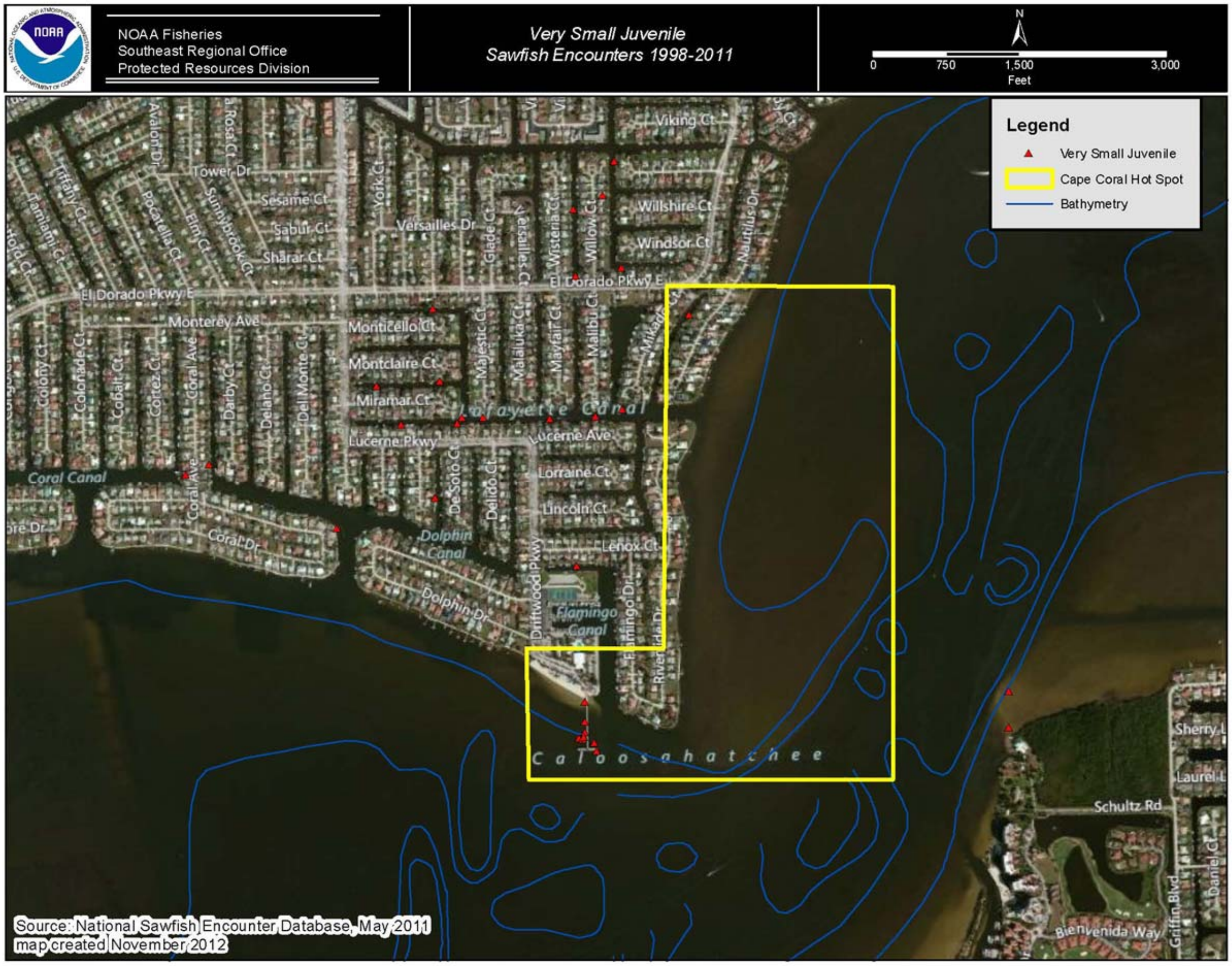


**Figure 5: Cape Coral Canals with very small juvenile sawfish encounters**

## 2.7 Assumptions

Because this is a programmatic consultation, the exact location, number of activities, and effects of each individual project is unknown. Therefore, we must look at the likely outcome of each project individually and the combined cumulative effect of all of the actions. Below is a list of assumptions made and the rationale for the assumption. The effects analyses for this programmatic consultation are based on these assumptions. The Tier II process discussed in Section 2.4, allows for regular reviews between NMFS and USACE to determine if the assumptions and effects of the action are in-line with those that were anticipated by this document. This review process includes determining if changes are occurring in the number of permits predicted to be authorized for activities covered under these general permits. At the time of review, consultation would be re-initiated if the effects seen in a given timeframe did not match those defined in this document. With the implementation of the Tier II reporting, better data will be collected during the next five years regarding the number of times each permit is used to authorize activities, its location and its relationship to each other and critical habitat, and the level of impact from the activity.

1. Since it is impossible to know the exact number of times a general permit will be used to authorize activities in the next five years, we look at the number of times each permit was used to authorize activities during the last five years. For comparison, we compared the number of vessels registered in the state of Florida over the last ten years (http://www.flhsmv.gov/dmv/vslfacts.html). Between 2002 and 2006, there was a net increase of 6 percent more vessels registered resulting in a likely increase of 6 percent more vessels traveling Florida coastal waters. Between 2007 and 2011, this number decreased 10 percent. This resulted in an overall decrease of 4 percent over the ten year period. Because the number of activities that will be authorized during the next five years is unknown, we increased the amount of anticipated impacts by 10 percent to allow for variability, as seen in vessel registration above. Therefore, we anticipate no more than 12,516 projects to be authorized under these general permits in the next five years. This is the total number of permits issued during the last five years (11,378 as listed in Table 1) plus 10 percent. If the number of permits exceeds this number, re-initiation of consultation will be required.

2. Since the exact location of each project that may be authorized under the general permits is unknown, we must look at the most likely conditions to be encountered and the worst case scenario for each species. For example, when considering effects to smalltooth sawfish from an average residential dock project, we consider a typical site with conditions commonly found in this area. These projects are often found in highly developed man-made canals (such as in the City of Cape Coral for SAJ-91). These canals typically are comprised of shallow, euryhaline banks along canals that are routinely dredged in the center to maintain vessel navigation. These canals typically have patchy coverage of mangroves along the shoreline, with mangroves typically found with sporadic coverage along the shoreline. We also consider the worst case scenario of in-water construction in which the project could possibly harm or impede movement of this species, or could interfere with reproductive females pupping their young.

   Some of the areas that these species are found are not considered within our action area. For instance, when Gulf sturgeon move into the rivers (such as the Suwannee River), they are covered under the jurisdiction of the USFWS. Therefore, the effect to species from projects that occur within this area are addressed by the USFWS not NMFS. By comparison, Atlantic and shortnose sturgeon are under NMFS jurisdiction in rivers but are not known to spawn in any Florida rivers so spawning related impacts are not considered. Similarly, effects to hatchling sea turtles are not considered under this consultation because they are under the jurisdiction of the USFWS on nesting beaches and the PDCs for this consultation prohibit activities on or contiguous to ocean beaches so these areas are outside of the action area as well.

3. Since we do not know the level of development that will occur within a given region or the distance between projects authorized under these general permits, we make the assumption that project are not likely to occur simultaneously in a small area. For instance, we assume that only one dock or seawall will be installed within a given canal in smalltooth sawfish critical habitat. We also consider the cumulative effects, if more than one project occurred simultaneously within a region. Since each of these projects is

likely to be completed quickly (a couple of days to a couple of weeks depending on the type of activity), it is unlikely that project will occur simultaneously. For the effects analysis, we assume a worst case scenario of up to two projects occurring in the same area simultaneously.

Since we do not know the exact size and number of vessels that will be stored at docks and minor structures authorized by these general permits, we look to studies conducted in the state of Florida that analyzed vessel use. According to these studies, the average size vessel stored at a residential dock is 22 feet in length with a draft of 2 feet (Sidman et al. 2007). This is consistent with the center console recreational vessel common in Florida waters. Also, the largest dock/pier structure authorized under these general permits is a 1,000 square foot dock under SAJ-33 or SAJ-34 allowing up to five vessels each. This size dock would not support larger vessels. The analysis in this opinion is based on recreational vessels in this size class.

## 3. Status of Listed Species and Critical Habitat

The following endangered (E) and threatened (T) species and their designated critical habitat under the jurisdiction of NMFS may occur in or near the action area (see Table 6 and Table 7).

**Table 6: Listed species likely to occur in or near the action area.**

| Common Name | Scientific Name | Status |
|---|---|---|
| **Turtles** | | |
| Green sea turtle | *Chelonia mydas*[3] | E/T |
| Kemp's ridley sea turtle | *Lepidochelys kempii* | E |
| Leatherback sea turtle | *Dermochelys coriacea* | E |
| Loggerhead sea turtle | *Caretta caretta*[4] | T |
| Hawksbill sea turtle | *Eretmochelys imbricata* | E |
| **Fish** | | |
| Smalltooth sawfish | *Pristis pectinata*[5] | E |
| Gulf sturgeon | *Acipenser oxyrinchus desotoi* | T |
| Shortnose sturgeon | *Acipenser brevirostrum* | E |
| Atlantic sturgeon | *Acipenser oxyrinchus*[6] | E |
| **Invertebrates and Marine Plants** | | |
| Elkhorn coral | *Acropora palmata* | T |
| Staghorn coral | *Acropora cervicornis* | T |
| Johnson’s seagrass | *Halophila johnsonii* | T |

[3] Green turtles are listed as threatened except for the Florida and Pacific coast of Mexico breeding populations, which are listed as endangered.
[4] Northwest Atlantic Ocean (NWA) DPS.
[5] The U.S. DPS.
[6] River and in-shore habitats within the action area may affect Atlantic sturgeon from the Carolina and South Atlantic DPS; however, Atlantic sturgeon from all DPS may be affected in off-shore waters within the action area.

| Common Name | Scientific Name | Status |
|---|---|---|
| **Marine Mammals** | | |
| North Atlantic right whale | *Eubalaena glacialis* | E |

**Table 7: Designated critical habitat likely to occur in or near the action area.**

| Species | Unit |
|---|---|
| Smalltooth sawfish | Charlotte Harbor Estuary; Ten Thousand Islands/Everglades |
| Gulf sturgeon | Estuarine and marine[7] (NMFS) – Units 9, 10, 11, 12, 13, 14 |
| Staghorn and elkhorn coral | Florida Area |
| Johnson's seagrass | All Units A-J |

NMFS analyzed the potential routes of effects from all of the activities proposed by each of the general permits to each of the listed species (see Table 6) and critical habitat units (see Table 7) that occur within each of the general permits action areas (see Section 2.6). Table 8 provides a list of each of the species that are not likely to be adversely affected, the species that are likely to be adversely affected, and the critical habitat units that are likely to be adversely affected by the activities that can be authorized under each of the general permits. Activities authorized under these permits that result in insignificant or discountable effects to species and critical habitat are listed in Table 8 under species not likely to be adversely affected and discussed in detail in Section 3.1. Activities that are likely to adversely affect species and critical habitat are discussed in Section 3.1 and addressed further in Section 3.2. Under the Special Conditions for these general permits and the PDCs, only SAJ- 17, 20, 33, 34, and 91 allow activities within ESA-designated critical habitat.

[7] Gulf sturgeon riverine critical habitat is under the jurisdiction of the USFWS. This action area includes Units 3, 4, 5, 6, and 7.

**Table 8: Impact to species and critical habitat by project type.**

| Project Type | Species not likely to be adversely affected | Species likely to be adversely affected | Critical habitat likely to be adversely affected |
|---|---|---|---|
| SAJ-5 Maintenance dredging | sea turtles, smalltooth sawfish, sturgeon, corals, Johnson's seagrass | none | none |
| SAJ-12 Private single-family boat ramps | sea turtles, smalltooth sawfish, sturgeon, corals, Johnson's seagrass | Sea turtles | none |
| SAJ-13 Aerial transmission lines | sea turtles, smalltooth sawfish, sturgeon, corals, Johnson's seagrass | none | none |
| SAJ-14 Sub-aquatic transmission lines | sea turtles, smalltooth sawfish, sturgeon, corals, Johnson's seagrass | none | none |
| SAJ-17 Minor structures | sea turtles, smalltooth sawfish, sturgeon, corals, Johnson's seagrass | Johnson's seagrass elkhorn and staghorn coral sea turtles | smalltooth sawfish, and Johnson's seagrass |
| SAJ-20 Single-family docks | sea turtles, smalltooth sawfish, sturgeon, corals, Johnson's seagrass | Johnson's seagrass sea turtles | smalltooth sawfish, , and Johnson's seagrass critical habitat |
| SAJ-33 Private multi-family docks | sea turtles, smalltooth sawfish, sturgeon, corals, Johnson's seagrass | Johnson's seagrass sea turtles | smalltooth sawfish, and Johnson's seagrass critical habitat |
| SAJ-34 Commercial docks | sea turtles, smalltooth sawfish, sturgeon, corals, Johnson's seagrass | Johnson's seagrass sea turtles | smalltooth sawfish, and Johnson's seagrass critical habitat |
| SAJ-46 Bulkheads and backfills | sea turtles, smalltooth sawfish, sturgeon, corals, Johnson's seagrass | none | none |
| SAJ-72 Residential docks in Citrus County | sea turtles, smalltooth sawfish | sea turtles | none |

| | | | |
|---|---|---|---|
| SAJ-91 Docks and minor structures in the City of Cape Coral | Sea turtles, smalltooth sawfish | sea turtles | Smalltooth sawfish critical habitat |
| SAJ-96 Docks and minor structures in Pinellas County | Sea turtles, smalltooth sawfish | sea turtles | None |

## 3.1 Status of Species and Critical Habitat Not Likely to be Adversely Affected

### 3.1.1 Docks, piers, associated facilities, and other minor piling supported structures (except municipal and commercial fishing piers).

As discussed below, individual activities authorized under SAJ-17, SAJ-20, SAJ-33, SAJ-34, SAJ-72, SAJ-91, and SAJ-96 may affect the following species as stated in Table 8 above: sea turtles (loggerhead, green, hawksbill, Kemp's ridley, and leatherback), smalltooth sawfish, sturgeon (shortnose, Gulf, and Atlantic), and corals (staghorn and elkhorn), protected by the ESA, may be found in or near the action. The action area for these general permits includes critical habitat for smalltooth sawfish, Gulf sturgeon, staghorn and elkhorn coral, and Johnson's seagrass. Table 1 provides a list of how many times each of these general permits was issued in critical habitat during the last 5-year authorization period. Potential individual and additive effects to these listed species critical habitat are discussed below. NMFS believes that sea turtles (loggerhead, green, hawksbill, Kemp's ridley, and leatherback) may be affected by indirect impacts from an increase in vessel traffic and smalltooth sawfish and Johnson's seagrass critical habitat may be adversely affected by some aspects of the proposed action, as discussed below and again in Section 3.2 and Section 5.

**Potential routes of effects to sea turtles:**
Sea turtles may be affected by being unable to use an area for forage or refuge habitat due to potential avoidance of construction activities caused by pile placement during dock construction. These effects will be insignificant due to the small size of each piling placed and the limited time it will take to complete each action (typically a day or two for small docks to a couple of weeks for SAJ-33 and 34). Because these species are mobile and likely to leave the area during construction, the risk of injury from this type of construction activity is insignificant. In areas where seagrasses are present or known to occur, the *"Dock Construction Guidelines in Florida for Docks or Other Minor Structures Constructed in or over Submerged Aquatic Vegetation (SAV), Marsh or Mangrove Habitat - August 2001"* will be followed to minimize impacts to sea grasses that may be used by sea turtles for foraging.

No impacts to nesting beaches are anticipated from the construction of docks and piers because the PDCs for these permits prohibit construction where nesting beaches are located. Specifically all construction is prohibited on or contiguous to ocean beaches.

**Potential routes of effects to North Atlantic right whales:**
North Atlantic right whales and North Atlantic right whale critical habitat will not be impacted by any of the actions proposed under these general permits based on the following. Only SAJ-14 (sub-aquatic transmission lines) provides for actions that extend any further from shore than the length of a dock or pier. SAJ-14 cannot be applied to projects that occur on or are contiguous with ocean beaches, or occur within critical habitat without a project-specific Section 7 consultation. Therefore, impacts to North Atlantic right whales are not expected from construction activities under these permits.

**Potential routes of effects to smalltooth sawfish:**
Effects include the risk of injury from construction activities including physical impacts from construction materials or operating construction machinery during construction activities. Construction of docks or piers typically involves the use of small boats and/or barges, and pile driving or jetting-in of pilings. Some work also may be conducted from the uplands. No dredging is authorized under these permits. Because these species are mobile and likely to leave the area during construction, the risk of injury from this type of construction activity is insignificant. At any given site, smalltooth sawfish may be affected by being temporarily action (typically a day or two for small docks to a couple of weeks for SAJ-33 and 34) unable to use the site due to potential avoidance of construction activities and related noise, but these effects will be insignificant. The effects of noise from the installation of docks and piers are discussed separately below for all species.

Juvenile smalltooth sawfish exhibit site fidelity to the areas in which they are pupped for the first several years of their lives, typically in very shallow, nearshore waters where they can avoid predation by coastal shark species. In South Florida, sawfish have established distinct nursery areas where they utilize shallow, euryhaline habitat and red mangroves for foraging and refuge; these areas have been designated as critical habitat for the species (discussed below). Therefore, the removal of red mangroves or changing of water depths is prohibited under these permits. The risk to juvenile sawfish would be insignificant due to the limited area of the impact around the pilings used to support docks or piers, the limited construction period, and because the sawfish are able to move away from the area during construction and return when installation is complete.

**Potential routes of effects to smalltooth sawfish critical habitat:**
The essential features for the conservation of smalltooth sawfish that provide nursery area functions are (1) red mangroves; and (2) shallow, euryhaline (fluctuating salinity) habitats, characterized by water depths between MHWL and 3 feet measured at Mean Lower Low Water (MLLW). Red mangroves and adjacent shallow, euryhaline habitats provide nursery area functions that facilitate recruitment of juveniles into the adult population (discussed in Section 3.2). Thus, these features are essential to the conservation of smalltooth sawfish. One or more of the essential features must be present in a project area for it to function as critical habitat for smalltooth sawfish. The PDCs for these permits prohibit the removal of red mangroves and dredging (which would change the shallow, euryhaline feature) associated with dock construction. Therefore, impacts to smalltooth sawfish critical habitat from piling placement are discountable.

**Potential routes of effects to Gulf, shortnose, and Atlantic sturgeon:**
Gulf, shortnose, and Atlantic sturgeon may be affected by being unable to use the immediate area for forage or refuge habitat due to potential avoidance of construction activities caused by pile placement during dock construction. These effects will be insignificant due to the small size of the impact from piling placement, and the limited duration of time required to place piles, which last typically a day or two for smaller residential docks. Larger dock projects (up to 1,000 square feet) may take up to a few weeks to place the increased number of piles necessary but are also constructed less frequently. For example, during the last permit period, only 11 docks were constructed in Gulf sturgeon critical habitat under SAJ-33 and 34. Because these species are mobile, the risk of injury from this type of construction activity is insignificant. In addition, sturgeon are opportunistic feeders and will be able to forage over large distances and will be able to locate prey beyond the immediate area of dock construction and return when construction is complete.

Sturgeon spawning will not be affected by activities covered under these general permits. The rivers in which Gulf sturgeon spawn are under the jurisdiction of the USFWS and are therefore out of the action area of this consultation. Shortnose and Atlantic sturgeon are not known to spawn in any rivers in the state of Florida (77 FR 5914) and therefore will not be affected by these general permits. Migration to spawning rivers will be insignificant because docks are designed to not create obstructions, as they must be built to allow for vessel traffic in a given area. The in-water footprint of a maximum 1,000-square-foot dock would not impede movement along a shoreline to spawning rivers.

**Potential routes of effects to Gulf sturgeon critical habitat:**
NMFS believes the project is not likely to adversely affect Gulf sturgeon critical habitat. According to the USACE, 216 dock/pier construction projects were authorized from 2006-2010 within Gulf sturgeon critical habitat in the state of Florida (Units 9-14). The essential features necessary for the conservation of Gulf sturgeon present include: abundant prey items; water quality and sediment quality necessary for normal behavior, growth, and viability of all life stages; and safe and unobstructed migratory pathways necessary for passage within and between riverine, estuarine, and marine habitats.

Of the essential features, NMFS believes prey abundance, water quality, and safe and unobstructed migratory pathways may be affected.

- Impacts to prey abundance will be insignificant due to the small size of the impact from piling placement and because sturgeon are opportunistic feeders and will be able to forage over large distances and will be able to locate prey beyond the immediate area of dock construction and return when construction is complete.
- Water quality may be temporarily impacted by the placement of piles; however, this impact will be insignificant as turbidity curtains will be used to contain disturbed sediments, disturbances from piling placement are minimal, and the construction will be completed quickly (typically a few days for most projects to a few weeks for larger docks). Larger docks (up to 1,000 square feet in size) are built less frequently, with only 11 constructed in Gulf sturgeon critical habitat between 2006 and 2010 under SAJ-33 and SAJ-34.
- Impacts to a safe and unobstructed migratory pathway from the construction of docks will be insignificant. As discussed above, docks are constructed in a manner to not

impede vessel traffic and therefore would not block migration during construction periods when the site was contained by turbidity curtains. Post construction, piling supported structures would not impede sturgeon pathways. Construction of these projects is temporary and completed quickly (typically a few days for most projects to a few weeks for larger docks).

**Potential routes of effects to staghorn and elkhorn corals:**
SAJ-17 is the only permit that allows construction in areas where corals may be found. All other piling permits prohibit projects that occur on or contiguous with ocean beaches, where coral are found. The USACE has also agreed to allow only SAJ-17 to authorize permits in *Acropora* critical habitat. SAJ-17 is also the only permit that allows projects within Monroe County, where corals are known to occur. Elkhorn and staghorn corals could be adversely affected by shading and by increases in turbidity due to construction, if structures were built where these species are growing. However, structures built where listed corals are growing, or that result in shading or turbidity effects to elkhorn and staghorn corals, are not authorized under these general permits and take of listed corals is not authorized under these permits. The PDCs for SAJ-17, also do not authorize activities that impact hardbottom or other essential features within staghorn or elkhorn coral designated critical habitat. SAJ-17 is limited to minor structures (e.g., davits, pilings along seawalls for securing vessels, etc.) constructed of typically 4 or fewer pilings. Since these structures are not allowed on or contiguous with ocean beaches, the majority of these are built in residential man-made canals, where coral is less likely to occur. Because the PDCs for SAJ-17 limit the location and prohibit impacts to corals and the hardbottom and coral skeletons that are used by spreading coral colonies, the potential impacts to corals are insignificant.

**Potential routes of effects to *Acropora* (staghorn and elkhorn) coral critical habitat:**
SAJ-17 is the only permit that allows construction in *Acropora* critical habitat. The physical feature of *Acropora* critical habitat essential to its conservation is substrate of suitable quality and availability to support larval settlement and recruitment, and reattachment and recruitment of asexual fragments. Substrate of suitable quality and availability is defined as consolidated hardbottom or dead coral skeleton that is free from fleshy macroalgae cover and sediment cover, occurring in water depths from the MHWL to 30 meters (73 FR 72210; November 26, 2008).

Information provided by the USACE indicates that 58 projects occurred within *Acropora* critical habitat between 2006 and 2010. However, according to conversations with the USACE, this is an inaccurate count of the number of actual projects in critical habitat because the GIS layer used to count the number of projects includes projects in man-made canals, which are exempt from *Acropora* critical habitat. These discrepancies likely account for the 58 projects permitted during the last renewal period (pers. e-mail comm. between N. Bailey, NMFS, and S. Santos, USACE Regulatory Division, May 26, 2011). During multiple conversations, the USACE stated that the majority of SAJ-17 projects are out-of-water structures such as boat lifts, davits, and whips that attach to either existing pilings or to structures in canals that are both exempt from critical habitat. As stated in the critical habitat rule, "all existing (meaning already constructed at the time of this critical habitat designation) federally-authorized or permitted man-made structures such as aids-to-navigation (ATONs), artificial reefs, boat ramps, docks, pilings, channels, or marinas do not provide the essential feature that is essential to the species' conservation." Therefore, if these projects occur in man-made canals or new structures are attached to existing pilings in place at the time of critical habitat listing, then they would occur within the critical habitat unit but would be exempt from critical habitat and any impacts from the project would not be counted against critical habitat losses. According to the USACE, projects in the Florida Keys are usually visited by USACE staff prior to issuing a permit to ensure that sensitive resources are not impacted by the proposed project. The site visits assess if the essential features of hardbottom or coral skeleton are present to support either existing living coral or future recruitment of *Acropora* species. The risk of impact to the coral skeleton component of the essential features of coral critical habitat is discountable since the PDCs prohibit impacts to corals or coral skeletons. If the potential exists for a proposed project to directly or indirectly affect *Acropora* coral species, then the proposed project will require separate ESA Section 7 consultation and will not be authorized through this opinion. The placement of pilings may affect the hardbottom component of the critical habitat essential feature; however, hardbottom impacts are not expected as most projects in this area receive a site visit by the USACE to verify essential features are not impacted. Therefore, loss of the *Acropora* essential features is not expected in *Acropora* critical habitat from the placement of pilings authorized under these general permits and will not reduce the ability of the Florida Area critical habitat unit to provide for the conservation of the species.

**Potential routes of effects to Johnson's seagrass and Johnson's seagrass critical habitat:** Docks and piers are allowed to be permitted that may affect Johnson's seagrass under SAJ-17, 20, 33, and 34. We believe the potential of impacts to Johnson's seagrass are insignificant because the PDCs prohibit any adverse impacts to any submerged aquatic vegetation and specifically to Johnson's seagrass. Between 2006 and 2010, only 56 projects were permitted in Johnson's seagrass critical habitat, of which 27 were minor structures (e.g., boat lifts, davits, and mooring pilings). The PDCs for SAJ-17, 20, 33, 34, do not allow direct or indirect impacts to Johnson's seagrass but do allow construction within Johnson's seagrass critical habitat. Because of concerns about adverse impacts to Johnson's seagrass, the PDCs for these permits include the requirement to use the construction guidelines titled "*Key for Construction Conditions for Docks or Other Minor Structures Constructed in or Over Johnson's Seagrass (Halophila johnsonii) NMFS/USACE – February 2002",* for dock construction in the lagoon (as well as canal) systems on Florida's east coast from Sebastian Inlet (Brevard County) south to and including central Biscayne Bay (Miami-Dade County). Though we believe impacts directly to Johnson's seagrass are insignificant, there may be adverse impacts to Johnson's seagrass critical habitat as discussed below in Section 3.2 and again in Section 5.

**Potential impacts from vessel traffic:**
Vessel traffic, both recreational and commercial, has been documented in stranding reports for each species to adversely affect protected species such as marine mammals and sea turtles. However, little information exists on interactions with smalltooth sawfish and sturgeon (Gulf sturgeon, shortnose, and Atlantic). This is likely due to the fact that these species are all primarily demersal and rarely would be at risk from moving vessels. There are no known stranding reports for smalltooth sawfish being struck by vessels. There are limited records strandings of sturgeon struck by vessels in the northeast resulting from interactions of large shipping vessels in narrow channels that eliminate the ability of the sturgeon to avoid the vessel due to the deep draft of the shipping vessels. These general permits are limited to smaller recreational vessels with an average size of 22 feet long with a draft of 2 feet (see Section 2.7).

All permits are for residential projects except for SAJ-34 which allows up to five commercial vessels and is limited to a 1,000 square foot dock that would not support larger vessels. Because vessels need sufficient water to navigate without striking the bottom, shallow areas are marked with navigational markers for recreational boaters to avoid these areas. Therefore, impacts with these species are not anticipated and effects to smalltooth sawfish and sturgeon are discountable. The potential increase of vessel traffic from the construction of pile-supported structures is listed below in Table 9. This is followed by an analysis of these effects to sea turtles and North Atlantic right whales.

**Table 9: Potential increase in vessel traffic**

| General Permit | Assumption | Number of times issued in 5-years[8] | Potential 5-year increase in vessels stored at docks |
|---|---|---|---|
| SAJ-12<br>Private boat ramps | 1 boat per ramp | 8 | 8 |
| SAJ-17<br>Minor piling structures | 1 boat per structure | 1,488 | 1,488 |
| SAJ-20<br>Single-family docks | Maximum 4 vessels allowed - assume 4 | 3,256 | 13,024 |
| SAJ-33<br>Private multi-family docks less than 1000 square feet | Maximum 5 vessels allowed - assume 5 | 149 | 745 |
| SAJ-34<br>Commercial docks less than 1000 square feet | Maximum 5 vessels allowed - assume 5 | 28 | 140 |
| SAJ-72<br>Docks in Citrus County | 1 boat per dock | 156 | 156 |
| SAJ-91<br>Docks and minor structures in Cape Coral | 1 boat per structure | 2,489[9] | 2,489 |
| SAJ-96<br>Docks and minor structures in Pinellas County | 1 boat per structure | 2,418 | 2,418 |
| Total | | | 20,468 |

Sea turtles are susceptible to vessel strikes. Dock and pier construction can indirectly (i.e., later in time) result in increased vessel traffic effects by new vessels using those structures. According to the USACE, the following general permits were issued for docks and minor structures that may support vessel storage (see Table 9). Sea turtles could be adversely affected by an increase in vessel traffic associated with the additive increase in facilities that allow vessel access to the marine environment. Because sea turtles spend a considerable amount of time on or near the surface of the water, this increases the potential risk of collision from vessel traffic.

[8] 5-year totals are from 2006-2010 except SAJ-96 which is 2007-2012 and SAJ-91 which is an average five year total based on 4 years of data from 2008-2011. 5-year totals includes all dock structures, minor structures, and davits.

[9] This is a five year average as explained in Section 2.1 for SAJ-91. It includes all dock structures and davits.

These general permits authorize not only the installation of new vessel access facilities, but also repair, replacement, and maintenance of existing vessel access facilities. Thus, the number of new permits issued may not translate into a similar increase in vessel traffic because a certain portion of the permitted docks are being replaced, not newly built. Due to the increase in vessel storage authorized by these general permits, sea turtles may be adversely affected by the potential increase in vessel traffic and vessel strikes, which is further discussed below in Section 3.2 and again in Section 5.

The increased risk of vessel strikes to North Atlantic right whales is greatest during the annual calving season from November to April. However, based on a study of recreational boating in nearby Brevard County,[10] and on offshore weather pattern information from the Coast Pilot, vessel traffic is likely to be lower during the right whale calving season. Sidman et al. (2007) showed the months of November through February to be the lowest in terms of recreational vessel use, that vessel trips were of shorter duration during these months, and that fewer boats traveled offshore. Coast Pilot information indicates that wind speeds off of Florida's east coast are generally highest from September or October through April. Given the reduced amount of vessel traffic due to higher wind speeds, the risk of injury or death to sea turtles and North Atlantic right whales from interactions with recreational vessel traffic from this proposed project is discountable. Based on the above, NMFS concludes that Northern Atlantic right whales are not likely to be adversely affected by the increased recreational vessel traffic.

### 3.1.2 Shoreline stabilization

Shoreline stabilization may be authorized under SAJ-46, 91, and 96. SAJ-46 does not allow projects to be authorized in critical habitat. SAJ-91 is located within smalltooth sawfish critical habitat, and SAJ-96 does not include any critical habitat within its action area of Pinellas County. Potential routes of effects to each of the listed species in Table 6 are discussed below along with potential impacts to smalltooth sawfish critical habitat from shoreline stabilization projects authorized under SAJ-91. The number of times that each general permit was issued for shoreline armoring between 2006 and 2010 is provided below in Table 10, along with the additive impact of these actions.

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[10] Sidman, C. et al. 2007. A Recreational Boating Characterization of Brevard County. Florida Sea Grant Program. (http://edis.ifas.ufl.edu/pdffiles/SG/SG08100.pdf)

**Table 10: Potential impacts from shoreline armoring.**

| | No. of seawalls permitted | Maximum impact per seawall | Total impact during 5-year period |
|---|---|---|---|
| SAJ-46 | 395 | Max 300 feet x 4 feet allowable riprap = 1,200 square feet (0.03 acre) | 474,000 square feet (10.88 acre) |
| SAJ-91 | 500[11] | Max 300 feet x 18 inches = 450 square feet (0.01 acre) | 225,000 square feet (5.17 acres) |
| SAJ-96 | 226[12] | Max 100 if below MHW x 10 feet riprap = 1,000 square feet (0.02 acre) | 226,000 square feet (5.18 acres) |

**Potential routes of effects to sea turtles:**
Effects on sea turtles include the risk of injury from construction activities (shoreline stabilization), including physical impacts from construction materials or operating construction machinery. The risk of injury from construction will be discountable due to these species' mobility and the implementation of NMFS' *Sea Turtle and Smalltooth Sawfish Construction Conditions*. Sea turtles may be affected by being temporarily unable to use the site for forage habitat due to potential avoidance of construction activities, related noise, and physical exclusion from areas contained by turbidity curtains, and potential foraging habitat may be permanently covered by riprap, but these effects will be insignificant, given each project's small footprint and short construction time. Projects authorized under SAJ-46 and 91 occur in man-made canals and even the additive loss of habitat within 4 feet of the MHWL in these canals will be insignificant to sea turtles, as these areas are not known to be valuable foraging and refuge habitat for sea turtles. The potential loss of 3.4 acres (see Table 10) in Pinellas County over the five years is insignificant due to the nearshore location of these impacts (projects must be built landward of the MHWL or in alignment with adjacent seawalls), the PDC requirement to avoid submerged aquatic vegetation potentially used for sea turtle foraging, and the PDC prohibiting construction on beaches used by nesting sea turtles. Shoreline stabilization projects of this size and typically completed within a few days or weeks.

**Potential routes of effects to smalltooth sawfish and critical habitat:**
Effects on smalltooth sawfish include the risk of injury from construction activities (shoreline stabilization), including physical impacts from construction materials or operating construction machinery. The risk of injury from construction will be discountable due to these species' mobility and the implementation of NMFS' *Sea Turtle and Smalltooth Sawfish Construction Conditions*. Effects on smalltooth sawfish include potential loss of habitat (i.e., shallow, euryhaline habitat and mangroves) for foraging and predator avoidance. The removal of mangroves is prohibited under SAJ-46, 91, 96; therefore, impacts to mangroves will be discountable. The removal of shallow, euryhaline habitat is limited by the PDCs of each of these three general permits. SAJ-91 authorizes activities within smalltooth sawfish critical habitat. Under SAJ-91, bulkheads shall not exceed 300 feet in length and not extend further waterward than 18 inches from the existing seawall or MHW. Riprap placement is only allowed outside of

[11] This is a 5-year average based on data provided for the four years from 2008 to 2011. It includes all dock structures and davits.
[12] Pinellas County did not differentiate between the number of times seawalls were authorized verses maintenance dredging. Therefore, the full amount of 226 activities was considered for both.

critical habitat for SAJ-46 and SAJ-96, and in waters deeper than 3 feet MLLW (as defined as the essential feature from smalltooth sawfish critical habitat) for SAJ-91. SAJ-46 occurs in man-made canals outside of smalltooth sawfish critical habitat in areas that may or may not support smalltooth sawfish. This permit does not allow bulkheads to exceed 300 feet in length or extend waterward of the MHW unless to align with neighboring seawalls. Riprap is allowed to be placed up to 4 feet waterward of MHW under SAJ-46. SAJ-96 is restricted to Pinellas County and limits bulkheads waterward of the MHW unless to connect 2 existing seawalls within 100 feet.

The cumulative impact of seawalls installation for SAJ-46, 91, and 96 is likely to be similar to the effects that occurred during the last 5-year period and therefore has the potential to similarly impact smalltooth sawfish and smalltooth sawfish critical habitat (see Table 10). Again, no mangroves will removed by the installation of seawalls. The loss of shallow, euryhaline habitat from SAJ-46 and SAJ-96 is insignificant because these are seawalls that either occur above the MHWL or align with existing seawalls. Since documented nursery habitat for smalltooth sawfish occurs within smalltooth sawfish critical habitat, the loss of potentially 14.28 acres (the sum of SAJ-46 and SAJ-96 impacts) of shallow, euryhaline habitat outside of critical habitat is insignificant. These impacts are spread between Pinellas County and man-made canals outside of critical habitat where encounters with juvenile sawfish are likely infrequent. Shallow, euryhaline habitat is crucial for foraging and refuge of juvenile sawfish and becomes less important to the species as they increase in size. The potential loss of 5.17 acres of shallow, euryhaline habitat within smalltooth sawfish critical habitat via SAJ-91 is likely to adversely impact critical habitat and is discussed further in Section 3.2 and again in Section 5.

**Potential routes of effects to Gulf, shortnose, and Atlantic sturgeon:**
Gulf, shortnose, and Atlantic sturgeon are not likely to be adversely affected by shoreline armoring permitable by SAJ-46, 91, or 96. SAJ-46 only applies to man-made, residential canals historically dug from the uplands where sturgeon are unlikely to occur. SAJ-91 is allowed only in Cape Coral, where sturgeon are not known to occur. SAJ-96 is only allowed in Pinellas County, where sturgeon are rare. The risk of injury to sturgeon from the construction of shoreline armoring will be discountable due to the species' mobility and the implementation of NMFS' *Sea Turtle and Smalltooth Sawfish Construction Conditions*. During foraging periods, Gulf sturgeon generally occupy shoreline areas between 2-4 m of depth characterized by low-relief sand substrate. Gulf sturgeon are selecting foraging habitat based on substrate composition and depth, rather than infaunal invertebrate density, abundance or diversity. Hence, Gulf sturgeon, and likely, shortnose and Atlantic sturgeon, occupy waters deeper than those impacted by shoreline armoring projects. Thus, the risk of impact from these activities is discountable. The range of shortnose sturgeon and Atlantic sturgeon in Florida is limited to the St. Mary's River and the St. Johns River. The PDCs state that projects cannot be permitted in the St. Mary's River and are limited to man-made canals, which excludes the St. Johns River. Therefore, the risk of impacts to shortnose and Atlantic sturgeon would be discountable.

**Potential routes of effects to elkhorn and staghorn coral:**
Elkhorn and staghorn corals are not likely to be adversely affected by shoreline armoring permitable by SAJ-46, 91, or 96. These corals do not occur within the action area for SAJ-91 (Cape Coral) or SAJ-96 (Pinellas County). SAJ-46 can only be authorized in man-made canals

where corals are not likely to occur and is not within critical habitat. Under this permit, adverse impacts are not allowed to hard or soft corals and specifically to elkhorn or staghorn corals. Therefore, the risk of impact to these species from shoreline armoring is discountable.

**Potential routes of effects to Johnson's seagrass:**
Johnson's seagrass is not likely to be adversely affected by shoreline armoring permitable by SAJ-46, 91, or 96. Johnson's seagrass does not occur within the action area for SAJ-91 (Cape Coral) or SAJ-96 (Pinellas County). SAJ-46 can only be authorized in man-made canals and is not within critical habitat. Under this permit, adverse impacts are not allowed to submerged aquatic vegetation and specifically to Johnson's seagrass. Therefore, the risk of impact to these species from shoreline armoring is discountable.

### 3.1.3 Maintenance Dredging

During the first four years of the previous 5-year authorization period (i.e., 2006-2010), SAJ-5 was used 84 times. SAJ-96 was used an estimated 148 times, though we don't know the number of times it was used specifically for maintenance dredging as 148 represents a combination of both shoreline stabilization and maintenance dredging (see Table 11). All dredging authorized under SAJ-5 is restricted to man-made canals throughout the state of Florida and SAJ-5 only allows dredging to restore the previously authorized depth. SAJ-96 is restricted to Pinellas County and is limited to the area immediately around a single-family dock to maintain boat slip access. No mangrove or seagrass removal is permitted by either of these two general permits. Neither permit is allowed for use in critical habitat for any species.

**Table 11: Maintenance dredging volume**

| Permit Number | Times Authorized during last 5 Years | Dredge Volume Per Project | Total Anticipated Dredged |
|---|---|---|---|
| SAJ-5 | 84 | Max. 4,000 cubic yards | 336,000 cubic yards |
| SAJ-96 | 226[13] | Average 100 cubic yards | 22,600 cubic yards |

**Potential routes of effects to sea turtles:**
We believe that sea turtles are not likely to be adversely affected by projects approved under SAJ-5 or SAJ-96. Effects on sea turtles include the risk of injury from construction activities (i.e., mechanical dredging), including physical impacts with construction materials or operating construction machinery. Maintenance dredging conducted in residential canals is typically completed by dragline dredging or by a land-based backhoe, trackhoe, or other commonly used excavation equipment. Work may be done from a small barge if several neighbors combine dredging projects. The risk of injury to sea turtles will be discountable because turtles are highly mobile and able to avoid this type of equipment. Sea turtles may be affected by being temporarily unable to use a project site for foraging and refuge due to potential avoidance of construction activities and related noise, and physical exclusion from areas contained by turbidity curtains, but these effects will be insignificant. Impacts to foraging and refuge habitat

[13] Pinellas County did not differentiate between the number of times seawalls were authorized verses maintenance dredging. Therefore, the full amount of 226 activities was considered for both.

will be insignificant as dredging is only allowed in areas previously dredged. Also, projects are not permitted that would affect submerged aquatic vegetation or mangroves. Potential effects are likely to be temporary, as projects of this size are typically completed in less than a week. No effects are anticipated to sea turtle nesting beaches as SAJ-5 is limited to man-made canals and SAJ-96 prohibits construction along beaches used by sea turtles for nesting.

**Potential routes of effects to smalltooth sawfish:**
We believe that smalltooth sawfish are not likely to be adversely affected by projects approved under SAJ-5 and SAJ-96. Effects to these species include the risk of injury from construction activities (dredging), which will be discountable due to the species' mobility, and the implementation of NMFS' *Sea Turtle and Smalltooth Sawfish Construction Conditions*. Smalltooth sawfish may be affected by being temporarily unable to use a project site due to potential avoidance of construction activities and related noise, and physical exclusion from areas contained by turbidity curtains, but these effects will be insignificant. These potential effects are likely to be temporary, as projects of this size typically take less than a week to complete. Effects on smalltooth sawfish include potential loss of habitat (i.e., shallow, euryhaline habitat and mangroves) for foraging and predator avoidance but these effects will be insignificant. Maintenance dredging will be restricted to man-made residential canals outside of smalltooth sawfish critical habitat, no impacts are permitted to mangroves, and dredging may not exceed the previously authorized dredge depth.

**Potential routes of effects to Gulf, shortnose, and Atlantic sturgeon:**
We believe that sturgeon are not likely to be adversely affected by projects approved under SAJ-5 and SAJ-96. Effects to these species include the risk of injury from construction activities (dredging), which will be discountable due to the species' mobility, and the implementation of NMFS' *Sea Turtle and Smalltooth Sawfish Construction Conditions*. Sturgeon may be affected by being temporarily unable to use a project site due to potential avoidance of construction activities (dredging) and related noise, and physical exclusion from areas contained by turbidity curtains, but these effects will be insignificant. These potential effects are likely to be temporary, as projects of this size typically take a less than a week to complete. Under SAJ-5, impacts are restricted to man-made canals and dredging is only allowed to a previously authorized depths. Dredging under SAJ-96 occurs only in Pinellas County where Gulf sturgeon sightings are rare. Impacts to foraging and refuge habitat will be insignificant because sturgeon are opportunistic feeders and will be able to forage over large distances, and will be able to locate prey beyond the immediate area of dredging and return when construction is complete. Under the PDCs, dredging is not allowed in Gulf sturgeon critical habitat, where most of the known nearshore Gulf sturgeon populations occur. Shortnose sturgeon and Atlantic sturgeon are limited in Florida to the St. Mary's River and the St. Johns River, and projects cannot be permitted in the St. Mary's River under these general permits (NOAA's *Final Recovery Plan for the Shortnose Sturgeon*, 1998). Also, the PDCs limit dredging to man-made canals, which would exclude the St. Johns River; therefore, effects to shortnose and Atlantic sturgeon would be discountable.

**Potential routes of effects to elkhorn and staghorn coral:**
Elkhorn and staghorn corals are not likely to be adversely affected by maintenance dredging authorized under SAJ-5 or SAJ-96. These corals do not occur within the action area for SAJ-96

(Pinellas County). SAJ-5 can only be authorized in man-made canals, where corals are not likely to occur, and not within critical habitat. Under this permit, adverse impacts are not allowed to hard or soft corals and specifically to elkhorn or staghorn corals. Therefore, the risk of impact to these species from maintenance dredging is discountable.

**Potential routes of effects to Johnson's seagrass:**
Johnson's seagrass is not likely to be adversely affected by maintenance dredging authorized under SAJ-5 or SAJ-96. Johnson's seagrass does not occur within the action area for SAJ-96 (Pinellas County). SAJ-5 can only be authorized in man-made canals and not within critical habitat. Under this permit, adverse impacts are not allowed to submerged aquatic vegetation and specifically to Johnson's seagrass. Therefore, the risk of impact to these species from maintenance dredging is discountable.

### 3.1.4 Boat ramps including appurtenant structures (bulkheads, rub-rails, tie-up piers)

SAJ-12 is the only general permit that allows projects to authorize the installation of boat ramps. The PDCs for this general permit prohibit installation within critical habitat. During the previous 5-year authorization period (i.e., 2006-2010), SAJ-12 was only used 8 times. Potential routes of effects to each of the listed species in Table 6 are discussed below.

**Potential routes of effects to sea turtles:**
We believe that sea turtles are not likely to be adversely affected by projects approved under SAJ-12. Effects on sea turtles include the risk of injury from construction activities (i.e., mechanical dredging, pile placement), including physical impacts with construction materials or operating construction machinery. Construction of boat ramps is typically conducted from the uplands, or with the use of small boats and/or barges. Sea turtles are mobile and can easily avoid this type of interaction. The PDCs for this permit restrict construction to within 5 feet of the MHWL (with projects typically only extending 1 to 2 feet waterward of the MHWL) so each project will have minor in-water impacts. Projects of this size are typically completed within a few hours to a few days. Additionally, pilings used for this permit will be small in size and number (i.e., to support a maximum of an 80-square-foot platform) and will typically be jetted or driven in less than a day. Therefore, the risk of injury from the construction of a boat ramp is discountable. Sea turtles may be affected by being temporarily unable to use a project site for foraging due to potential avoidance of construction activities and related noise, and physical exclusion from areas contained by turbidity curtains, but these effects will be insignificant due to the short duration of this type of project. Impacts to foraging habitat would be small in nature (within 5 feet of the MHWL) and limited in number (only 8 projects during the last 5 years). Projects are also not permitted that would have an effect on submerged aquatic vegetation that may potentially be used for foraging.

Sea turtles are also susceptible to vessel strikes. Private boat ramp construction can indirectly (i.e., later in time) result in increased vessel traffic effects by new vessels accessing the water at these locations. An analysis of this increase in vessel traffic from SAJ-12 is included in the analysis for vessel strikes resulting from dock construction above and again in Section 5.

**Potential routes of effects to smalltooth sawfish:**
We believe that smalltooth sawfish are not likely to be adversely affected by projects approved under SAJ-12. Effects on smalltooth sawfish include the risk of injury from construction activities (i.e., mechanical dredging, pile placement), including physical impacts with construction materials or operating construction machinery. Boat ramp construction is typically conducted from the uplands, or with the use of small boats and/or barges. Smalltooth sawfish are highly mobile and can easily avoid this type of interaction. The PDCs for this permit restrict construction to within 5 feet of the MHWL (with projects typically only extending 1 to 2 feet waterward of the MHWL), so each project will have minor in-water impacts. Projects of this size are typically completed within a few hours to a few days. Additionally, pilings used for this permit will be small in size and number and will typically be jetted or driven in less than a day. Therefore, the risk of injury from the construction of a boat ramp is discountable. Smalltooth sawfish may be affected by being temporarily unable to use a project site for foraging and refuge habitat due to potential avoidance of construction activities, and physical exclusion from areas contained by turbidity curtains, but these effects will be insignificant due to the short duration of this type of project. Impacts to foraging and refuge habitat would be small in nature, occur within 5 feet of the MHWL, and limited in number (only 8 projects during the last 5 years). Effects on smalltooth sawfish include potential loss of habitat (i.e., shallow, euryhaline habitat and mangroves) for foraging and predator avoidance; however, the potential loss will be insignificant due to the small size of the project sites that could be permitted. Mangrove removal and work within smalltooth critical habitat are not permitted under the special conditions of this permit; therefore, there will be no effects to the shallow, euryhaline water and red mangrove essential features.

**Potential routes of effects to Gulf, shortnose, and Atlantic sturgeon:**
We believe that Gulf sturgeon, shortnose sturgeon, and Atlantic sturgeon are not likely to be adversely affected by projects approved under SAJ-12. Effects to these species include the risk of injury from construction activities, which will be discountable due to the species' mobility, and the implementation of NMFS' *Sea Turtle and Smalltooth Sawfish Construction Conditions*. Sturgeon may be affected by being temporarily unable to use a project site due to potential avoidance of construction activities and related noise, and physical exclusion from areas contained by turbidity curtains, but these effects will be insignificant. These potential effects are likely to be temporary, as projects of this size typically take a few days to weeks to complete. Projects are also not allowed in Gulf sturgeon critical habitat so there will be no effect to Gulf sturgeon critical habitat essential features. Shortnose sturgeon and Atlantic sturgeon are limited in Florida to the St. Mary's River and the St. Johns River, and projects cannot be permitted in the St. Mary's River under the general permits covered by this consultation. According to the USACE, between 2005 and 2010, only 2 permits were authorized under SAJ-12 in the lower St. Johns River and none in the upper St. Johns River. Due to the species' mobility, the limited number, and the small size of the construction impacts, the risk of impact to sturgeon is discountable.

**Potential routes of effects to elkhorn and staghorn coral:**
Elkhorn and staghorn corals are not likely to be adversely affected by the installation of boat ramps under this general permit. The risk of impact to corals is discountable because (1) the nearshore location of the boat ramps (less than 5 feet from MHW), (2) the PDCs for this permit

exclude *Acropora* critical habitat in Monroe County where most of these corals are found in Florida, and (3) the PDCs prohibit adverse impacts to hard or soft corals and specifically to elkhorn or staghorn corals.

**Potential routes of effects to Johnson's seagrass:**
Johnson's seagrass is not likely to be adversely affected by the installation of boat ramps under this general permit. The risk of impact to this species is discountable because (1) the small nearshore location of the boat ramps (less than 5 feet from MHWL), (2) the PDCs for this permit exclude Johnson's seagrass critical habitat where most of this seagrass is located, and (3) the PDCs prohibit adverse impacts to submerged aquatic vegetation and specifically to Johnson's seagrass.

### 3.1.5 Transmission lines and Stormwater Outfalls

SAJ-13 provides authorization for aerial transmission lines and SAJ-14 provides authorization for sub-aquatic transmission lines not located within critical habitat. SAJ-91 provides authorization for aerial transmission lines, sub-aqueous transmission lines, and stormwater outfalls located within smalltooth sawfish critical habitat. Potential routes of effects to each of the listed species in Table 6 are discussed below along with potential impacts to smalltooth sawfish critical habitat from these actions authorized under these general permits. SAJ-13 was used 41 times during the last 5-year period, SAJ-14 was used 167 times, and SAJ-91 was not used to authorize transmission lines (aerial or sub-aquatic) or for new stormwater outfalls during the last authorization period. The City of Cape Coral does do not anticipate the need to use SAJ-91 for the installation of new transmission lines (aerial or sub-aquatic) or stormwater outfalls. However, SAJ-91 may be used for the regular maintenance of existing stormwater outfalls (pers. comm. M. Ilczyszyn, City of Cape Coral to N. Bailey, NMFS, September 27, 2012).

**Potential routes of effects to sea turtles:**
We believe that sea turtles are not likely to be adversely affected by projects approved under SAJ-13 or SAJ-91for the installation of aerial transmission lines. Effects on sea turtles include the risk of injury from in-water construction activities (i.e., pile placement, transmission line tower installation), including physical impacts with construction materials or operating construction machinery. Construction of the transmission line tower foundations will be accomplished by jetting or driving pilings and then placing precast structures or pouring concrete in place. All in-water work will be done from the uplands, floating platform or barge, and in some instances by helicopter. The risk of injury from construction will be discountable because of the small size of each pole or tower placement in relationship to the surrounding open water and because sea turtles are mobile and can easily avoid this type of activity. Sea turtles may be affected by being temporarily unable to use a project site for foraging and refuge habitat due to potential avoidance of construction activities and related noise, and physical exclusion from areas contained by turbidity curtains, but these effects will be insignificant. Projects are not permitted that would affect submerged aquatic vegetation that may be used for foraging by sea turtles. Exclusion of these areas by turbidity curtains will likely to be temporary, as individual sections of the project will likely be completed one at a time, each section will not take long to complete, turbidity curtains will be removed, and the project will progress forward to the next linear location. However, depending on the length of water body to be crossed, the total in-water construction time to complete the linear project could vary considerably. According to the

USACE, SAJ-13 is usually used to authorize projects that span over the water with all footings on the uplands. According to the PDC's, permanent impacts (e.g., foundation towers, transmission line poles, etc.) must be less than 1 acre per 2-mile in-water segment. The USACE regulates that the height of the transmission lines provides adequate clearance for vessels to pass safely beneath the lines, so project authorized may not even result in in-water impacts but be limited to line height for vessel navigation. Therefore, impacts to foraging and refuge habitat from installation of structures are insignificant based on the spacing design and small impact areas.

We believe that sea turtles are not likely to be adversely affected by sub-aquatic transmission projects approved under SAJ-14 or SAJ-91. Effects on sea turtles include the risk of injury from in-water construction activities (i.e., directional drilling, sub-aquatic line placement, substation installation), including physical impacts with construction materials or operating construction machinery. Under SAJ-14, the only activities allowed in tidal waters are the construction and operation of subaqueous utility and transmission lines themselves and the outfall and intake structures associated with the utility lines. According to the USACE, SAJ-14 was only used one time during the last authorization period to permit a stormwater outfall. The USACE regulates the placement of the structures, and the discharge must meet (and is regulated by) state and federal water quality standards. In-water work is normally performed from a floating platform or barge by excavating trenches using draglines or backhoes, placing the utility line, and then backfilling or allowing the trench to naturally refill. Most work will be accomplished using directional drilling under the substrata to avoid impacts to marine resources, some will be trenched with temporary sidecasting, and some will be done by simply placing the line on the bottom with no excavation. Under SAJ-14, only 1 acre of permanent fill (e.g., line placement) is allowed per 2-mile segment of linear transmission line. Due to the species' mobility, the slow movement of the barges, and the implementation of NMFS' *Sea Turtle and Smalltooth Sawfish Construction Conditions*, the risk of injury will be discountable. Sea turtles may be affected by being temporarily unable to use a project site for refuge and foraging due to potential avoidance of construction activities and related noise, and physical exclusion from areas contained by turbidity curtains, but these effects will be insignificant. Projects are not permitted that would have an effect on submerged aquatic vegetation that may be used by sea turtles for foraging. These potential effects are likely to be temporary, as sections of this linear project will likely be completed quickly. However, depending on the length of the water body to be crossed, the total in-water construction times could vary considerably. To further minimize impacts to sea turtles, projects are prohibited that are located in the Atlantic Ocean, Gulf of Mexico, or on or contiguous to the Atlantic Ocean or Gulf of Mexico beaches, where sea turtles are typically found. This measure also protects beaches used by nesting sea turtles.

**Potential routes of effects to smalltooth sawfish:**
We believe that smalltooth sawfish are not likely to be adversely affected by aerial transmission line projects approved under SAJ-13 or SAJ-91. As previously stated, the City of Cape Coral does not anticipate using SAJ-91 to permit in-water activities for transmission lines (aerial or sub-aquatic), and stormwater outfall work will be limited to regular maintenance. Effects to smalltooth sawfish include the risk of injury from construction activities, which will be discountable due to the species' mobility, and the implementation of NMFS' *Sea Turtle and Smalltooth Sawfish Construction Conditions*. Smalltooth sawfish may be affected by being

temporarily unable to use a project site due to potential avoidance of construction, and physical exclusion from areas contained by turbidity curtains, but these effects will be insignificant. These potential effects are likely to be temporary, as sections of these linear projects typically take a few days to weeks to complete. Effects on smalltooth sawfish include potential loss of habitat (i.e., shallow, euryhaline habitat and red mangroves) for foraging and predator avoidance; however, the potential loss will be insignificant due to the small size of the foundations that could be permitted. Aerial transmission lines typically span water bodies with the support structures placed on the uplands. According to the PDCs, permanent impacts (e.g., foundation towers, transmission line poles, etc.) must be less than 1 acre per 2-mile in-water segment. Mangrove removal and work within smalltooth critical habitat are not permitted under the special conditions of SAJ-13; therefore, there will be no effect to the shallow-water essential features. No transmission line work is anticipated under SAJ-91.

We believe that smalltooth sawfish are not likely to be adversely affected by sub-aquatic transmission line projects approved under SAJ-14 and SAJ-91. Effects to these species include the risk of injury from construction activities (i.e., directional drilling, sub-aquatic line placement, substation installation), which will be discountable due to the species' mobility, and the implementation of NMFS' *Sea Turtle and Smalltooth Sawfish Construction Conditions*. Smalltooth sawfish may be affected by being temporarily unable to use a project site due to potential avoidance of construction activities and related noise, and physical exclusion from areas contained by turbidity curtains, but these effects will be insignificant. These potential effects are likely to be temporary, as sections of these linear projects are likely to be competed quickly. Effects on smalltooth sawfish include potential loss of habitat (i.e., shallow, euryhaline habitat and mangroves) for foraging and predator avoidance; however, the potential loss will be insignificant due to the small size of impacts likely from transmission line placement or directional drilling. Under SAJ-14, only 1 acre of permanent fill (i.e., transmission poles or foundations) is allowed per 2-mile segment of linear transmission line. Mangrove removal and work within smalltooth critical habitat is not permitted under the special conditions of SAJ-14 and no transmission line work is anticipated under SAJ-91.

**Potential routes of effects to Gulf, shortnose, and Atlantic sturgeon:**
We believe that sturgeon (Gulf sturgeon, shortnose, and Atlantic) are not likely to be adversely affected by aerial transmission line projects approved under SAJ-13 or SAJ-91. The action area of SAJ-91 (Cape Coral) is not within the known range for Gulf, shortnose, or Atlantic sturgeon; therefore, impacts are not expected to occur to these species. Effects to these species from SAJ-13 include the risk of injury from construction activities, which will be discountable due to the species' mobility, and the implementation of NMFS' *Sea Turtle and Smalltooth Sawfish Construction Conditions*, which the PDCs for this permit apply to sturgeon as well. Sturgeon may be affected by being temporarily unable to use a project site due to potential avoidance of construction activities, and physical exclusion from areas contained by turbidity curtains, but these effects will be insignificant. These potential effects are likely to be temporary, as sections of these linear projects typically take a few days to weeks to complete. According to the PDCs, permanent impacts (e.g., foundation towers, transmission line poles, etc.) must be less than 1 acre per 2-mile in-water segment. Projects are also not allowed in critical habitat so there will be no effect to Gulf sturgeon critical habitat. Shortnose sturgeon and Atlantic sturgeon are limited in Florida to the St. Mary's River and the St. Johns River, and projects cannot be permitted in the

St. Mary's River under the general permits covered by this consultation. Due to the species' mobility and the implementation of NMFS' *Sea Turtle and Smalltooth Sawfish Construction Conditions,* the risk of injury to shortnose sturgeon and Atlantic sturgeon in the St. Johns River will be discountable.

We believe that sturgeon (Gulf sturgeon, shortnose, and Atlantic) are not likely to be adversely affected by sub-aquatic transmission line projects approved under SAJ-14. Effects to these species from SAJ-14 include the risk of injury from construction activities, which will be discountable due to the species' mobility, and the implementation of NMFS' *Sea Turtle and Smalltooth Sawfish Construction Conditions*. Sturgeon may be affected by being temporarily unable to use a project site due to potential avoidance of construction activities and related noise, and physical exclusion from areas contained by turbidity curtains, but these effects will be insignificant. According to the PDCs, permanent impacts must be less than 1 acre per 2-miles in-water segment. Projects are also not allowed in critical habitat so there will be no effect to Gulf sturgeon critical habitat. Shortnose sturgeon and Atlantic sturgeon are limited in Florida to the St. Mary's River and the St. Johns River, and projects cannot be permitted in the St. Mary's River under the general permits covered by this consultation. The risk of injury to shortnose sturgeon and Atlantic sturgeon in the St. Johns River will be discountable due to the species' mobility and the implementation of NMFS' *Sea Turtle and Smalltooth Sawfish Construction Conditions*.

**Potential routes of effects to elkhorn and staghorn coral:**
Elkhorn and staghorn corals are not likely to be adversely affected by activities authorized under SAJ-13, 14, and 91. The action area of SAJ-91 (Cape Coral) does not support elkhorn or staghorn corals. SAJ-13 and 14 are not expected to impact these species because the PDCs prohibit construction in areas that support elkhorn and staghorn corals (Monroe County, Atlantic Ocean, Gulf of Mexico, or on or contiguous to the Atlantic Ocean or Gulf of Mexico, and *Acropora* critical habitat) and the PDCs prohibit adverse impacts to hard or soft corals and specifically to elkhorn or staghorn corals.

**Potential routes of effects to Johnson's seagrass:**
Johnson's seagrass is not likely to be adversely affected by activities authorized under SAJ-13, 14, and 91. Johnson's seagrass does not occur within the action area for SAJ-91 (Cape Coral). SAJ-13 and 14 are not expected to impact these species because the PDCs prohibit construction in areas that support Johnson's seagrass (Atlantic Ocean, Gulf of Mexico, or on or contiguous to the Atlantic Ocean or Gulf of Mexico), work is prohibited in Johnson's seagrass critical habitat, and the PDCs prohibit adverse impacts to submerged aquatic vegetation and specifically to Johnson's seagrass.

### 3.1.6 Noise

We believe that the noise generated during the installation of pilings and seawalls under these general permits and the noise generated by an increase in vessels stored at structures authorized under these general permits may affect sea turtles (loggerhead, green, hawksbill, Kemp's ridley, and leatherback), smalltooth sawfish, and sturgeon (shortnose, Gulf, and Atlantic).

*Construction of piling supported structures*

Piling supported structures considered in this analysis consider a variety of materials such as wood, steel, concrete, fiberglass, and composites. According to the USACE, approximately 98 percent of the docks installed under these permits are constructed of 8-inch wood pilings. The other 2 percent of docks covered under these general permits are generally constructed of 8-inch concrete piles. Dock installers in Cape Coral, Florida estimated that approximately 99 percent of residential docks constructed in southwest Florida are constructed of wood piles (August 20, 2012 personal communication from Dan Stovall, VP of Honc Marine, to Nicole Bailey, NMFS). The major difference between wood and concrete piles is the shorter longevity and lower cost of wood piles compared to concrete construction.

In-water construction equipment for docks and seawalls include workboats, water jetting, auger-drilling equipment, vibratory hammers, and impact hammers. Jetting and drilling result in much lower noise levels than either impact or vibratory pile driving. In many areas, projects utilize pile jetting during the initial phases of pile installation to set the pile in place before it is driven to resistance. This method uses high-pressure water sprayed beneath the pile to excavate sediment and sand layers. Noise measurements taken with water jetting turned on or off during pile driving resulted in no additional noise recorded above that of the pile driving noise (CALTRANS 2007), and the source levels for jetting is believed to be well below the 150 dB re 1 μPaRMS threshold for behavioral disturbance to fish. Noise levels for auger drilling through rock to install large piles have been measured to be above 150 dB re 1 μPa RMS (Dazey et al. 2012); however, small-scale drilling operations that are more representative of dock construction methods have been measured to be no more than 107 dB re 1 μPa0-peak at 7.5 meters from the source (Willis et al. 2010). Our back calculation resulted in an approximate source level of 120 dB re 1 μPa0-peak. *Neither small-scale auger drilling nor water jetting is expected to result in noise levels that may adversely affect listed species.*

Impact hammer installation generates the most in-water noise. There are two main classes of impact hammers: external combustion and internal combustion. External combustion hammers use cables, steam, compressed air or pressurized hydraulic fluid to raise the ram which is then dropped by gravity (e.g., a drop hammer). Internal combustion hammers do not rely on gravity and force the ram into the pile (e.g., a diesel hammer). During impact pile driving, noise is produced when the energy from the hammer is transferred to the pile and released into the surrounding water and sediment.

The number of piles necessary to complete construction under these general permits varies by permit. A typical residential dock as authorized under SAJ-20, 72, 91, and 96, is constructed of 15 piles and requires approximately 10 hours to complete in-water construction, including placement of piles and equipment, and can take 2 or more days to complete. Some larger docks (up to 1,000 square feet) authorized under SAJ-33 and SAJ-34, can use up to 70 piles and noise could be produced over a period of 2 weeks. SAJ-17 requires the fewest number of piles with an average of only 4 piles. The size of timber piles used for smaller residential dock and boat lift construction range from 8-inch diameters for small docks and 10-inch diameter piles to support a boatlift. Larger boatlifts of 30,000 pounds or more use 12-inch pilings, and 16-inch diameter mooring piles. A breakdown of the number and size of piles anticipated to be used by each general permit is provided in Table 12 below.

Because of the noise levels generated, projects proposing installation of any type of piling greater than 24" in diameter, or installation of any size of metal piling or sheet piling by impact hammer cannot be authorized until project-specific consultation has been reinitiated and concluded with the NMFS.

*Construction of seawalls*

Seawalls are constructed of either pre-fabricated concrete slabs, metal sheet pile with concrete caps, or vinyl sheets. Construction of this type of project is typically conducted from the uplands. Typically, residential seawalls are installed by excavating with land-based equipment, jetting, or vibratory hammer. Some seawalls are also installed by impact hammer. Metal sheet pile is used least frequently because of the corrosive nature of the marine environment resulting in a limited lifespan of this type of bulkhead. Noise levels generated in the marine environment from land-based equipment are insignificant because the air-water interface is an almost perfect reflector of acoustic waves. Therefore, the noise generated by land-based mechanical excavators or jetting will reflect off the surface and will not be transmitted into the water at noise levels expected to be heard by these species. The installation of steel sheet pile seawalls and support pilings will generate the most noise of all residential seawalls. Installation by impact hammer also increases the noise generated when installing seawalls. The installation of metal piles or sheet pile by impact hammer cannot be authorized until project-specific consultation has been reinitiated and concluded with the NMFS.

Appendix A details the methods and noise analysis to establish zones of influence for injury and behavioral reactions as the basis for our effects analysis. Below we consider the potential for the piling noise installed by impact hammer and vibratory hammer to ensonify aquatic areas where listed species are found. This is followed by a discussion about the impacts from noise to sea turtles (loggerhead, green, hawksbill, Kemp's ridley, and leatherback), smalltooth sawfish, and sturgeon (shortnose, Gulf, and Atlantic).

**Table 12: Number of Pilings per project.**

| General Permit | Average installation | Worst case scenario | 5-year totals[14] |
|---|---|---|---|
| SAJ-17<br>Minor piling structure | (4) 10-inch wood piles installed by jetting | (4) 10-inch concrete piles installed by pile driving | 1,488 |
| SAJ-20<br>Single family | (45) 8-inch wood piles installed by jetting | (68) 8-inch concrete piles installed by pile driving | 3,256 |

[14] 5-year totals are from 2006-2010 except SAJ-96 which is 2007-2012 and SAJ-91 which is an average five year total based on 4 years of data from 2008-2011.

| | | | |
|---|---|---|---|
| SAJ-33<br>Private multi-family dock less than 1000 square feet | (45) 8-inch wood piles installed by jetting | (80) 8-inch concrete piles installed by pile driving | 149 |
| SAJ-34<br>Commercial Pier less than 1000 square feet | (45) 8-inch wood piles installed by jetting | (80) 8-inch concrete piles installed by pile driving | 28 |
| SAJ-72<br>Dock in Citrus County | (15) 8-inch wood piles installed by jetting | (15) 8-inch concrete piles installed by pile driving | 156 |
| SAJ-91<br>Docks and minor structures in Cape Coral | (15) 8-inch wood piles installed by jetting | (15) 8-inch concrete piles installed by pile driving | 2,489[15] |
| SAJ-96<br>Docks and minor structures in Pinellas County | (15) 8-inch wood piles installed by jetting | (15) 8-inch concrete piles installed by pile driving | 2,418 |

*Pile Driving and Seawall Installation Summary*

For this analysis, we assumed that a maximum of 10 pilings would be installed daily for docks installed under these general permits. For seawalls, we assumed a worst case scenario of steel sheet pile bulkhead, as installation of sheet pile generates more noise than the installation of pre-fabricated concrete slabs. The noise level calculations were then compared to the threshold for small and large fish to determine if these levels would cause injurious or behavioral changes in sea turtles (loggerhead, green, hawksbill, Kemp's ridley, and leatherback), smalltooth sawfish, and sturgeon (shortnose, Gulf, and Atlantic). For this consultation, we are considering small fish to represent juvenile sturgeon (young of the year) and sea turtle hatchlings. Large fish include sub-adult and adult sturgeon, all age classes of smalltooth sawfish, and sub-adult and adult sea turtles. Impacts to small fish are not considered under this consultation because of their location in the state of Florida. Small Gulf sturgeon (young of the year) occur within the Suwannee River in Florida, which is under the jurisdiction of the USFWS and therefore out of our action area. Small shortnose and Atlantic sturgeon are not known to occur in Florida. Small sea turtles (hatchlings) are found on nesting beaches and in open ocean environments which are excluded under the PDCs for these general permits; hence, they too are located outside of the action area. The threshold levels of noise at which potentially adverse effects may be experienced from impact and vibratory pile driving appear in table 13 and table 14, respectively.

[15] This is a five year average as explained in Section 2.1 for SAJ-91. It includes all dock structures and davits.

**Table 13. Impact pile driving threshold noise levels for fish and sea turtles.**

| Effect | Organism | Underwater threshold (dB) |
|---|---|---|
| Injury | All fish and turtles | 206 peak |
| | Fish ≥ 2 grams | 187 SEL |
| | | |
| Behavior | Fish | 150 dB RMS |
| | Sea turtles | 160 dB RMS |

Thresholds are based on the most conservative criteria for hearing generalists for fish (Federal Highway Administration 2012). No data on sea turtle injury from pile driving is available. Considering animals of equal mass, fish are considered more sensitive to physical injury than sea turtles; therefore, fish thresholds are recommended as conservative thresholds for sea turtles as interim criteria.

**Table 14. Vibratory pile driving threshold levels for fish and turtles.**

| Effect | Animal | Threshold Level |
|---|---|---|
| Injury | Sturgeon, Sawfish, and Turtles | 206 peak |
| Injury (onset) | Fish ≥ 102 g | 234 SELCUM |
| | | |
| Behavior | Fish | 150 RMS |
| | Turtles | 160 RMS |

Thresholds are based on the recommended criteria for vibratory piling found in Hastings (2010). Cumulative source levels were back calculated using 20 minutes to drive each pile and 15 logR intermediate spreading loss based on reference levels for 24-inch AZ sheet pile noise using a vibratory hammer reported in CALTRANS (2007). There are no $SEL_{CUM}$ levels established for sea turtles and fish thresholds are used as conservative indicators of potential injury.

To determine the effect of noise on these species, we reviewed research to see how these species respond to noise. A recent study (Krebs et al. 2012) reported that tagged Atlantic sturgeon are not likely to remain in an area ensonified from pile driving long enough to reach the threshold level for the onset of injurious effects. Tagging data showed that Atlantic sturgeon are likely to avoid these areas during high levels of construction noise. Another study showed that sharks (and likely smalltooth sawfish), also leave an area when exposed to high levels of noise. Myrberg (2001) reported that sudden increases in sound beginning at 20 decibels above ambient caused sharks to move away from the sound source. It is reasonable to assume that initiating pile driving that increases noise levels upwards of 150 decibels above ambient levels would elicit a withdrawal response from smalltooth sawfish that may be in the area. NMFS believes that due to the mobile foraging habits of sea turtles, smalltooth sawfish, and sturgeon, these species are likely to avoid annoying levels of noise and avoid any potentially harmful effects from long term exposure (hours). Therefore, we have discounted the potential effects of animals remaining in the area for long periods and we have discounted the potential effects of cumulative sound exposure in our effects analysis.

We will further consider the potential effects from expose to a sudden injurious noise occurring before a species has ample time to leave the area and the behavioral effects of non-injurious noise exposure. At relatively close distances, the risk of injury or death (injurious noise effects) to fish from sound result primarily from their vulnerability of their gas-filled organs (e.g., swim bladders, ears) as they expand and contract with passage of a pressure wave. Prolonged exposure to noise can amplify impacts to species. However, the larger the size of fish species exposed to sound disturbance, the greater their resistance to the pressure waves produced by the sound in general. Notably, smalltooth sawfish are quite large in comparison to most species affected by pile driving. Additionally, smalltooth sawfish are elasmobranchs that do not have swim bladders but do have gas filled cavities in their hearing apparatus. Injurious effects in the context of the proposed action (e.g., pile driving) are those effects that cause physical injury to smalltooth sawfish (e.g., hematomas, gill bleeding, auditory injury, or possibly entrap of an animal in an area where repeated exposure to noise elevates effects from behavioral to injurious levels). The results of the noise analysis for pile and seawall installation only resulted in noise levels high enough to cause injurious effects to these species from the installation of metal sheet pile by impact hammer only, which is not authorized under the PDCs for these general permits. Tables 15 and 16 provide the distance for each species to experience behavioral effects for in-water construction authorized by these general permits.

**Table 15: Impact pile driving impact zones.**

| Noise Unit | Source Level at Pile[a] | Fish >2 g Impact Radius (m) | Turtle Impact Radius (m) |
|---|---|---|---|
| *Timber pile* | | | |
| Peak pressure (injury) | 195 dB | none | none |
| SELss (injury) | 175 dB | none | none |
| **RMS (behavior)** | **185 dB** | **215** | 46 |
| *24-inch concrete pile* | | | |
| Peak pressure (injury) | 200 dB | none | none |
| SELss | 175 dB | none | none |
| **RMS (behavior)** | **185 dB** | **215** | **46** |

[a]Pile driving data derived from CALTRANS (2007 and 2009).
[b]Tier 2 analysis is required for impact driving of sheet piles.

**Table 16. Vibratory pile driving impact zones.**

| | Source Level at Pile[a] | Fish Impact Radius (m) | Turtle Impact Radius (m) |
|---|---|---|---|
| *Timber or Concrete pile*[b] | | | |
| Peak pressure (injury) | 186 | none | none |
| SELss (injury) | 170 | none | none |
| **RMS (behavior)** | **170** | **22** | **5** |
| *Sheet pile* | | | |
| Peak pressure (injury) | 192 | none | none |
| SELss (injury) | 178 | none | none |
| **RMS (behavior)** | **178** | **74** | **16** |

[a]Pile driving data derived from CALTRANS (2007 and 2009).
[b]Vibratory pile driving of wood and concrete is not common and no measurements are available. We used source levels from vibratory pile driving of a 13-inch steel pipe as a conservative upper limit of potential noise for wood and concrete.

**Potential routes of effects to sea turtles and sturgeon (Gulf, shortnose, and Atlantic):**
Since we expect sea turtles and sturgeon to avoid potentially injurious noise levels and since they can be deterred from the project area during pile-driving activities, we further considered the potential for this avoidance behavior to disrupt feeding, mating, or sheltering of individuals. The effects of avoidance of the construction areas is not expected to have any measurable effect on the feeding, reproduction, or sheltering behavior due to short duration of most projects, that reproductive habitat for these species are excluded from the action areas, and that ample habitat is likely to be found in the surrounding area. Therefore, noise impacts from construction of projects authorized under these general permits are insignificant.

**Potential routes of effects to smalltooth sawfish:**
Since we also expect smalltooth sawfish to avoid potentially injurious noise levels and because they can be deterred from the project area during pile-driving activities, we further considered the potential for this avoidance behavior to disrupt feeding, mating, or sheltering of individuals. The effects of avoidance of the construction areas is not expected to have any measurable effect on the feeding or sheltering behavior due to short duration of most projects and that ample habitat is likely to be found in the surrounding area. Unlike sea turtles and sturgeon, smalltooth sawfish is the only species considered in this opinion that is known to birth within the action area. As a result, behavioral noise impacts have a greater ability to impact the species by potentially deterring a reproducing female from delivering young in an area disturbed by increased noise. The PDCs prohibit potentially loud and startling noise generated by impact hammering in the noise restriction zones that are areas likely to be most frequently used by smalltooth sawfish to pup their young. In addition, impact hammering of any metal pile or sheet pile is prohibited in the PDCs because of the increase in noise levels generated from this type of activity. Therefore, noise impacts form construction of projects authorized under these general permits are insignificant.

*Vessel Noise and Operation*
Noise generated by vessels may affect sturgeon, sea turtles, and smalltooth sawfish. Vessels transmit noise through water and cumulatively are a significant contributor to increases in ambient noise levels in many areas. The dominant source of vessel noise from the proposed action is propeller cavitation of recreational vessels, as well as that produced from work barges. The intensity of noise from service vessels is roughly related to ship size and speed. Large ships tend to be noisier than small ones, and ships underway with a full load (or towing or pushing a load) produce more noise than unladen vessels. Vessel noise is most significant at frequencies from 20 to 300 Hz, but is also present above ambient noise levels up to 1 kHz. The low frequencies produced overlap with the low-frequency hearing abilities of sturgeons and sea turtles (see Table 17).

**Table 17. Hearing ranges of listed species.**

| Species or Group | Hearing Range | References |
|---|---|---|
| sea turtles | 100-2,000 Hz | Lenhardt (1994), Lenhardt et al. (1996), McCauley et al. (2000a), McCauley et al. (2000b),Moein et al. (1994), O'Hara and Wilcox (1990), Ketten and Bartol (2006) |

| | | |
|---|---|---|
| sturgeon | 100-2,000 Hz | Fay and Popper (2000), Lovell et al. (2005), Meyer and Popper (2002), Meyer et al. (2003) |
| smalltooth sawfish | <1,000 Hz | Has not been measured, but is based on assumed lower-frequency hearing for fish without swim bladders [e.g., (Casper et al. 2003)]. |

(Codarin et al. 2009) measured the noise produced from an 8.5-m long cabin-cruiser, with a 163 HP inboard diesel engine operating at maximum speed 6 knots. At a minimum 10-m distance of the boat to the hydrophone, the average noise level of 132 dB was recorded.

*Effects of Vessel Operation and Noise on Sea Turtles*
Increases in ambient noise are believed to be a potential threat to mask communication in animals. Effects on communication in sea turtles are not expected since these species are not known to vocalize underwater, and are not known to communicate with sound. Due to their lack of reliance on their auditory sense, increases in ambient noise levels are not a major concern for sea turtles. For sea turtles, the potential for disturbance from vessels appears to be more of a function of the physical presence of the vessel and motor noise at close distances to the vessel. The exposure of animals to vessels and propeller noise is dependent on the number and proximity of the vessels to an animal. Since the location of noise is limited to the position of a moving vessel, both noise and the presence of the vessel on the water may potentially affect the behavior of animals at relatively close distances where the vessel noise is more audible and the vessel may be visible from both below and above the surface. Sea turtles may react to an oncoming vessel by swimming rapidly at the surface or diving beneath the surface. These reactions are expected to be immediate reactions to avoid vessels and not have any long-term consequences on individuals. For work barges, the USACE shall implement the NMFS' *Vessel Strike Avoidance Measures and Reporting for Mariners* that requires that vessel operators maintain a distance of 45 meters from sea turtles that would reduce the potential effects from the physical presence of the vessels to discountable levels. Due to the reported interactions with vessels from stranding reports, not all sea turtles move out of the way of oncoming vessels. NMFS believes this is more a function of the speed of the vessel and the decreased reaction time associated with fast approaching vessels. In Section 3.1.1, we determined that the increase of vessels resulting from the authorization of docks from these general permits is likely to result in an increase in sea turtle vessel strikes. This is considered further in Section 5 of this opinion.

*Effects of Vessel Operation and Noise of Sturgeon and Sawfish*
Sawfish are not known to vocalize and masking of communication signal is not expected. While the data on sturgeon sound production is limited, a recent paper by (Johnston and Phillips 2003) reports that both the pallid sturgeon and shovelnose sturgeon produce sounds during the breeding season. Unpublished work by (Tolstoganova 1999) indicates that that several species of *Acipenser* also make sounds. However, there are no activities associated with the proposed action that are proposed to occur in sturgeon spawning areas; therefore, the effects to masking of sturgeon communication sounds in considered insignificant. The exposure of sturgeon and sawfish to vessel noise is dependent on the number and proximity of vessels to an animal, thus the behavioral responses to vessel noise are limited to close distances. Although these levels are

expected to be heard by sturgeon and smalltooth sawfish, the sound levels do not exceed the sound level (> 150 dB) considered to elicit responses which would result in animals abandoning the area. Exposure to noise from passing vessels is ephemeral and below thresholds considered to result in significant behavioral responses, the effects of vessel noise on listed species of sturgeon and sawfish is discountable.

## 3.2 Status of Species and Critical Habitat Likely to be Adversely Affected

Of the listed species and critical habitat under NMFS' jurisdiction occurring within the action area (see Table 6 and Table 7), NMFS believes sea turtles (loggerhead, green, hawksbill, Kemp's ridley, and leatherback), smalltooth sawfish critical habitat, and Johnson's seagrass critical habitat may be adversely impacted by the authorization of these general permits. The remaining sections of this opinion will focus solely on these species and critical habitat.

The following subsections are synopses of the best available information on the status of the species that are likely to be adversely affected by one or more components of the proposed action, including information on the distribution, population structure, life history, abundance, and population trends of each species and threats to each species. The biology and ecology of these species as well as their status and trends inform the effects analysis for this opinion. Additional background information on the status of sea turtle species can be found in a number of published documents, including: recovery plans for the Atlantic green sea turtle (NMFS and USFWS 1991), hawksbill sea turtle (NMFS and USFWS 1993), Kemp's ridley sea turtle (NMFS and USFWS 1992b), leatherback sea turtle (NMFS and USFWS 1992a), and loggerhead sea turtle (NMFS and USFWS 2008); Pacific sea turtle recovery plans (NMFS and USFWS 1998a; NMFS and USFWS 1998b; NMFS and USFWS 1998c; NMFS and USFWS 1998b); and sea turtle status reviews, stock assessments, and biological reports (Conant et al. 2009; NMFS-SEFSC 2001; NMFS-SEFSC 2009a; NMFS and USFWS 1995; NMFS and USFWS 2007a; NMFS and USFWS 2007b; NMFS and USFWS 2007c; NMFS and USFWS 2007d; NMFS and USFWS 2007e; TEWG 1998; TEWG 2000; TEWG 2007; TEWG 2009).

Sources of background information on the smalltooth sawfish critical habitat include the smalltooth sawfish status review (NMFS 2000), the proposed and final critical habitat rules (73 FR 70290 and 74 FR45353), and pertinent other publications [e.g., (Poulakis and Seitz 2004; Seitz and Poulakis 2002; Simpfendorfer 2001; Simpfendorfer and Wiley 2004; Simpfendorfer and Wiley 2005a)].

Sources of background information on Johnson's seagrass critical habitat include the final rule designating Johnson's seagrass on April 5, 2000 (65 FR 17786; see also, 50 CFR 226.213), the Recovery Plan (67 FR 62230), and the 5-year review published on December 4, 2007 (72 FR 68129).

### 3.2.1 Loggerhead Sea Turtle – Northwest Atlantic DPS

The loggerhead sea turtle was listed as a threatened species throughout its global range on July 28, 1978. NMFS and USFWS published a final rule designating nine DPSs for loggerhead sea turtles (76 FR 58868, September 22, 2011; effective October 24, 2011). The DPSs established by this rule include (1) Northwest Atlantic Ocean (threatened); (2) Northeast Atlantic Ocean (endangered); (3) South Atlantic Ocean (threatened); (4) Mediterranean Sea (endangered); (5) North Pacific Ocean (endangered); (6) South Pacific Ocean (endangered); (7) North Indian Ocean (endangered); (8) Southeast Indo-Pacific Ocean (endangered); and (9) Southwest Indian Ocean (threatened). The Northwest Atlantic DPS (NWA DPS) is the only one that occurs within the action area and therefore is the only one to be considered in this opinion. No critical habitat has been designated as of the time of this opinion.

*Species Description, Distribution, and Population Structure*
Loggerheads are large sea turtles with the mean straight carapace length of adults in the southeast United States being approximately 92 cm. The corresponding mass is approximately 116 kg (Ehrhart and Yoder 1978). Adult and subadult loggerhead sea turtles typically have a light yellow plastron and a reddish brown carapace covered by non-overlapping scutes that meet along seam lines. They typically have 11 or 12 pairs of marginal scutes, five pairs of costals, five vertebrals, and a nuchal (precentral) scute that is in contact with the first pair of costal scutes (Dodd 1988).

The loggerhead sea turtle inhabits continental shelf and estuarine environments and occurs throughout the temperate and tropical regions of the Atlantic, Pacific, and Indian Oceans (Dodd 1988). The majority of loggerhead nesting occurs at the western rims of the Atlantic and Indian Oceans concentrated in the north and south temperate zones and subtropics (NRC 1990).

In the western North Atlantic, the majority of loggerhead nesting is concentrated along the coasts of the United States from southern Virginia to Alabama. Additional nesting beaches are found along the northern and western Gulf of Mexico, eastern Yucatán Peninsula, at Cay Sal Bank in the eastern Bahamas (Addison 1997; Addison and Morford 1996), off the southwestern coast of Cuba (Gavilan 2001), and along the coasts of Central America, Colombia, Venezuela, and the eastern Caribbean Islands.

Non-nesting, adult female loggerheads are reported throughout the United States and Caribbean Sea. Little is known about the distribution of adult males who are seasonally abundant near nesting beaches although aerial surveys suggest that loggerheads in U.S. waters are distributed as a whole in the following proportions: 54 percent in the southeast U.S. Atlantic, 29 percent in the northeast U.S. Atlantic, 12 percent in the eastern Gulf of Mexico, and 5 percent in the western Gulf of Mexico (TEWG 1998). Shallow water habitats with large expanses of open ocean access, such as Florida Bay, provide year-round resident foraging areas for significant numbers of male and female adult loggerheads while juveniles are also found in enclosed, shallow water estuarine environments not frequented by adults (Epperly et al. 1995c). Further offshore, adults primarily inhabit continental shelf waters, from New England south to Florida, the Caribbean, and Gulf of Mexico (Schroeder et al. 2003). Benthic, immature loggerheads foraging in northeastern U.S. waters are known to migrate southward in the fall as water temperatures cool and then migrate back northward in spring (Epperly et al. 1995c; Keinath 1993; Morreale and Standora 1998; Shoop and Kenney 1992).

Within the NWA DPS, most loggerhead sea turtles nest from North Carolina to Florida and along the Gulf coast of Florida. Previous Section 7 analyses have recognized at least five

Western Atlantic subpopulations, divided geographically as follows (1) a northern nesting subpopulation, occurring from North Carolina to Northeast Florida at about 29ºN; (2) a South Florida nesting subpopulation, occurring from 29°N on the east coast to Sarasota on the west coast; (3) a Florida Panhandle nesting subpopulation, occurring at Eglin Air Force Base and the beaches near Panama City, Florida; (4) a Yucatán nesting subpopulation, occurring on the Eastern Yucatán Peninsula, Mexico (Márquez M 1990; TEWG 2000); and (5) a Dry Tortugas nesting subpopulation, occurring in the islands of the Dry Tortugas, near Key West, Florida (NMFS-SEFSC 2001). The recovery plan for the Northwest Atlantic population of loggerhead sea turtles concluded, based on recent advances in genetic analyses, that there is no genetic distinction between loggerheads nesting on adjacent beaches along the Florida Peninsula and that specific boundaries for subpopulations could not be designated based on genetic differences alone. Thus, the plan uses a combination of geographic distribution of nesting densities, geographic separation, and geopolitical boundaries, in addition to genetic differences, to identify recovery units. The recovery units are (1) the Northern Recovery Unit (Florida/Georgia border north through southern Virginia); (2) the Peninsular Florida Recovery Unit (Florida/Georgia border through Pinellas County, Florida); (3) the Dry Tortugas Recovery Unit (islands located west of Key West, Florida); (4) the Northern Gulf of Mexico Recovery Unit (Franklin County, Florida, through Texas); and (5) the Greater Caribbean Recovery Unit (Mexico through French Guiana, the Bahamas, Lesser Antilles, and Greater Antilles) (NMFS and USFWS 2008). The recovery plan concluded that all recovery units are essential to the recovery of the species. Although the recovery plan was written prior to the listing of the NWA DPS, the recovery units for what was then termed the Northwest Atlantic population apply to the NWA DPS.

*Life History Information*

Loggerhead sea turtles reach sexual maturity between 20 and 38 years of age, although this varies widely among populations (Frazer and Ehrhart 1985; NMFS and SEFSC 2001). The annual mating season for loggerhead sea turtles occurs from late March to early June, and eggs are laid throughout the summer months. Female loggerheads deposit an average of 4.1 nests within a nesting season (Murphy and Hopkins 1984) and have an average remigration interval of 3.7 years (Tucker 2010). Mean clutch size varies from 100 to 126 eggs for nests occurring along the southeastern U.S. coast (Dodd 1988).

Loggerheads originating from the western Atlantic nesting aggregations are believed to lead a pelagic existence in the North Atlantic Gyre for a period as long as 7-12 years (Bolten et al. 1998). Stranding records indicate that when immature loggerheads reach 40-60 centimeters straight carapace length, they begin to occur in coastal inshore waters of the continental shelf throughout the U.S. Atlantic and Gulf of Mexico (Witzell 2002). Recent studies have suggested that not all loggerhead sea turtles follow the model of circumnavigating the North Atlantic Gyre as pelagic juveniles, followed by permanent settlement into benthic environments (Bolten and Witherington 2003; Laurent et al. 1998). These studies suggest some turtles may either remain in the pelagic habitat in the North Atlantic longer than hypothesized or move back and forth between pelagic and coastal habitats interchangeably (Witzell 2002).

As post-hatchlings, loggerheads hatched on U.S. beaches migrate offshore and become associated with Sargassum habitats, driftlines, and other convergence zones (Carr 1986) (Witherington 2002). Juveniles are omnivorous and forage on crabs, mollusks, jellyfish and vegetation at or near the surface (Dodd 1988). Sub-adult and adult loggerheads are primarily found in coastal waters and prey on benthic invertebrates such as mollusks and decapod crustaceans in hard bottom habitats.

*Abundance and Trends*

A number of stock assessments and similar reviews (Conant et al. 2009; Heppell et al. 2003; NMFS-SEFSC 2009a; NMFS and SEFSC 2001; NMFS and USFWS 2008; TEWG 1998; TEWG 2000; TEWG 2009) have examined the stock status of loggerheads in the Atlantic Ocean, but none have been able to develop a reliable estimate of absolute population size.

Numbers of nests and nesting females can vary widely from year to year. However, nesting beach surveys can provide a reliable assessment of trends in the adult female population, due to the strong nest site fidelity of females turtles, as long as such studies are sufficiently long and effort and methods are standardized [e.g., NMFS and USFWS (2008)]. NMFS and USFWS (2008) concluded that the lack of change in two important demographic parameters of loggerheads, remigration interval and clutch frequency, indicate that time series on numbers of nests can provide reliable information on trends in the female population. Analysis of available data for the Peninsular Florida Recovery Unit up through 2008 led to the conclusion that the observed decline in nesting for that unit could best be explained by an actual decline in the number of adult female loggerheads in the population (Witherington et al. 2009).

Annual nest totals from beaches within the Northern Recovery Unit averaged 5,215 nests from 1989-2008, a period of near-complete surveys of Northern Recovery Unit nesting beaches (Georgia Department of Natural Resources unpublished data, North Carolina Wildlife Resources Commission unpublished data, South Carolina Department of Natural Resources unpublished data, and represent approximately 1,272 nesting females per year [4.1 nests per female (Murphy and Hopkins 1984)]. The loggerhead nesting trend from daily beach surveys showed a significant decline of 1.3 percent annually. Nest totals from aerial surveys conducted by South Carolina Department of Natural Resources showed a 1.9 percent annual decline in nesting in South Carolina from 1980 through 2008. Overall, there is strong statistical data to suggest the Northern Recovery Unit has experienced a long-term decline. Data in 2008 showed improved nesting numbers. In 2008, 841 loggerhead nests were observed compared to the 10-year average of 715 nests in North Carolina. The number dropped to 276 in 2009, but rose again in 2010 (846 nests) and 2011 (948 nests). In South Carolina, 2008 was the seventh highest nesting year on record since 1980, with 4,500 nests, but this did not change the long-term trend line indicating a decline on South Carolina beaches. Nesting dropped in 2009 to 2,183, with an increase to 3,141 in 2010. Georgia beach surveys located a total of 1,648 nests in 2008. This number surpassed the previous statewide record of 1,504 nests in 2003. In 2009, the number of nests declined to 998, and in 2010, a new statewide record was established with 1,760 loggerhead nests. (Georgia Department of Natural Resources, North Carolina Wildlife Resources Commission, and South Carolina Department of Natural Resources nesting data located at www.seaturtle.org).

Another consideration that may add to the importance and vulnerability of the NMU is the sex ratio of this subpopulation and its potential importance for genetic diversity. Research conducted over a limited timeframe but across multiple years found that while the small Northern subpopulation can produce a larger proportion of male hatchlings than the large Peninsular

Florida subpopulation, the sex ratio is female biased. In most years, the extent of the female bias is likely to be less extreme based upon current information. However, because their absolute numbers are small, their contribution to overall hatchling sex ratios is small (Wyneken et al. 2004; Wyneken et al. 2012). Since nesting female loggerhead sea turtles exhibit nest fidelity, the continued existence of the Northern subpopulation is related to the number of female hatchlings that are produced. Fewer females will limit the number of subsequent offspring produced by the subpopulation.

The Peninsular Florida Recovery Unit is the largest loggerhead nesting assemblage in the Northwest Atlantic. A near-complete nest census (all beaches including index nesting beaches) undertaken from 1989 to 2007 showed a mean of 64,513 loggerhead nests per year, representing approximately 15,735 nesting females per year (NMFS and USFWS 2008). The statewide estimated total for 2010 was 73,702 (Fish and Wildlife Research Institute nesting database). An analysis of index nesting beach data shows a 26 percent decline in nesting by the Peninsular Florida Recovery Unit between 1989 and 2008, and a mean annual rate of decline of 1.6 percent despite a large increase in nesting for 2008, to 38,643 nests (NMFS and USFWS 2008; Witherington et al. 2009), Fish and Wildlife Research Institute nesting database). In 2009, nesting levels, while still higher than the lows of 2004, 2006, and 2007, dropped below 2008 levels to approximately 32,717 nests, but in 2010 a large increase was seen, with 47,880 nests on the index nesting beaches (Fish and Wildlife Research Institute nesting database). The 2010 Florida index nesting number is the largest since 2000. With the addition of data through 2010, the nesting trend for the proposed NWA DPS of loggerheads became only slightly negative and not statistically different from zero (no trend) (NMFS and USFWS 2010). Nesting at the index nesting beaches in 2011 declined from 2010, but was still the second highest since 2001, at 43,595 nests (Florida Wildlife Research Institute nesting database).

The remaining three recovery units - Dry Tortugas, Northern Gulf of Mexico, and Greater Caribbean - are much smaller nesting assemblages but still considered essential to the continued existence of the species. Nesting surveys for the Dry Tortugas recovery unit are conducted as part of Florida’s statewide survey program. Survey effort was relatively stable during the 9-year period from 1995-2004 (although the 2002 year was missed). Nest counts ranged from 168-270, with a mean of 246, but with no detectable trend during this period (NMFS and USFWS 2008). Nest counts for the Northern Gulf of Mexico recovery unit are focused on index beaches rather than all beaches where nesting occurs. Analysis of the 12-year dataset (1997-2008) of index nesting beaches in the area shows a significant declining trend of 4.7 percent annually (NMFS and USFWS 2008). Nesting on the Florida Panhandle index beaches, which represents the majority of Northern Gulf of Mexico recovery unit nesting, had shown a large increase in 2008, but then declined again in 2009 and 2010 before rising back to a level similar to the 2003-2007 average in 2011. Similarly, nesting survey effort has been inconsistent among the Greater Caribbean recovery unit nesting beaches and no trend can be determined for this subpopulation. Zurita et al. (2003) found a statistically significant increase in the number of nests on seven of the beaches on Quintana Roo, Mexico, from 1987-2001, where survey effort was consistent during the period. However, nesting has declined since 2001, and the previously reported increasing trend appears to not have been sustained (NMFS and USFWS 2008).

Determining the meaning of the long-term nesting decline data is confounded by various in-water research that suggests the abundance of neritic juvenile loggerheads is steady or increasing. Ehrhart et al. (2007) found no significant regression-line trend in the long-term dataset. However, notable increases in recent years and a statistically significant increase in catch per unit effort (CPUE) of 102.4 percent from the 4-year period of 1982-1985 to the 2002-2005 periods were found. Epperly et al.(2007) determined the trends of increasing loggerhead catch rates from all the aforementioned studies in combination provide evidence there has been an increase in neritic juvenile loggerhead abundance in the southeastern United States in the recent past. A study led by the South Carolina Department of Natural Resources found that standardized trawl survey CPUEs for loggerheads from South Carolina to North Florida was 1.5 times higher in summer 2008 than summer 2000. However, even though there were persistent inter-annual increases from 2000-2008, the difference was not statistically significant, likely due to the relatively short time series. Comparison to other datasets from the 1950s through 1990s showed much higher CPUEs in recent years regionally and in the South Atlantic Bight, leading South Carolina Department of Natural Resources to conclude that it is highly improbable that CPUE increases of such magnitude could occur without a real and substantial increase in actual abundance (Arendt et al. 2009). Whether this increase in abundance represents a true population increase among juveniles or merely a shift in spatial occurrence is not clear. NMFS and USFWS (2008), citing (Bjorndal et al. 2005), caution about extrapolating localized in-water trends to the broader population and relating localized trends in neritic sites to population trends at nesting beaches. The apparent overall increase in the abundance of neritic loggerheads in the southeastern United States may be due to increased abundance of the largest Stage III individuals (oceanic/neritic juveniles, historically referred to as small benthic juveniles), which could indicate a relatively large cohort that will recruit to maturity in the near future (TEWG 2009). However, in-water studies throughout the eastern United States also indicate a substantial decrease in the abundance of the smallest Stage III loggerheads, a pattern also corroborated by stranding data (TEWG 2009).

The NMFS Southeast Fisheries Science Center (SEFSC) has developed a preliminary stage/age demographic model to help determine the estimated impacts of mortality reductions on loggerhead sea turtle population dynamics (NMFS-SEFSC 2009a). This model does not incorporate existing trends in the data (such as nesting trends) but instead relies on utilizing the available information on the relevant life-history parameters for sea turtles and then predicts future population trajectories based upon model runs using those parameters. Therefore, the model results do not build upon, but instead are complementary to, the trend data obtained through nest counts and other observations. The model uses the range of published information for the various parameters including mortality by stage, stage duration (years in a stage), and fecundity parameters such as eggs per nest, nests per nesting female, hatchling emergence success, sex ratio, and remigration interval. Model runs were done for each individual recovery unit as well as the western North Atlantic population as a whole, and the resulting trajectories were found to be very similar. One of the most robust results from the model was an estimate of the adult female population size for the western North Atlantic in the 2004-2008 timeframe. The distribution resulting from the model runs suggest the adult female population size to be likely between approximately 20,000 to 40,000 individuals, with a low likelihood of being up to 70,000 (NMFS-SEFSC 2009a). A much less robust estimate for total benthic females in the western

North Atlantic was also obtained, with a likely range of approximately 30,000-300,000 individuals, up to less than 1 million (NMFS-SEFSC 2009a).

*Threats*

Loggerhead sea turtles face numerous natural and anthropogenic threats that help shape its status and affect the ability of the species to recover. As many of the threats affecting loggerheads are either the same or similar in nature to threats affecting other listed sea turtle species, many of the threats identified in this section below are discussed in a general sense for all listed sea turtles rather than solely for loggerheads. Threats specific to a particular species are then discussed in the corresponding status sections where appropriate.

The Loggerhead Biological Review Team determined that the greatest threats to the NWA DPS of loggerheads result from cumulative fishery bycatch in neritic and oceanic habitats (Conant et al. 2009). Domestic fishery operations often capture, injure, and kill sea turtles at various life stages. Loggerheads in the pelagic environment are exposed to U.S. Atlantic pelagic longline fisheries. Although loggerhead sea turtles are most vulnerable to pelagic longlines during their immature life history stage, there is some evidence that benthic juveniles may also be captured, injured, or killed by pelagic fisheries as well (Lewison et al. 2004). Southeast U.S. shrimp fisheries have historically been the largest fishery threat to benthic sea turtles in the southeastern United States, and continue to interact with and kill large numbers of turtles each year. Loggerheads in the benthic environment in waters off the coastal United States are exposed to a suite of other fisheries in federal and state waters including trawl, gillnet, purse seine, hook-and-line, including bottom longline and vertical line (e.g., bandit gear, handline, and rod-reel), pound net, and trap fisheries (refer to the *Environmental Baseline* section of this opinion for more specific information regarding federal and state managed fisheries affecting sea turtles within the action area). In addition to domestic fisheries, sea turtles are subject to direct as well as incidental capture in numerous foreign fisheries, further exacerbating the ability of sea turtles to survive and recover on a global scale. For example, pelagic, immature loggerhead sea turtles circumnavigating the Atlantic are exposed to international longline fisheries including the Azorean, Spanish, and various other fleets (Aguilar et al. 1995; Bolten et al. 1994; Crouse 1999). Bottom set lines in the coastal waters of Madeira, Portugal, are reported to take an estimated 500 pelagic immature loggerheads each year (Dellinger and Encarnaçâo 2000) and gillnet fishing is known to occur in many foreign waters, including (but not limited to) the northwest Atlantic, western Mediterranean, South America, West Africa, Central America, and the Caribbean. Shrimp trawl fisheries are also occurring off the shores of numerous foreign countries and pose a significant threat to sea turtles similar to the impacts seen in U.S. waters. Many unreported takes or incomplete records by foreign fleets, making it difficult to characterize the total impact that international fishing pressure is having on listed sea turtles. Nevertheless, international fisheries represent a continuing threat to sea turtle survival and recovery throughout their respective ranges.

There are also many non-fishery impacts affecting the status of sea turtle species, both in the marine and terrestrial environment. In nearshore waters of the United States, the construction and maintenance of Federal navigation channels has been identified as a source of sea turtle mortality. Hopper dredges, which are frequently used in ocean bar channels and sometimes in harbor channels and offshore borrow areas, move relatively rapidly and can entrain and kill sea turtles (NMFS 1997a). Sea turtles entering coastal or inshore areas have been affected by entrainment in the cooling-water systems of electrical generating plants. Other nearshore threats include harassment and/or injury resulting from private and commercial vessel operations, military detonations and training exercises, and scientific research activities.

Coastal development can deter or interfere with nesting, affect nesting success, and degrade nesting habitats for sea turtles. Structural impacts to nesting habitat include the construction of buildings and pilings, beach armoring and renourishment, and sand extraction (Bouchard et al. 1998; Lutcavage et al. 1997). These factors may directly, through loss of beach habitat, or indirectly, through changing thermal profiles and increasing erosion, serve to decrease the amount of nesting area available to females and may change the natural behaviors of both adults and hatchlings (Ackerman 1997; Witherington et al. 2003; Witherington et al. 2007). In addition, coastal development is usually accompanied by artificial lighting which has been known to alter the behavior of nesting adults (Witherington 1992) and is often fatal to emerging hatchlings that are drawn away from the water (Witherington and Bjorndal 1991).

Predation by various land predators is a threat to developing nests and emerging hatchlings. Additionally, direct harvest of eggs and adults from beaches in foreign countries continues to be a problem for various sea turtle species throughout their ranges (NMFS and USFWS 2008).

Multiple municipal, industrial, and household sources, as well as atmospheric transport, introduce various pollutants such as pesticides, hydrocarbons, organochlorides [e.g., dichlorodiphenyltrichloroethane (DDT) and polychlorinated biphenyl (PCBs)], and others that may cause adverse health effects to sea turtles (Garrett 2004; Grant and Ross 2002; Hartwell 2004; Iwata et al. 1993). Loggerheads may be particularly affected by organochlorine contaminants as they were observed to have the highest organochlorine contaminant concentrations in sampled tissues (Storelli et al. 2008). It is thought that dietary preferences were likely to be the main differentiating factor among species. Storelli et al. (2008) analyzed tissues from stranded loggerhead sea turtles and found that mercury accumulates in sea turtle livers while cadmium accumulates in their kidneys, as has been reported for other marine organisms like dolphins, seals and porpoises (Law et al. 1991). Recent efforts have led to improvements in regional water quality in the action area, although the more persistent chemicals are still detected and are expected to endure for years (Grant and Ross 2002; Mearns 2001). Acute exposure to hydrocarbons from petroleum products released into the environment via oil spills and other discharges may directly injure individuals through skin contact with oils (Geraci 1990), inhalation at the water's surface and ingesting compounds while feeding (Matkin and Saulitis 1997). Hydrocarbons also have the potential to impact prey populations, and therefore may affect listed species indirectly by reducing food availability in the action area. In 2010, there was a massive oil spill in the Gulf of Mexico at British Petroleum's Deepwater Horizon (DWH) well. Official estimates are that millions of barrels of oil were released into the Gulf, with some experts estimating even higher volumes. At this time the assessment of total direct impact to sea turtles has not been determined. Additionally, the long-term impacts to sea turtles as a result of habitat impacts, prey loss, and subsurface oil particles and oil components broken down through physical, chemical, and biological processes are not known.

There is a large and growing body of literature on past, present, and future impacts of global climate change, exacerbated and accelerated by human activities. Some of the likely effects commonly mentioned are sea level rise, increased frequency of severe weather events, and change in air and water temperatures. National Ocean and Atmospheric Association's (NOAA) climate information portal provides basic background information on these and other measured or anticipated effects (see http://www.climate.gov).

Climate change impacts on sea turtles currently cannot, for the most part, be predicted with any degree of certainty; however significant impacts to the hatchling sex ratios of loggerhead turtles may result (NMFS and USFWS 2007c). In marine turtles, sex is determined by temperature in the middle third of incubation with female offspring produced at higher temperatures and males at lower temperatures within a thermal tolerance range of 25°-35°C (Ackerman 1997). Increases in global temperature could potentially skew future sex ratios toward higher numbers of females (NMFS and USFWS 2007c). Modeling suggests an increase of 2°C in air temperature would result in a sex ratio of over 80 percent female offspring for loggerheads nesting near Southport, North Carolina. The same increase in air temperatures at nesting beaches in Cape Canaveral, Florida, would result in close to 100 percent female offspring. More ominously, an air temperature increase of 3°C is likely to exceed the thermal threshold of most clutches, leading to death (Hawkes et al. 2007). Warmer sea surface temperatures have been correlated with an earlier onset of loggerhead nesting in the spring (Hawkes et al. 2007; Weishampel et al. 2004), as well as short inter-nesting intervals (Hays et al. 2002) and shorter nesting season (Pike et al. 2006).

The effects from increased temperatures may be exacerbated on developed nesting beaches where shoreline armoring and construction have denuded vegetation. Erosion control structures could potentially result in the permanent loss of nesting beach habitat or deter nesting females (NRC 1990). These impacts will be exacerbated by sea level rise. If females nest on the seaward side of the erosion control structures, nests may be exposed to repeated tidal overwash (NMFS and USFWS 2007c). Sea level rise from global climate change is also a potential problem for areas with low-lying beaches where sand depth is a limiting factor, as the sea may inundate nesting sites and decrease available nesting habitat (Baker et al. 2006; Daniels et al. 1993; Fish et al. 2005). The loss of habitat as a result of climate change could be accelerated due to a combination of other environmental and oceanographic changes such as an increase in the frequency of storms and/or changes in prevailing currents, both of which could lead to increased beach loss via erosion (Antonelis et al. 2006; Baker et al. 2006).

Other changes in the marine ecosystem caused by global climate change (e.g., ocean acidification, salinity, oceanic currents, dissolved oxygen levels, nutrient distribution, etc.) could influence the distribution and abundance of phytoplankton, zooplankton, submerged aquatic vegetation, crustaceans, mollusks, forage fish, etc., which could ultimately affect the primary foraging areas of sea turtles.

Actions have been taken to reduce anthropogenic impacts to loggerhead sea turtles from various sources, particularly since the early 1990s. These include lighting ordinances, predation control, and nest relocations to help increase hatchling survival, as well as measures to reduce the mortality of pelagic immatures, benthic immatures, and sexually mature age classes from various fisheries and other marine activities. Recent actions have taken significant steps towards reducing the recurring sources of mortality of sea turtles in the environmental baseline and improving the status of all loggerhead subpopulations. For example, the Turtle Excluder Device (TED) regulation published on February 21, 2003 (68 FR 8456), represents a significant improvement in the baseline effects of trawl fisheries on loggerhead sea turtles, though shrimp trawling is still considered to be one of the largest source of anthropogenic mortality on loggerheads (NMFS-SEFSC 2009a).

### 3.2.2 Green Sea Turtle

The green sea turtle was listed as threatened under the ESA on July 28, 1978, except for the Florida and Pacific coast of Mexico breeding populations which were listed as endangered. Critical habitat for the green sea turtle has been designated on September 2, 1998, for the waters surrounding Isla Culebra, Puerto Rico, and its associated keys. No critical habitat exists in the action area for this consultation.

*Species Description, Distribution, and Population Structure*
Green sea turtles have a smooth carapace with four pairs of lateral (or costal) scutes and a single pair of elongated prefrontal scales between the eyes. They typically have a black dorsal surface and a white ventral surface although the carapace of green sea turtles in the Atlantic Ocean has been known to change in color from solid black to a variety of shades of grey, green, brown and black in starburst or irregular patterns (Lagueux 2001).

Green sea turtles are distributed circumglobally, mainly in waters between the northern and southern 20$^{o}$ C isotherms (Hirth 1971) and nesting occurs in more than 80 countries worldwide (Hirth and USFWS 1997). The two largest nesting populations are found at Tortuguero, on the Caribbean coast of Costa Rica, and Raine Island, on the Great Barrier Reef in Australia. The complete nesting range of green sea turtles within the southeastern United States includes sandy beaches of mainland shores, barrier islands, coral islands, and volcanic islands between Texas and North Carolina as well as the U.S. Virgin Island and Puerto Rico (Dow et al. 2007; NMFS and USFWS 1991). However, the vast majority of green sea turtle nesting within the southeastern United States occurs in Florida (Johnson and Ehrhart 1994; Meylan et al. 1995). Principal U.S. nesting areas for green sea turtles are in eastern Florida, predominantly Brevard through Broward counties. For more information on green sea turtle nesting in other ocean basins, refer to the 1991 Recovery Plan for the Atlantic Green Turtle (NMFS and USFWS 1991) or the 2007 Green Sea Turtle 5-Year Status Review (NMFS and USFWS 2007a).

In U.S. Atlantic and Gulf of Mexico waters, green turtles are found in inshore and nearshore waters from Texas to Massachusetts. Principal benthic foraging areas in the southeastern United States include Aransas Bay, Matagorda Bay, Laguna Madre, and the Gulf inlets of Texas (Doughty 1984; Hildebrand 1982; Shaver 1994), the Gulf of Mexico off Florida from Yankeetown to Tarpon Springs (Caldwell and Carr 1957; Carr 1984), Florida Bay and the Florida Keys (Schroeder and Foley 1995), the Indian River Lagoon system in Florida (Ehrhart 1983), and the Atlantic Ocean off Florida from Brevard through Broward Counties (Guseman and Ehrhart 1992; Wershoven and Wershoven 1992). The summer developmental habitat for green turtles also encompasses estuarine and coastal waters from North Carolina to as far north as Long Island Sound (Musick and Limpus 1997). Additional important foraging areas in the western Atlantic include the Culebra archipelago and other Puerto Rico coastal waters, the south coast of Cuba, the Mosquito Coast of Nicaragua, the Caribbean coast of Panama, scattered areas along Colombia and Brazil (Hirth 1971), and the northwestern coast of the Yucatan Peninsula.

Adults of both sexes are presumed to migrate between nesting and foraging habitats along corridors adjacent to coastlines and reefs (Hays et al. 2001) and, like loggerheads, are known to migrate from northern areas in the summer back to warmer southern waters to the south in the fall and winter to avoid seasonally cold seawater temperatures. In terms of genetic structure, regional subpopulations show distinctive mitochondrial DNA properties for each nesting rookery (Bowen et al. 1992; Fitzsimmons et al. 2006). Despite the genetic differences, turtles from separate nesting origins are commonly found mixed together on foraging grounds throughout the species' range. However, such mixing occurs at extremely low levels in Hawaiian foraging areas, perhaps making this central Pacific population the most isolated of all green turtle populations occurring worldwide (Dutton et al. 2008).

*Life History Information*

Green sea turtles exhibit particularly slow growth rates [about 1-5 centimeters per year (Green 1993; McDonald-Dutton and Dutton 1998)] and also have one of the longest ages to maturity of any sea turtle species [i.e., 20-50 years (Chaloupka and Musick 1997; Hirth and USFWS 1997)]. The slow growth rates are believed to be a consequence of their largely herbivorous, low-net energy diet (Bjorndal 1982). Upon reaching sexual maturity, females begin returning to their natal beaches (i.e., the same beaches where they were hatched) to lay eggs (Balazs 1982; Frazer and Ehrhart 1985) and are capable of migrating significant distances (hundreds to thousands of kilometers) between foraging and nesting areas. While females lay eggs every 2-4 years, males are known to reproduce every year (Balazs 1983).

Green sea turtle mating occurs in the waters off nesting beaches. In the southeastern United States, females generally nest between June and September, and peak nesting occurs in June and July (Witherington and Ehrhart 1989). During the nesting season, females nest at approximately two-week intervals, laying an average of 3-4 clutches (Johnson and Ehrhart 1996). Clutch size often varies among subpopulations, but mean clutch size is around 110-115 eggs. In Florida, green sea turtle nests contain an average of 136 eggs (Witherington and Ehrhart 1989), which will incubate for approximately two months before hatching. Survivorship at any particular nesting site is greatly influenced by the level of anthropogenic stressors, with the more pristine and less disturbed nesting sites (e.g., Great Barrier Reef in Australia) showing higher survivorship values than nesting sites known to be highly disturbed (e.g., Nicarauga) (Campbell and Lagueux 2005; Chaloupka and Limpus 2005). After emerging from the nest, hatchlings swim to offshore areas and go through a posthatchling pelagic stage where they are believed to live for several years, feeding close to the surface on a variety of marine algae and other life associated with drift lines and other debris. This early oceanic phase remains one of the most poorly understood aspects of green turtle life history (NMFS and USFWS 2007b). However, at approximately 20- to 25-centimeter caprapace length, juveniles leave pelagic habitats and enter benthic foraging habitats. Growth studies using skeletochronology indicate that for green sea turtles in the Western Atlantic shift from the oceanic phase to nearshore development habitats (protected lagoons and open coastal areas rich in sea grass and marine algae) after approximately

5-6 years (Bresette et al. 2006; Zug and Glor 1998). As adults, they feed almost exclusively on sea grasses and algae in shallow bays, lagoons, and reefs (Rebel and Ingle 1974) although some populations are known to also feed heavily on invertebrates (Carballo et al. 2002). While in coastal habitats, green sea turtles exhibit site fidelity to specific foraging and nesting grounds and it is clear they are capable of "homing in" on these sites if displaced (McMichael et al. 2003). Reproductive migrations of Florida green turtles have been identified through flipper tagging and/or satellite telemetry. Based on these studies, the majority of adult female Florida green turtles are believed to reside in nearshore foraging areas throughout the Florida Keys from Key Largo to the Dry Tortugas and in the waters southwest of Cape Sable, Florida, with some post-nesting turtles also residing in Bahamian waters as well (NMFS and USFWS 2007b).

*Abundance and Trends*
A summary of nesting trends is provided in the most recent 5-year status review for the species (NMFS and USFWS 2007b) in which the authors collected and organized abundance data from 46 individual nesting concentrations organized by ocean region (i.e., Western Atlantic Ocean, Central Atlantic Ocean, Eastern Atlantic Ocean, Mediterranean Sea, Western Indian Ocean, Northern Indian Ocean, Eastern Indian Ocean, Southeast Asia, Western Pacific Ocean, Central Pacific Ocean, and Eastern Pacific Ocean). The authors were able to determine trends at 23 of the 46 nesting sites and found that 10 appeared to be increasing, 9 appeared to be stable, and 4 appeared to be decreasing. With respect to regional trends, the Pacific, the Western Atlantic, and the Central Atlantic regions appeared to show more positive trends (i.e., more nesting sites increasing than decreasing) while the Southeast Asia, Eastern Indian Ocean, and possibly the Mediterranean Sea regions appeared to show more negative trends (i.e., more nesting sites decreasing than increasing). These regional determinations should be viewed with caution since trend data was only available for about half of the total nesting concentration sites examined in the review and that site specific data availability appeared to vary across all regions.

The western Atlantic region (focus of this opinion) was one of the best performing in terms of abundance in the entire review as there were no sites that appeared to be decreasing. The 5-year status review for the species identified eight geographic areas considered to be primary sites for green sea turtle nesting in the Atlantic/Caribbean and reviewed the trend in nest count data for each (NMFS and USFWS 2007a). These sites include (1) Yucatán Peninsula, Mexico; (2) Tortuguero, Costa Rica; (3) Aves Island, Venezuela; (4) Galibi Reserve, Suriname; (5) Isla Trindade, Brazil; (6) Ascension Island, United Kingdom; (7) Bioko Island, Equatorial Guinea; and (8) Bijagos Achipelago, Guinea-Bissau. Nesting at all of these sites was considered to be stable or increasing with the exception of Bioko Island and the Bijagos Archipelago where the lack of sufficient data precluded a meaningful trend assessment for either site (NMFS and USFWS 2007a). Seminoff (2004) likewise reviewed green sea turtle nesting data for eight sites in the western, eastern, and central Atlantic, including all of the above with the exception that nesting in Florida was reviewed in place of Isla Trindade, Brazil. Seminoff (2004) concluded that all sites in the central and western Atlantic showed increased nesting, with the exception of nesting at Aves Island, Venezuela, while both sites in the eastern Atlantic demonstrated decreased nesting. These sites are not inclusive of all green sea turtle nesting in the Atlantic. However, other sites are not believed to support nesting levels high enough that would change the overall status of the species in the Atlantic (NMFS and USFWS 2007a). More information about site specific trends for the other major ocean regions can be found in the most recent 5-year status review for the species [see NMFS and USFWS (2007a)].

By far, the largest known nesting assemblage in the western Atlantic region occurs at Tortuguero, Costa Rica. According to monitoring data on nest counts as well as documented emergences (both nesting and non-nesting events), there appears to be an increasing trend in this nesting assemblage since monitoring began in the early 1970s. For instance, from 1971-1975 there were approximately 41,250 average emergences documented per year and this number increased to an average of 72,200 emergences documented per year from 1992-1996 (Bjorndal et al. 1999). Troëng and Rankin (Troëng and Rankin 2005) collected nest counts from 1999-2003 and also reported increasing trends in the population consistent with the earlier studies, with nest count data suggesting 17,402-37,290 females per year (NMFS and USFWS 2007a). Modeling by (Chaloupka et al. 2008) using data sets of 25 years or more resulted in an estimate of the Tortuguero, Costa Rica, population growing at 4.9 percent annually. The number of females nesting per year on beaches in the Yucatán, Aves Island, Galibi Reserve, and Isla Trindade number in the hundreds to low thousands, depending on the site (NMFS and USFWS 2007a).

In the continental United States, green turtle nesting occurs along the Atlantic coast, primarily along the central and southeast coast of Florida where an estimated 200-1,100 females nest each year (Meylan et al. 1994; Weishampel et al. 2003). Occasional nesting has also been documented along the Gulf coast of Florida as well as the beaches on the Florida Panhandle (Meylan et al. 1995). More recently, green turtle nesting occurred on Bald Head Island, North Carolina; just east of the mouth of the Cape Fear River; on Onslow Island; and on Cape Hatteras National Seashore. In 2010, a total of 18 nests were found in North Carolina, 6 nests in South Carolina, and 6 nests in Georgia (nesting databases maintained on www.seaturtle.org). Increased nesting has also been observed along the Atlantic coast of Florida, on beaches where only loggerhead nesting was observed in the past (Pritchard 1997).

In Florida, index beaches were established to standardize data collection methods and effort on key nesting beaches. Since establishment of the index beaches in 1989 up until recently, the pattern of green turtle nesting has shown biennial peaks in abundance with a generally positive trend during the ten years of regular monitoring. According to data collected from Florida's index nesting beach survey from 1989-2011, green turtle nest counts across Florida have increased approximately tenfold from a low of 267 in the early 1990's to a high of 10,701 in 2011. In 2007, there were 9,455 green turtle nests found just on index nesting beaches, the highest since index beach monitoring began in 1989. The number fell back to 6,385 in 2008 and dropped under 3,000 in 2009, at first causing some concern, but 2010 saw an increase back to 8,426 nests on the index nesting beaches and then the high of 10,701was measured in 2011 (FWC Index Nesting Beach Survey Database). Modeling by (Chaloupka and Balazs 2007) using data sets of 25 years or more has resulted in an estimate of the Florida nesting stock at the Archie Carr National Wildlife Refuge growing at an annual rate of 13.9 percent.

There are no reliable estimates of the number of immature green sea turtles that inhabit coastal areas of the southeastern United States, where they come to forage. Ehrhart et al. (2007) have documented a significant increase in in-water abundance of green turtles in the Indian River Lagoon area. It is likely that immature green sea turtles foraging in the southeastern United

States come from multiple genetic stocks; therefore, the status of immature green sea turtles in the southeastern United States might also be assessed from trends at all of the main regional nesting beaches, principally Florida, Yucatán, and Tortuguero.

*Threats*
The principal cause of past declines and extirpations of green sea turtle assemblages has been the overexploitation of green sea turtles for food and other products. Although intentional take of green sea turtles and their eggs is not extensive within the southeastern United States, green sea turtles that nest and forage in the region may spend large portions of their life history outside the region and outside U.S. jurisdiction, where exploitation is still a threat. There are also significant and ongoing threats to green sea turtles from human-related causes in the United States. Similar to that described in more detail above for loggerhead sea turtles, these threats include beach armoring, erosion control, artificial lighting, beach disturbance (e.g., driving on the beach), pollution, foraging habitat loss as a result of direct destruction by dredging, siltation, boat damage, interactions with fishing gear, and oils spills.

Fibropapillomatosis disease is an increasing threat to green sea turtles. Presently, this disease is cosmopolitan and has been found to affect large numbers of animals in some areas, including Hawaii and Florida (Herbst 1994; Jacobson 1990; Jacobson et al. 1991). Other sources of natural mortality include cold-stunning and biotoxin exposure. Cold-stunning is not considered a major source of mortality in most cases. As temperatures fall below 8°-10°C, turtles may lose their ability to swim and dive, often floating to the surface. The rate of cooling that precipitates cold-stunning appears to be the primary threat, rather than the water temperature itself (Milton and Lutz 2003). Sea turtles that overwinter in inshore waters are most susceptible to cold-stunning because temperature changes are most rapid in shallow water (Witherington and Ehrhart 1989). During January 2010, an unusually large cold-stunning event in the southeastern United States resulted in around 4,600 sea turtles, mostly greens, found cold-stunned, with hundreds found dead or dying. A large cold-stunning event occurred in the western Gulf of Mexico in February 2011, resulting in approximately 1650 green turtles being found cold-stunned in Texas. Of these, approximately 620 were found dead or died after stranding and approximately 1030 were rehabilitated and released. Additionally, during this same time frame, approximately 340 green turtles were found cold-stunned in Mexico, with approximately 300 of those reported as being subsequently released.

The likely effects of global climate change discussed previously for loggerheads also apply to green turtles. Additionally, green sea turtle hatchling size also appears to be influenced by incubation temperatures, with smaller hatchlings produced at higher temperatures (Glen et al. 2003).

### 3.2.3 Leatherback Sea Turtle

The leatherback sea turtle was listed as endangered throughout its entire range on June 2, 1970 (35 FR 8491) under the Endangered Species Conservation Act of 1969, a precursor to the ESA. Critical habitat was designated in 1979 in coastal waters adjacent to Sandy Point, St. Croix, U.S. Virgin Islands. Designation of critical habitat in the Pacific Ocean occurred on January 26, 2012 (77 FR 4170). This designation includes approximately 16,910 square miles (43,798 square km) stretching along the California coast from Point Arena to Point Arguello east of the 3,000 meter depth contour; and 25,004 square miles (64,760 square kilometers) stretching from Cape Flattery, Washington to Cape Blanco, Oregon east of the 2,000 meter depth contour.

*Species Description, Distribution, and Population Structure*

The leatherback is the largest sea turtle in the world. Mature males and females can reach lengths of over 2 meters and weigh close to 900 kilograms (or 2000 pounds). The leatherback is the only sea turtle that lacks a hard, bony shell. A leatherback's carapace is approximately 4 centimeters thick and consists of a leathery, oil-saturated connective tissue overlaying loosely interlocking dermal bones. The ridged carapace and large flippers are characteristics that make the leatherback uniquely equipped for long distance foraging migrations. Leatherbacks lack the crushing chewing plates characteristic of sea turtles that feed on hard-bodied prey (Pritchard 1971). Instead, they have pointed toothlike cusps and sharp edged jaws that are perfectly adapted for a diet of soft-bodied pelagic (open ocean) prey, such as jellyfish and salps. A leatherback's mouth and throat also have backward-pointing spines that help retain gelatinous prey.

The leatherback sea turtle ranges farther than any other sea turtle species, exhibiting broad thermal tolerances (NMFS and USFWS 1995). They forage in temperate and subpolar regions between latitudes 71º N and 47º S in all oceans and undergo extensive migrations to and from their tropical nesting beaches. In the Atlantic Ocean, leatherbacks have been recorded as far north as Newfoundland, Canada, and Norway, and as far south as Uruguay, Argentina, and South Africa (NMFS-SEFSC 2001). Female leatherbacks nest from the southeastern United States to southern Brazil in the western Atlantic and from Mauritania to Angola in the eastern Atlantic. The most significant nesting beaches in the Atlantic, and perhaps in the world, are located in French Guiana and Suriname (NMFS-SEFSC 2001).

Previous genetic analyses of leatherbacks using only mitochondrial DNA (mtDNA) suggested that within the Atlantic basin there were at least three genetically distinct nesting populations: the St. Croix nesting population (U.S. Virgin Islands), the mainland nesting Caribbean population (Florida, Costa Rica, Suriname/French Guiana), and the Trinidad nesting population (Dutton et al. 1998). Further genetic analyses using microsatellite markers along with the mtDNA data and tagging data has resulted in Atlantic Ocean leatherbacks now being divided into seven groups or breeding populations: Florida, Northern Caribbean, Western Caribbean, Southern Caribbean/Guianas, West Africa, South Africa, and Brazil (TEWG 2007). General differences in migration patterns and foraging grounds may occur between the seven nesting assemblages, although data to support this is limited in most cases.

*Life History Information*

Leatherbacks are a long-lived sea turtle species, with some individuals reaching 30 years of age or older. Past estimates showed that they reached sexual maturity faster than most other sea turtle species as Rhodin (1985) reported maturity for leatherbacks occurring at 3-6 years of age while Zug and Parham (1996) reported maturity occurring at 13-14 years of age. More recent research using sophisticated methods of analyzing leatherback ossicles has cast doubt on the previously accepted age to maturity figures, with leatherbacks in the western North Atlantic possibly not reaching sexual maturity until as late as 29 years of age (Avens and Goshe 2007).

Female leatherbacks lay up to 10 nests during the nesting season (March through July in the United States) at 2-3 year intervals. They produce 100 eggs or more in each clutch and, thus, can produce 700 eggs or more per nesting season (Schultz 1975). However, a significant portion (up to approximately 30 percent) of the eggs can be infertile. Thus, the actual proportion of eggs that can result in hatchlings is less than this seasonal estimate. After 60-65 days, leatherback hatchlings with white striping along the ridges of their backs and on the margins of the flippers emerge from the nest. Leatherback hatchlings are approximately 50-77 centimeters in length, with fore flippers as long as their bodies, and weigh approximately 40-50 g. Although leatherbacks forage in coastal waters, they appear to remain primarily pelagic through all life stages (Heppell et al. 2003). Eckert (1999) found that leatherback juveniles remain in waters warmer than 26ºC until they exceed 100 centimeters in length. The location and abundance of prey, including medusae, siphonophores, and salpae, in temperate and boreal latitudes likely has a strong influence on leatherback distribution in these areas (Plotkin 1995). Leatherbacks are known to be deep divers, with recorded depths in excess of a half mile (Eckert et al. 1989), but may also come into shallow waters to locate prey items.

*Abundance and Trends*

The status of the Atlantic leatherback population has been less clear than the Pacific population, which has shown dramatic declines at many nesting sites (Sarti Martínez et al. 2007; Spotila et al. 2000). This uncertainty has been a result of inconsistent beach and aerial surveys, cycles of erosion and reformation of nesting beaches in the Guianas (representing the largest nesting area), a lesser degree of nest-site fidelity than occurs with the hardshell sea turtle species, and inconsistencies in the availability and analyses of data. However, coordinated efforts at data collection and analyses by the Leatherback Turtle Expert Working Group have helped to clarify the understanding of the Atlantic population status (TEWG 2007).

The Southern Caribbean/Guianas stock is the largest known Atlantic leatherback nesting aggregation (TEWG 2007). This area includes the Guianas (Guyana, Suriname, and French Guiana), Trinidad, Dominica, and Venezuela, with the vast majority of the nesting occurring in the Guianas and Trinidad. Past analyses had shown that the nesting aggregation in French Guiana had been declining at about 15 percent per year since 1987 (NMFS-SEFSC 2001). However, from 1979-1986, the number of nests was increasing at about 15 percent annually, which could mean that the observed decline could be part of a nesting cycle that coincides with the erosion cycle of Guiana beaches described by Schultz (1975). It is thought that the cycle of erosion and reformation of beaches has resulted in shifting nesting beaches throughout this region. This was supported by the increased nesting seen in Suriname, where leatherback nest numbers had shown large increases concurrent with declines elsewhere (with more than 10,000 nests per year since 1999 and a peak of 30,000 nests in 2001), and the long-term trend for the overall Suriname and French Guiana population was thought to possibly show an increase [(Girondot et al. 2002) in (Hilterman and Goverse 2003)]. In the past, many sea turtle scientists have agreed that the Guianas (and some would include Trinidad) should be viewed as one population and that a synoptic evaluation of nesting at all beaches in the region is necessary to develop a true picture of population status (Reichart et al. 2001). Genetics studies have added support to this notion and have resulted in the designation of the Southern Caribbean/Guianas stock. Using both Bayesian modeling and regression analyses, the Turtle Expert Working Group (TEWG 2007) determined that the Southern Caribbean/Guianas stock had demonstrated a long-term, positive population growth rate (using nesting females as a proxy for population). This positive growth was seen within major nesting areas for the stock, including Trinidad, Guyana, and the combined beaches of Suriname and French Guiana (TEWG 2007).

The Western Caribbean stock includes nesting beaches from Honduras to Colombia. The most intense nesting in that area occurs in Costa Rica, Panama, and the Gulf of Uraba in Colombia (Duque et al. 2000). The Caribbean coast of Costa Rica and extending through Chiriquí Beach, Panama, represents the fourth largest known leatherback rookery in the world (Troëng et al. 2004). Examination of data from three index nesting beaches in the region (Tortuguero, Gandoca, and Pacuare in Costa Rica) using various Bayesian and regression analyses indicated that the nesting population likely was not growing over the 1995-2005 time series of available data (TEWG 2007). Other modeling of the nesting data for Tortuguero indicates a possible 67.8 percent decline between 1995 and 2006 (Troëng and Chaloupka 2007).

Nesting data for the Northern Caribbean stock is available from Puerto Rico, the U.S. Virgin Islands (St. Croix), and the British Virgin Islands (Tortola). In Puerto Rico, the primary nesting beaches are at Fajardo and on the island of Culebra. Nesting between 1978 and 2005 has ranged between 469-882 nests, and the population has been growing since 1978, with an overall annual growth rate of 1.1 percent (TEWG 2007). At the primary nesting beach on St. Croix, the Sandy Point National Wildlife Refuge, nesting has fluctuated from a few hundred nests to a high of 1,008 in 2001, and the average annual growth rate has been approximately 1.1 percent from 1986-2004 (TEWG 2007). Nesting in Tortola is limited, but has been increasing from 0-6 nests per year in the late 1980s to 35-65 per year in the 2000s, with an annual growth rate of approximately 1.2 percent between 1994 and 2004 (TEWG 2007).

The Florida nesting stock nests primarily along the east coast of Florida. This stock is of growing importance, with total nests between 800-900 per year in the 2000s following nesting totals fewer than 100 nests per year in the 1980s (Florida Fish and Wildlife Conservation Commission, unpublished data). Using data from the index nesting beach surveys, the TEWG (TEWG 2007) estimated a significant annual nesting growth rate of 1.17 percent between 1989 and 2005. In 2007, a record 517 leatherback nests were observed on the index beaches in Florida, followed by 265 nests in 2008, a record 615 nests in 2009, a slight decline to 552 nests in 2010, and then a new record of 625 nests in 2011 (FWC Index Nesting Beach Survey Database). This up-and-down pattern is thought to be a result of the cyclical nature of leatherback nesting, similar to the biennial cycle of green turtle nesting, but overall the trend shows rapid growth on Florida's east coast beaches.

The West African nesting stock of leatherbacks is a large, important, but mostly unstudied aggregation. Nesting occurs in various countries along Africa's Atlantic coast, but much of the nesting is undocumented and the data are inconsistent. However, it is known that Gabon has a very large amount of leatherback nesting, with at least 30,000 nests laid along its coast in one season (Fretey et al. 2007). Fretey et al. (2007) also provide detailed information about other known nesting beaches and survey efforts along the Atlantic African coast. Because of the lack of consistent effort and minimal available data, trend analyses were not possible for this stock (TEWG 2007).

Two other small but growing nesting stocks utilize the beaches of Brazil and South Africa. For the Brazilian stock, the TEWG (TEWG 2007) analyzed the available data and determined that between 1988 and 2003 there was a positive annual average growth rate of 1.07 percent using regression analyses and 1.08 percent using Bayesian modeling. The South African stock has an annual average growth rate of 1.06 based on regression modeling and 1.04 percent using the Bayesian approach (TEWG 2007).

Estimates of total population size for Atlantic leatherbacks are difficult to ascertain due to the inconsistent nature of the available nesting data. In 1996, the entire Western Atlantic population was characterized as stable at best (Spotila et al. 1996), with numbers of nesting females reported to be on the order of 18,800. Spotila et al. (1996) estimated that the leatherback population for the entire Atlantic basin, including all nesting beaches in the Americas, the Caribbean, and West Africa, totaled approximately 27,600 adult females (considering both nesting and interesting females), with an estimated range of 20,082-35,133. This is consistent with the estimate of 34,000-95,000 total adults (20,000-56,000 adult females; 10,000-21,000 nesting females) determined by the TEWG (TEWG 2007).

*Threats*

Anthropogenic impacts to the leatherback population are similar to those facing other sea turtle species including interactions with fishery gear, marine pollution, destruction of foraging habitat, and threats to nesting beaches (see loggerhead status and trends section for more information on these threats). Of all the extant sea turtle species, leatherbacks seem to be the most vulnerable to entanglement in fishing gear, especially gillnet and pot/trap lines used in various fisheries around the world. This susceptibility may be the result of their body type (large size, long pectoral flippers, and lack of a hard shell), their attraction to gelatinous organisms and algae that collect on buoys and buoy lines at or near the surface, their method of locomotion, and/or perhaps their attraction to the lightsticks used to attract target species in longline fisheries. From 1990-2000, 92 entangled leatherbacks were reported from New York through Maine and many other stranded individuals exhibited evidence of prior entanglement (Dwyer et al. 2002). For many years, the use of turtle excluder devices (TEDs) required for use in many U.S. fisheries were less effective at excluding the larger leatherback sea turtles compared to the smaller, hard-shelled turtle species. However, modifications to the design of TEDs have been required since 2003 that are expected to have reduced the amount of leatherback deaths that result from net capture. Zug and Parham (1996) point out that a combination of the loss of long-lived adults in fishery-related mortalities and a lack of recruitment from intense egg harvesting in some areas has caused a sharp decline in leatherback sea turtle populations and represents a significant threat to survival and recovery of the species worldwide. Leatherback sea turtles may also be more susceptible to marine debris ingestion than other sea turtle species due to their predominantly pelagic existence and the tendency of floating debris to concentrate in convergence zones that adults and juveniles use for feeding and migratory purposes (Lutcavage et al. 1997; Shoop and Kenney 1992).

Investigations of the stomach contents of leatherback sea turtles revealed that a substantial percentage (44 percent of the 16 cases examined) contained some form of plastic debris (Mrosovsky 1981). The presence of plastic in the digestive tract suggests that leatherbacks might not be able to distinguish between prey items and forms of debris such a plastic bags (Mrosovsky et al. 2009). Balazs (1985) speculated that the object might resemble a food item by its shape, color, size or even movement as it drifts about, and induce a feeding response in leatherbacks. Just as with other sea turtles, nesting and foraging leatherback sea turtles are subjected to the effects from past and present oil spills occurring in the Gulf of Mexico and other regions (see loggerhead sea turtle status section for more information). At the time of this consultation, no confirmed deaths of leatherbacks have been recorded in the vicinity of the DWH spill site, although this does not mean that no mortality has occurred (NMFS et al. 2011).

As discussed in more detail in the loggerhead section above, global climate change can be expected to have various impacts on all sea turtles, including leatherbacks. Global climate change is likely to also influence the distribution and abundance of jellyfish, the primary prey item of leatherbacks (NMFS and USFWS 2007c). Several studies have shown leatherback distribution is influenced by jellyfish abundance [e.g., (Houghton et al. 2006; Witt et al. 2006; Witt et al. 2007)]; however, more studies need to be done to monitor how changes to prey items affect distribution and foraging success of leatherbacks so that population-level effects can be determined.

### 3.2.4 Hawksbill Sea Turtle

The hawksbill sea turtle was listed as endangered throughout its entire range on June 2, 1970 (35 FR 8491) under the Endangered Species Conservation Act of 1969, a precursor to the ESA. Critical habitat was designated on June 2, 1998 in coastal waters surrounding Mona and Monito Islands in Puerto Rico (63 FR 46693). No critical habitat exists within the action area for this consultation.

*Species Description, Distribution, and Population Structure*

Hawksbill sea turtles are small to medium-sized (45 to 68 kilograms on average) although nesting females are known to weigh up to 80 kilograms in the Caribbean (Pritchard et al. 1983). The carapace is usually serrated and has a "tortoise-shell" coloring, ranging from dark to golden brown, with streaks of orange, red, and/or black. The plastron of a hawksbill turtle is typically yellow. The head is elongated and tapers to a point, with a beak-like mouth that gives the species its name. The shape of the mouth allows the hawksbill turtle to reach into holes and crevices of coral reefs to find sponges, their primary food source as adults, and other invertebrates. The shells of hatchlings are 42 millimeters long and are mostly brown and somewhat heart-shaped (Eckert 1995; Hillis and Mackay 1989; Van Dam and Sarti 1989).

Hawksbill turtles have a circumtropical distribution and usually occur between latitudes 30°N and 30°S in the Atlantic, Pacific, and Indian Oceans. In the western Atlantic, hawksbills are widely distributed throughout the Caribbean Sea, off the coasts of Florida and Texas in the continental United States, in the Greater and Lesser Antilles, and along the mainland of Central America south to Brazil (Amos 1989; Groombridge and Luxmoore 1989; Lund 1985; Meylan and Donnelly 1999; NMFS and USFWS 1998b; Plotkin and Amos 1988; Plotkin and Amos 1990). They are highly migratory and use a wide range of habitats during their lifetimes (Musick and Limpus 1997; Plotkin 2003). Adult hawksbill turtles are capable of migrating long distances between nesting beaches and foraging areas. For instance, a female hawksbill sea turtle tagged in BIRNM was later identified 1,160 miles (1,866 kilometers) away in the Miskito Cays in Nicaragua (Spotila 2004).

Hawksbill sea turtles nest on insular and sandy beaches throughout the tropics and subtropics. Nesting occurs in at least 70 countries, although much of it now only occurs at low densities compared to other sea turtle species (NMFS and USFWS 2007b). It is believed that the widely dispersed nesting areas as well as the often low densities seen on nesting beaches is likely a result of overexploitation of previously large colonies that have since been depleted over time (Meylan and Donnelly 1999). The most significant nesting within the United States occurs in Puerto Rico and the U.S. Virgin Islands, specifically on Mona Island and Buck Island Reef National Monument, respectively. Although nesting within the continental United States is typically rare, it can also occur along the southeast coast of Florida and the Florida Keys. The largest hawksbill nesting population in the Western Atlantic occurs in the Yucatán Península of Mexico, where several thousand nests are recorded annually in the states of Campeche, Yucatán, and Quintana Roo (Garduno-Andrade et al. 1999; Spotila 2004). In the U.S. Pacific, hawksbills nest on main island beaches in Hawaii, primarily along the east coast of the island. Hawksbill nesting has also been documented in American Samoa and Guam. More information on nesting in other ocean basins may be found in the 5-year status review for the species (NMFS and USFWS 2007b).

Mitochondrial DNA studies show that reproductive populations are effectively isolated over ecological time scales (Bass et al. 1996). Substantial efforts have been made to determine the nesting population origins of hawksbill sea turtles assembled in foraging grounds, and genetic research has shown that hawksbills of multiple nesting origins commonly mix in foraging areas (Bowen et al. 1996). The fact that hawksbills exhibit site fidelity to their natal beaches suggests that if subpopulations become extirpated they may not be replenished by recruitment from other nesting rookeries (Bass et al. 1996).

*Life History Information*

Hawksbill sea turtles exhibit slow growth rates although they are known to vary within and among populations from a low of 1-3 centimeters per year measured in the Indo-Pacific (Chaloupka and Limpus 1997; Mortimer et al. 2003; Mortimer et al. 2002; Whiting 2000) to a high of 5 centimeters or more per year measured at some sites in the Caribbean (Díez and Dam 2002; León and Díez 1999). Differences in growth rates are likely due to differences in diet and/or density of turtles at foraging sites and overall time spent foraging (Bjorndal et al. 2000; Chaloupka et al. 2004). Consistent with slow growth, age to maturity for the species is also long, taking between 20 and 40 years depending on the region (Chaloupka and Musick 1997; Limpus and Miller 2000). Hawksbills in the western Atlantic are known to mature faster (i.e., 20 or more years) than turtles found in the Indo-Pacific (i.e., 30-40 years) based on studies performed in these areas (Boulan 1983; Boulon 1994; Díez and Dam 2002; Limpus and Miller 2000). Males are typically mature when their length reaches 69 centimeters while females are typically mature at 75 cm (Eckert et al. 1992; Limpus 1992). Female hawksbills return to their natal beaches every 2-3 years to nest (Van Dam et al. 1991; Witzell 1983) and generally lay 3-5 nests per season (Richardson et al. 1999). Compared with other sea turtles, clutch size for hawksbills can be quite high (e.g., up to 250 eggs per clutch) (Hirth and Abdel Latif 1980). Hawksbills may undertake developmental migrations (migrations as immatures) and reproductive migrations that involve travel over hundreds or thousands of kilometers (Meylan 1999a). Post-hatchlings (oceanic stage juveniles) are believed to occupy the pelagic environment, taking shelter in floating algal mats and drift lines of flotsam and jetsam in the Atlantic and Pacific oceans

(Musick and Limpus 1997) before recruiting to more coastal foraging grounds. In the Caribbean, hawksbills are known to almost exclusively feed on sponges (Meylan 1988; van Dam and Díez 1997) although at times they have been seen foraging on other food items, notably corallimorphs and zooanthids (León and Díez 2000; Mayor et al. 1998; van Dam and Díez 1997).

Reproductive females undertake periodic (usually non-annual) migrations to their natal beach to nest and exhibit a high degree of fidelity to their nest sites. Movements of reproductive males are less certain, but are presumed to involve migrations to the nesting each or to courtship stations along the migratory corridor. Hawksbills show a high fidelity to their foraging areas as well (van Dam and Díez 1998). Foraging sites are typically areas associated with coral reefs although hawksbills are also found around rocky outcrops and high energy shoals which are optimum sites for sponge growth. They can also inhabit seagrass pastures in mangrove-fringed bays and estuaries, particularly along the eastern shore of continents where coral reefs are absent (Bjorndal 1997; van Dam and Díez 1998).

*Abundance and Trends*

There are currently no reliable estimates of population abundance and trends for nonnesting hawksbills at the time of this consultation; therefore, nesting beach data is currently the primary information source for evaluating trends in global abundance. Most hawksbill populations around the globe are either declining, depleted, and/or remnants of larger aggregations (NMFS and USFWS 2007b). The largest nesting population of hawksbills appears to occur in Australia where approximately 2,000 hawksbills nest off the northwest coast and about 6,000 to 8,000 nest off the Great Barrier Reef each year (Spotila 2004). Additionally, about 2,000 hawksbills nest each year in Indonesia and 1,000 nest in the Republic of Seychelles (Spotila 2004). In the United States, about 500-1,000 hawksbill nests are laid on Mona Island, Puerto Rico (Diez and van Dam 2007) and another 56-150 nests are laid on Buck Island off St. Croix (Meylan 1999b; Mortimer and Donnelly 2008). Nesting also occurs to a lesser extent on other additional beaches on St. Croix, St. John, St. Thomas, Culebra Island, Vieques Island, and mainland Puerto Rico. Mortimer and Donnelly (2008) reviewed nesting data for 83 nesting concentrations organized among 10 different ocean regions (i.e., Insular Caribbean, Western Caribbean Mainland, Southwestern Atlantic Ocean, Eastern Atlantic Ocean, Southwestern Indian Ocean, Northwestern Indian Ocean, Central Indian Ocean, Eastern Indian Ocean, Western Pacific Ocean, Central Pacific Ocean, and Eastern Pacific Ocean). Historic trends (i.e., 20-100 year time period) were determined for 58 of the 83 sites while recent abundance trends (i.e., within the past 20 years) were also determined for 42 of the 83 sites. Among the 58 sites where historic trends could be determined, all showed a declining trend during the long term period. Among the 42 sites where recent trend data were available, 10 appeared to be increasing, 3 appeared to be stable, and 29 appeared to be decreasing. With respect to regional trends, nesting populations in the Atlantic (especially in the Insular Caribbean and Western Caribbean Mainland) are generally doing better than those in the Indo-Pacific regions. For instance, 9 of the 10 sites showing recent increases were all located in the Caribbean. Nesting concentrations in the Pacific Ocean appear to be performing the worst of all regions despite the fact that the region currently supports more nesting hawksbills than either the Atlantic or Indian Oceans (Mortimer and Donnelly 2008). Buck Island and St. Croix's East End beaches support two remnant populations of between 17-30 nesting females per season (Hillis and Mackay 1989; Mackay 2006). While the proportion of hawksbills nesting on Buck Island represents a small proportion of the total hawksbill nesting occurring in the greater Caribbean region, Mortimer and Donnelly (2008) report an increasing trend in nesting at that site based on data collected from 2001-2006. This increase is likely due to the conservation measures implemented when Buck Island Reef National Monument was expanded in 2001. More information about site specific trends for can be found in the most recent 5-year status review for the species [see (NMFS and USFWS 2007b)].

*Threats*

The historical decline of the species is primarily attributed to centuries of exploitation for the beautifully patterned shell which made it a highly attractive species to target (Parsons 1972). The fact that reproductive females exhibit a high fidelity for nest sites and the tendency of hawksbills to nest at regular intervals within a season made them an easy target for capture on nesting beaches. The tortoiseshell from hundreds of thousands of turtles in the western Caribbean region was imported into the United Kingdom and France during the 19th and early 20th centuries (Parsons 1972) and additional hundreds of thousands of turtles contributed to the region's trade with Japan prior to 1993 when a zero quota was imposed (Milliken and Tokunaga 1987) as cited in (Brautigram and Eckert 2006).

The continuing demand for the hawksbill's shell as well as other products (leather, oil, perfume, and cosmetics) represents an ongoing threat to recovery of the species. The British Virgin Islands, Cayman Islands, Cuba, Haiti, and the Turks and Caicos Islands (United Kingdom) all permit some form of legal take of hawksbill turtles. In the northern Caribbean, hawksbills continue to be harvested for their shells, which are often carved into hair clips, combs, jewelry, and other trinkets (Márquez M 1990; Stapleton and Stapleton 2006). Additionally, hawksbills are harvested for their eggs and meat while whole stuffed turtles are sold as curios in the tourist trade. Also, hawksbill sea turtle products are openly available in the Dominican Republic and Jamaica despite a prohibition on harvesting hawksbills and their eggs (Fleming 2001). In Cuba, 500 turtles are legally captured each year and while current nesting trends are unknown, the number of nesting females is suspected to be declining in some areas (Carillo et al. 1999; Moncada et al. 1999). International trade in the shell of this species is prohibited between countries that have signed the Convention on International Trade in Endangered Species of Wild Flora and Fauna, but illegal trade is still occurring and remains an ongoing threat to hawksbill survival and recovery throughout its range.

Due to their preference to feed on sponges associated with coral reefs, hawksbill sea turtles are particularly sensitive to losses of coral reef communities. Coral reefs are vulnerable to destruction and degradation caused by human activities (e.g., nutrient pollution, sedimentation, contaminant spills, vessel groundings and anchoring, recreational uses, etc.) and are also highly sensitive to the effects of climate change (e.g., higher incidences of disease and coral bleaching) (Crabbe 2008; Wilkinson 2004). Continued loss of coral reef communities (especially in the greater Caribbean region) is expected to impact foraging and represents a major threat to recovery of the species.

Hawksbills are also currently subject to the same suite of threats on both nesting beaches and in the marine environment that affect other sea turtles (e.g., interaction with federal and state fisheries, coastal construction, oil spills, climate change affecting sex ratios, etc.) as discussed in the loggerhead sea turtle status section Hawksbill sea turtles are also susceptible to capture in nearshore artisanal fishing gear such as drift-netting, long-lining, set-netting, and trawl fisheries with gill nets and artisanal hook and line representing the greatest impact to the species in the greater Caribbean region [(Epperly 2003; Lutcavage et al. 1997; NRC 1990)].

### 3.2.5 Kemp's Ridley Sea Turtle

The Kemp's ridley sea turtle was listed as endangered throughout its entire range on December 2, 1970 under the Endangered Species Conservation Act of 1969, a precursor to the ESA. No critical habitat has been designated for the species.

*Species Description, Distribution, and Population Structure*
The Kemp's ridley sea turtle is the smallest of all extant sea turtles with adults generally weighing less than 45 kilograms and having a carapace length of around 65 centimeters. Adults have an almost circular carapace with a grayish green color while the plastron is often pale yellow. There are two pairs of prefrontal scales on the head, five vertebral scutes, and five pairs of costal scutes. In the bridge adjoining the plastron to the carapace, there are four scutes, each of which is perforated by a pore. Hatchlings are usually grayish-black in color and weigh between 15-20 grams. This species has a very restricted range relative to other sea turtle species with most adults occurring in the Gulf of Mexico in shallow nearshore waters, although adult-sized individuals sometimes are found on the eastern seaboard of the United States as well. Nesting is essentially limited to the beaches of the western Gulf of Mexico, primarily in the Mexican state of Tamaulipas, although few nests have also been recorded in Florida and the Carolinas (Meylan et al. 1995). Kemp's ridleys nest in daytime aggregations known as "arribadas", primarily at Rancho Nuevo, a stretch of beach in Mexico. Most of the population of adult females nests in this single locality (Pritchard 1969).

*Life History Information*
Kemp's ridley sea turtles reach sexual maturity at 7-15 years of age. While some turtles nest annually, the weighted mean remigration rate is approximately two years. Nesting generally occurs from April to July and females lay approximately 2.5 nests per season with each nest containing approximately 100 eggs (Márquez M 1994). Studies have shown that the time spent in the post-hatchling pelagic stage can vary from 1-4 years' time, while the benthic immature stage typically lasts approximately 7-9 years (Schmid and Witzell 1997). Little is known of the movements of the post-hatching, planktonic stage within the Gulf of Mexico although the turtles during this stage are assumed to associate with floating seaweed (e.g., *Sargassum spp.*) where they would presumably feed on the available sargassum and associated infauna or other epipelagic species found in the Gulf of Mexico. Atlantic juveniles/subadults travel northward with vernal warming to feed in the productive, coastal waters of Georgia through New England, returning southward with the onset of winter to escape the cold (Henwood and Ogren 1987; Lutcavage and Musick 1985; Ogren 1989). Upon leaving Chesapeake Bay in autumn, juvenile ridleys migrate down the coast, passing Cape Hatteras in December and January (Musick and Limpus 1997). These larger juveniles are joined there by juveniles of the same size from North Carolina sounds and smaller juveniles from New York and New England to form one of the densest concentrations of Kemp's ridleys outside of the Gulf of Mexico (Epperly et al. 1995c; Epperly et al. 1995b; Musick and Limpus 1997). Adult Kemp's ridleys primarily occupy neritic habitats, typically containing muddy or sandy bottoms where prey can be found. In the post-

pelagic stages, Kemp's ridley sea turtles are largely cancrivorous (crab eating), with a preference for portunid crabs (Bjorndal 1997). Stomach contents of Kemp's ridleys along the lower Texas coast consisted of a predominance of nearshore crabs and mollusks, as well as fish, shrimp and other foods considered to be scavenged discards from the shrimping industry (Shaver 1991).

*Abundance and Trends*

Of the seven extant species of sea turtles in the world, the Kemp's ridley has declined to the lowest population level. Most of the population of adult females nest on the Rancho Nuevo beaches (Pritchard 1969). When nesting aggregations at Rancho Nuevo were discovered in 1947, adult female populations were estimated to be in excess of 40,000 individuals (Hildebrand 1963). By the mid-1980s, nesting numbers were below 1,000 (with a low of 702 nests in 1985). However, observations of increased nesting in the 1990's suggested that the decline in the ridley population has stopped and the population is now increasing (USFWS 2000). The number of nests observed at Rancho Nuevo and nearby beaches increased at a mean rate of 11.3 percent per year from 1985 to 1999 (TEWG 2000). These trends are further supported by 2004-2007 nesting data from Mexico. The number of nests over that period has increased from 7,147 in 2004, to 10,099 in 2005, to 12,143 in 2006, and 15,032 during the 2007 nesting season (Gladys Porter Zoo nesting database 2007). In 2008, there were 17,882 nests in Mexico (Gladys Porter Zoo 2008), and nesting in 2009 reached 21,144 (Gladys Porter Zoo 2010). In 2010, nesting declined significantly, to 13,302 (Gladys Porter Zoo 2010). Nesting numbers rebounded from 2010's reduced nesting to 20,570 (Gladys Porter Zoo 2011). A small nesting population is also emerging in the United States, primarily in Texas, rising from 6 nests in 1996 to 128 in 2007, 195 in 2008, and 197 in 2009. Texas nesting then experienced a decline similar to that seen in Mexico for 2010, with 140 nests (National Park Service data, http://www.nps.gov/pais/naturescience/strp.htm), but nesting rebounded in 2011 with a record 199 nests (National Park Service data, http://www.nps.gov/pais/naturescience/current-season.htm).

Heppell et al. (2005) predicted in a population model that the population is expected to increase at least 12-16 percent per year and that the population could attain at least 10,000 females nesting on Mexico beaches by 2015. NMFS et al. (2011) contains an updated model which predicts that the population is expected to increase 19 percent per year and that the population could attain at least 10,000 females nesting on Mexico beaches by 2011. Approximately 25,000 nests would be needed for an estimate of 10,000 nesters on the beach, based on an average 2.5 nests/nesting female. In 2009 the population was on track with 21,144 nests, but an unexpected and as yet unexplained drop in nesting occurred in 2010 (13,302), deviating from the NMFS et al. (2011) model prediction. A subsequent increase to 20,570 nests in 2011 occurred, but we will not know if the population is continuing the trajectory predicted by the model until future nesting data is available. Of course, this updated model assumes that current survival rates within each life stage remain constant. The recent increases in Kemp's ridley sea turtle nesting seen in the last two decades is likely due to a combination of management measures including elimination of direct harvest, nest protection, the use of TEDs, reduced trawling effort in Mexico and the United States, and possibly other changes in vital rates (TEWG 1998; TEWG 2000). While these results are encouraging, the species limited range as well as low global abundance makes it particularly vulnerable to new sources of mortality as well as demographic and environmental stochasticity all of which are often difficult to predict with any certainty.

*Threats*
Kemp's ridleys face many of the same threats as other sea turtle species, including destruction of nesting habitat from storm events, natural predators at sea, and oceanic events such as cold-stunning. Although cold-stunning can occur throughout the range of the species, it may be a greater risk for sea turtles that utilize the more northern habitats of Cape Cod Bay and Long Island Sound. For example, in the winter of 1999-2000, there was a major cold-stunning event where 218 Kemp's ridleys, 54 loggerheads, and 5 green sea turtles were found on Cape Cod beaches (R. Prescott, NMFS, pers. comm. 2001). Annual cold-stunning events do not always occur at this magnitude; the extent of episodic major cold-stun events may be associated with numbers of sea turtles utilizing Northeast waters in a given year, oceanographic conditions, and the occurrence of storm events in the late fall. Many cold-stunned sea turtles can survive if found early enough, but cold-stunning events can still represent a significant cause of natural mortality. A complete list of other indirect factors can be found in NMFS SEFSC (NMFS-SEFSC 2001).

Although changes in the use of shrimp trawls and other trawl gear have helped to reduce mortality of Kemp's ridleys, this species is also affected by other sources of anthropogenic impacts similar to those discussed in previous sections. For example, in the spring of 2000, a total of 5 Kemp's ridley carcasses were recovered from the same North Carolina beaches where 275 loggerhead carcasses were found. Cause of death for most of the sea turtles recovered was unknown, but the mass mortality event was suspected to have been from a large-mesh gillnet fishery operating offshore in the preceding weeks. The 5 Kemp's ridley carcasses that were found are likely to have been only a minimum count of the number of Kemp's ridleys that were killed or seriously injured as a result of the fishery interaction because it is unlikely that all of the carcasses washed ashore.

The impacts of pollution on Kemp's ridley sea turtles, as with all sea turtles, are still poorly understood. There is little data to provide an understanding of how water quality impacts sea turtles. It is expected that the acute and chronic impacts of the DWH oil spill, along with other oil spills in the Gulf of Mexico, will continue to have an impact on sea turtles, especially Kemp's ridley sea turtles, for years to come.

Global climate change impacts as described in the section for loggerhead sea turtles above are also expected. Other changes in the marine ecosystem caused by global climate change (e.g., salinity, oceanic currents, dissolved oxygen levels, nutrient distribution, etc.) could influence the distribution and abundance of phytoplankton, zooplankton, submerged aquatic vegetation, forage fish, etc., which could ultimately affect the primary foraging areas of Kemp's ridley sea turtles.

### 3.2.6 Smalltooth Sawfish

*Species Description*
The smalltooth sawfish is a tropical marine and estuarine elasmobranchs. It has an extended snout with a long, narrow, flattened, rostral blade (rostrum) with a series of transverse teeth along either edge. In general, smalltooth sawfish inhabit shallow coastal waters of warm seas throughout the world and feed on a variety of small fish, e.g., mullet, jacks, and ladyfish

(Simpfendorfer 2001), and crustaceans, e.g., shrimp and crabs (Bigelow and Schroeder 1953; Norman and Fraser 1937). Although this species is reported to have a circumtropical distribution, NMFS identified smalltooth sawfish from the Southeast United States as a distinct population segment (DPS), due to the physical isolation of this population from others, the differences in international management of the species, and the significance of the U.S. population in relation to the global range of the species (see 68 FR15674). The U.S. DPS of smalltooth sawfish was listed as endangered under the ESA on April 1, 2003 (68 FR 15674).

*Life History Information*

Smalltooth sawfish fertilization is internal and females give birth to live young. The brood size, gestation period, and frequency of reproduction are unknown for smalltooth sawfish. Therefore, data from the closely related largetooth sawfish represent our best estimates of these parameters. The largetooth sawfish likely reproduces every other year, has a gestation period of approximately 5 months, and produces a mean of 7.3 offspring per brood [range of 1-13 offspring; (Thorson 1976)]. Smalltooth sawfish are approximately 31 in (80 cm) at birth and may grow to a length of 18 feet (548 cm) or greater during their lifetime (Bigelow and Schroeder 1953; Simpfendorfer 2002). Simpfendorfer et al. (2008) report rapid juvenile growth for smalltooth sawfish for the first two years after birth, with stretched total length increasing by an average of 25-33 in (65-85 cm) in the first year and an average of 19-27 in (48-68 cm) in the second year. However, very little information exists on size classes other than juveniles, which make up the majority of sawfish encounters; therefore, much uncertainty remains in estimating life history parameters for smalltooth sawfish, especially as it relates to age at maturity and post-juvenile growth rates. Based on age and growth studies of the largetooth sawfish (Thorson 1982) and research by Simpfendorfer (2000), the smalltooth sawfish is likely a slow-growing (with the exception of early juveniles), late-maturing (10-20 years) species with a long lifespan (30-60 years). However, juvenile growth rates presented by Simpfendorfer et al. (2008) suggest smalltooth sawfish are growing faster than previously thought and therefore may reach sexual maturity at an earlier age.

There are distinct differences in habitat use based on life history stage. Juvenile smalltooth sawfish [those up to 3 years of age or approximately 8 feet in length (Simpfendorfer et al. 2008)] inhabit the shallow waters of estuaries and can be found in sheltered bays, dredged canals, along banks and sandbars, and in rivers (NMFS 2000). Juvenile smalltooth sawfish occur in euryhaline waters (i.e., waters with a wide range of salinities) and are often closely associated with muddy or sandy substrates, and shorelines containing red mangroves, *Rhizophora mangle* (Simpfendorfer 2001; Simpfendorfer 2003). Tracking data from the Caloosahatchee River in Florida indicate very shallow depths and salinity are important abiotic factors influencing juvenile smalltooth sawfish movement patterns, habitat use, and distribution (Simpfendorfer 2011). Another recent acoustic tagging study in a developed region of Charlotte Harbor, Florida identified the importance of mangroves in close proximity to shallow water habitat for juvenile smalltooth sawfish, stating that juveniles generally occur in shallow water within 328 feet (100 meters) of mangrove shorelines [generally red mangroves (Simpfendorfer et al. 2010)]. Juvenile smalltooth sawfish spend the majority of their time in waters less than 13 feet (4 m) in depth (Simpfendorfer et al. 2010) and are seldom found in depths greater than 32 feet(10 m; (Poulakis and Seitz 2004). Simpfendorfer et al. (2010) also indicated developmental differences in habitat use: the smallest juveniles (young-of-the-year juveniles measuring <100 centimeter in length) generally used water depths less than 0.5 meter (1.64 feet), had small home ranges (4,264 to 4,557 square mile), and exhibited high levels of site fidelity. Although small juveniles exhibit high levels of site fidelity for specific nursery habitats for periods of time lasting up to three months (Wiley 2007), they do undergo small movements coinciding with changing tidal stages. These movements often involve moving from shallow sandbars at low tide to within red mangrove prop roots at higher tides (Simpfendorfer et al. 2010), behavior likely to reduce the risk of predation (Simpfendorfer 2006). As juveniles increase in size, they begin to expand their home ranges (Simpfendorfer et al. 2010; Simpfendorfer et al. 2011), eventually moving to more offshore habitats where they likely feed on larger prey and eventually reach sexual maturity.

Researchers have identified several areas within the Charlotte Harbor Estuary that are disproportionately more important to juvenile smalltooth sawfish, based on intra- or inter-annual capture rates during random sampling events within the estuary (Poulakis 2012; Poulakis et al. 2011). These areas were termed “hotspots” and also correspond with areas where public encounters are most frequently reported. Use of these “hotspots” can be variable between and among years based on the amount and timing of freshwater inflow. Smalltooth sawfish use hotspots further upriver during high salinity conditions (drought) and areas closer to the mouth of the Caloosahatchee River during times of high freshwater inflow (Poulakis et al. 2011). At this time researchers are unsure what specific biotic (e.g., presence or absence of predators and prey) or abiotic factors influence this habitat use, but believe a variety of conditions in addition to salinity, such as temperature, dissolved oxygen, water depth, shoreline vegetation, and food availability, may influence habitat selection (Poulakis et al. 2011).

While adult smalltooth sawfish may also use the estuarine habitats used by juveniles, they are commonly observed in deeper waters along the coasts. Poulakis and Seitz (2004) noted that nearly half of the encounters with adult-sized smalltooth sawfish in Florida Bay and the Florida Keys occurred in depths from 200 to 400 feet (70 to 122 meters) of water. Similarly, Simpfendorfer and Wiley (2005a) reported encounters in deeper waters off the Florida Keys, and observations from both commercial longline fishing vessels and fishery-independent sampling in the Florida Straits report large smalltooth sawfish in depths up to 130 feet (~40 meters) (NSED 2012). However, NMFS believes adult smalltooth sawfish use shallow estuarine habitats during parturition (when adult females return to shallow estuaries to pup) because very young juveniles still containing rostral sheaths are captured in these areas. Since very young juveniles have high site fidelities, we hypothesize that they are birthed nearby or in their nursery habitats. The noise restriction zones identified in Figures 2-5 correlate with the hotspots identified by the studies listed above and encounter data. These areas are likely used during parturition.

*Population Dynamics*

Few long-term abundance data exist for the smalltooth sawfish, making it very difficult to estimate the current population size. However, Simpfendorfer (2001) estimated that the U.S. population may number less than five percent of historic levels, based on anecdotal data and the fact that the species’ range has contracted by nearly 90 percent, with south and southwest Florida the only areas known to support a reproducing population. Since actual abundance data are limited, researchers have begun to compile capture and sightings data (collectively referred to as encounter data) in the NSED that was developed in 2000. Although this data cannot be used to assess the population because of the opportunistic nature in which they are collected (i.e., encounter data are a series of random occurrences rather than an evenly distributed search over a defined period of time), researchers can use this database to assess the spatial and temporal distribution of smalltooth sawfish. We expect that as the population grows, the geographic range of encounters will also increase. Since the conception of the National Sawfish Encounter Database ( NSED), over 3,000 smalltooth sawfish encounters have been reported and compiled in the encounter database (NSED 2012).

Despite the lack of scientific data on abundance, recent encounters with young-of-the-year, older juveniles, and sexually mature smalltooth sawfish indicate that the U.S. population is currently reproducing (Seitz and Poulakis 2002; Simpfendorfer 2003). The abundance of juveniles encountered, including very small individuals, suggests that the population remains viable (Simpfendorfer and Wiley 2004), and data analyzed from Everglades National Park as part of an established fisheries-dependent monitoring program (angler interviews) indicate a slightly increasing trend in abundance within the park over the past decade (Carlson and Osborne 2012; Carlson et al. 2007). Using a demographic approach and life history data for smalltooth sawfish and similar species from the literature, Simpfendorfer (2000) estimated intrinsic rates of natural population increase for the species at 0.08 to 0.13 per year and population doubling times from 5.4 to 8.5 years. These low intrinsic rates[16] of population increase suggest that the species is particularly vulnerable to excessive mortality and rapid population declines, after which recovery may take decades.

*Status, Distribution, and Threats*

Within the United States, smalltooth sawfish have been captured in estuarine and coastal waters from New York south through Texas, although peninsular Florida has historically been the region of the United States with the largest number of recorded captures (NMFS 2000). Recent records indicate there is a resident reproducing population of smalltooth sawfish in south and southwest Florida from Charlotte Harbor through the Dry Tortugas, which is also the last U.S. stronghold for the species (Poulakis and Seitz 2004; Seitz and Poulakis 2002; Simpfendorfer and Wiley 2005a). Water temperatures (no lower than 16°-18°C) and the availability of appropriate coastal habitat (shallow, euryhaline waters and red mangroves) are the major environmental constraints limiting the northern movements of smalltooth sawfish in the western North Atlantic. Most specimens captured along the Atlantic coast north of Florida are large adults (over 10 feet) that likely represent seasonal migrants, wanderers, or colonizers from a historic Florida core population(s) to the south, rather than being members of a continuous, even-density population (Bigelow and Schroeder 1953).

Past literature indicates smalltooth sawfish were once abundant along both coasts of Florida and quite common along the shores of Texas and the northern Gulf coast [(NMFS 2010b) and citations therein]. Based on recent comparisons with these historical reports, the U.S. DPS of smalltooth sawfish has declined over the past century[e.g.,(Simpfendorfer 2001; Simpfendorfer 2002)]. The decline in smalltooth sawfish abundance has been attributed to several factors including bycatch mortality in fisheries, habitat loss, and life history limitations of the species (NMFS 2010).

[16] The rate at which a population increases in size if there are no density-dependent forces regulating the population

Bycatch Mortality

Bycatch mortality is cited as the primary cause for the decline in smalltooth sawfish in the United States (NMFS 2010b). While there has never been a large-scale directed fishery, smalltooth sawfish easily become entangled in fishing gears (gillnets, otter trawls, trammel nets, and seines) directed at other commercial species, often resulting in serious injury or death (NMFS 2009c). This has historically been reported in Florida (Snelson and Williams 1981), Louisiana (Simpfendorfer 2002), and Texas (Baughman 1943). For instance, one fisherman interviewed by Evermann and Bean (1898) reported taking an estimated 300 smalltooth sawfish in just one netting season in the Indian River Lagoon, Florida. In another example, smalltooth sawfish landings data gathered by Louisiana shrimp trawlers from 1945-1978, which contained both landings data and crude information on effort (number of vessels, vessel tonnage, number of gear units), indicated declines in smalltooth sawfish landings from a high of 34,900 pounds in 1949 to less than 1,500 pounds in most years after 1967. The Florida net ban passed in 1995 has led to a reduction in the number of smalltooth sawfish incidentally captured, "…by prohibiting the use of gill and other entangling nets in all Florida waters, and prohibiting the use of other nets larger than 500 square feet in mesh area in nearshore and inshore Florida waters[17]" (FLA. CONST. art. X, § 16). However, the threat of bycatch currently remains in commercial fisheries (e.g., South Atlantic shrimp fishery, Gulf of Mexico shrimp fishery, federal shark fisheries of the South Atlantic, and the Gulf of Mexico reef fish fishery), though anecdotal information collected by NMFS ports agents suggest smalltooth sawfish captures are now rare.

In addition to the incidental bycatch in commercial fisheries, smalltooth sawfish have historically been and continue to be captured by recreational fishermen. Encounter data (NSED 2012) and past research (Caldwell 1990) document that rostrums are sometimes removed from smalltooth sawfish caught by recreational fishermen, thereby reducing their chances of survival. While the current threat of mortality associated with recreational fisheries is expected to be low given that possession of the species in Florida has been prohibited since 1992, bycatch in recreational fisheries remains a potential threat to the species.

Habitat Loss

Modification and loss of smalltooth sawfish habitat, especially nursery habitat, is another contributing factor in the decline of the species. Activities such as agricultural and urban development, commercial activities, dredge-and-fill operations, boating, erosion, and diversions of freshwater runoff contribute to these losses (SAFMC 1998). Large areas of coastal habitat were modified or lost between the mid-1970s and mid-1980s within the United States (Dahl and Johnson 1991). Since then, rates of loss have decreased but habitat loss continues. From 1998-2004, approximately 64,560 ac of coastal wetlands were lost along the Atlantic and Gulf coasts of the United States, of which approximately 2,450 ac were intertidal wetlands consisting of mangroves or other estuarine shrubs (Stedman and Dahl 2008). Further, Orlando et al. (1994) analyzed 18 major southeastern estuaries and recorded over 703 miles of navigation channels and 9,844 miles of shoreline with modifications. In Florida, coastal development often involves the removal of mangroves and the armoring of shorelines through seawall construction. Changes to the natural freshwater flows into estuarine and marine waters through construction of canals

[17] "nearshore and inshore Florida waters" means all Florida waters inside a line three miles seaward of the coastline along the Gulf of Mexico and inside a line one mile seaward of the coastline along the Atlantic Ocean.

and other water control devices have also altered the temperature, salinity, and nutrient regimes; reduced both wetlands and submerged aquatic vegetation; and degraded vast areas of coastal habitat utilized by smalltooth sawfish (Gilmore 1995; Reddering 1988; Whitfield and Bruton 1989). While these modifications of habitat are not the primary reason for the decline of smalltooth sawfish abundance, it is likely a contributing factor and almost certainly hampers the recovery of the species. Juvenile sawfish and their nursery habitats are particularly likely to be affected by these kinds of habitat losses or alternations, due to their affinity for shallow, estuarine systems. Although many forms of habitat modification are currently regulated, some permitted direct and/or indirect damage to habitat from increased urbanization still occurs and is expected to continue to threaten survival and recovery of the species in the future.

Life History Limitations
The smalltooth sawfish is also limited by its life history characteristics as a slow-growing, relatively late-maturing, and long-lived species. Animals using this life history strategy are usually successful in maintaining small, persistent population sizes in constant environments, but are particularly vulnerable to increases in mortality or rapid environmental change (NMFS 2000). The combined characteristics of this life history strategy result in a very low intrinsic rate of population increase (Musick 1999) that make it slow to recover from any significant population decline (Simpfendorfer 2000). More recent data suggest smalltooth sawfish may mature earlier than previously thought, meaning rates of population increase could be higher and recovery times shorter than those currently reported (Simpfendorfer et al. 2008).

Current Threats
The three major factors that led to the current status of the U.S. DPS of smalltooth sawfish (bycatch mortality, habitat loss, and life history limitations) continue to be the greatest threats today. However, other threats such as the illegal commercial trade of smalltooth sawfish or their body parts, predation, and marine pollution and debris may also affect the population and recovery of smalltooth sawfish on smaller scales (NMFS 2010b). We anticipate that all of these threats will continue to affect the rate of recovery for the U.S. DPS of smalltooth sawfish.

In addition to the anthropogenic effects mentioned previously, changes to the global climate are likely to be a threat to smalltooth sawfish and the habitats they use. The Intergovernmental Panel on Climate Change has stated that global climate change is unequivocal (IPCC 2007) and its impacts to coastal resources may be significant. Some of the likely effects commonly mentioned are sea level rise, increased frequency of severe weather events, changes in the amount and timing of precipitation, and changes in air and water temperatures [e.g.,(EPA 2012; NOAA 2012). The impacts to smalltooth sawfish cannot, for the most part, currently be predicted with any degree of certainty, but we can project some effects to the coastal habitats where they reside. We know that the coastal habitats that contain red mangroves and shallow, euryhaline waters will be directly impacted by climate change through sea level rise, which is expected to exceed 1 meter globally by 2100 according to Meehl et al. (2007), Pfeffer et al. (2008), and Vermeer and Rahmstorf (2009). Sea level rise will impact mangrove resources, as sediment surface elevations for mangroves will not keep pace with conservative projected rates of elevation in sea level (Gilman et al. 2008). Sea level increases will also affect the amount of shallow water available for juvenile smalltooth sawfish nursery habitat, especially in areas where there is shoreline armoring (e.g., seawalls). Further, the changes in precipitation coupled with sea level rise may also alter salinities of coastal habitats, reducing the amount of available smalltooth sawfish nursery habitat.

### 3.2.7 Smalltooth Sawfish Critical Habitat

On September 2, 2009, NMFS issued a final rule (74 FR 45353; see also, 50 CFR § 226.218) to designate critical habitat for the U.S. DPS of smalltooth sawfish. The critical habitat consists of two units: the Charlotte Harbor Estuary Unit (CHEU), which comprises approximately 221,459 acres (346 $mi^2$) of coastal habitat, and the Ten Thousand Islands/Everglades Unit, which comprises approximately 619,013 acres (967 $mi^2$) of coastal habitat. This consultation primarily focuses on an activity occurring in the CHEU, located in Charlotte and Lee Counties (see Figure 6). Charlotte Harbor is the second largest estuary in the state of Florida. It is fed by the Myakka River and Peace River to the north and the Caloosahatchee River to the east of the harbor which connect to the Gulf of Mexico. Freshwater flows from the Caloosahatchee River are controlled by the Franklin Lock and Dam which periodically releases water; hence, effecting the salinity regime downstream of the dam. Charlotte Harbor is a relatively shallow estuary comprised of large areas of submerged aquatic vegetation, oyster bars, saltwater marsh, freshwater wetlands, and mangroves. The unit boundaries for both the CHEU and Ten Thousand Islands/Everglades Unit are defined in detail in the final rule (74 FR 45353; see also, 50 CFR § 226.218).

The majority of the Ten Thousand Islands/ Everglades Unit is comprised of protected lands located within Everglades National Park, the Cape Romano-Ten Thousand Islands Aquatic Preserve, and Rookery Bay Aquatic Preserve. This leaves only a few small towns where residential development can occur. These towns include Everglades, Plantation Island, Chokoloskee, and Goodland. These communities are highly developed with numerous man-made canals hardened by seawalls.

Critical habitat is defined by the ESA as including areas in a species' occupied range that include the physical and biological features essential to a species conservation ("essential features"). Section 3 of the ESA defines the terms "conserve," "conserving," and "conservation" to mean: "to use, and the use of, all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this chapter are no longer necessary." The recovery plan developed for the smalltooth sawfish represents NMFS' best judgment about the objectives and actions necessary for the species' recovery. These objectives include the need to protect and/or restore smalltooth sawfish habitats for both adult and juvenile sawfish. Habitats, especially those that have been demonstrated to be important for juveniles, must be protected and, if necessary, restored. Without sufficient habitat, the population is unlikely to increase to a level associated with low extinction risk and delisting.

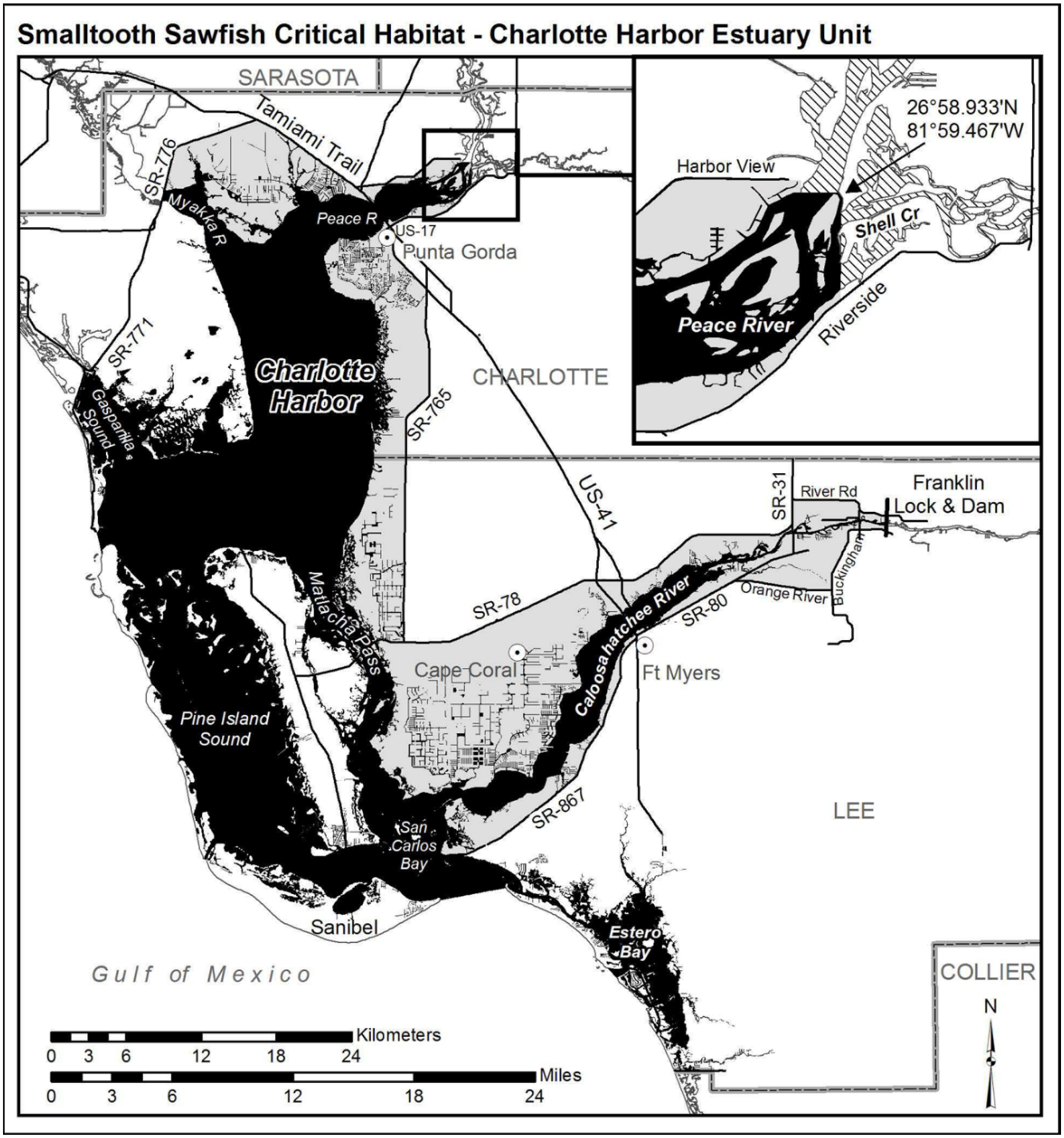


**Figure 6: Smalltooth sawfish critical habitat (CHEU)**

The recovery plan also identifies specific recovery criteria to implement each recovery objective. The habitat-based recovery criterion focuses on protecting areas that have been identified as important for juveniles (i.e., nurseries), and identifies mangrove shorelines, non-mangrove nursery habitats, and freshwater flow regimes as important features for juveniles. Juveniles are especially vulnerable to predation and starvation (Simpfendorfer and Wiley 2005b). The recovery plan states that the recovery of the smalltooth sawfish depends on the availability and quality of nursery habitats and that protection of high-quality nursery habitats located in southwest Florida is essential to the species. Facilitating recruitment into the adult population by protecting the species' juvenile nursery areas is the key conservation objective for the species that will be supported by protection of critical habitat.

As discussed in the status of smalltooth sawfish,  researchers have identified several areas within the Charlotte Harbor Estuary that are disproportionately more important to juvenile smalltooth sawfish, based on intra- or inter-annual capture rates during random sampling events within the estuary (Poulakis 2012; Poulakis et al. 2011).  These hotspots were compared to areas where public encounters are most frequently reported.  Use of these hotspots can be variable between and among years based on the amount and timing of freshwater inflow.  Smalltooth sawfish use hotspots further upriver during high salinity conditions (drought) and areas closer to the mouth of the Caloosahatchee River during times of high freshwater inflow (Poulakis et al. 2011).  At this time researchers are unsure what specific biotic (e.g., presence or absence of predators and prey) or abiotic factors influence this habitat use, but believe a variety of conditions in addition to salinity, such as temperature, dissolved oxygen, water depth, shoreline vegetation, and food availability, may influence habitat selection (Poulakis et al. 2011).

*Threats to Critical Habitat*

Development in this region exploded in the 1950s with the founding of master plan communities including Cape Coral and Punta Gorda.  These communities involved large dredge and fill projects resulting in over 400 miles of man-made canals in Cape Coral alone.  This unique design provided a large percentage of home owners in these communities with water front homes.  The majority of these man-made canal communities have armored shorelines with minimal remaining mangroves habitat.  The canals also require periodic dredging to maintain adequate depth for vessel navigation.  Additional developmental pressures continue to occur within the area from the installation or replacement of docks, boat ramps, marinas, and shoreline armoring, and utility projects.

Between September 2009 and October 16, 2012, NMFS completed 78 consultations with the USACE on activities that may affect critical habitat for smalltooth sawfish with the CHEU.  By comparison, only 9 projects have occurred with the Ten Thousand Island/Everglades Unit and only 3 of these resulted in impacts to critical habitat.  Because of the comparatively few number of projects within the Ten Thousand Island/Everglades Unit, the focus of this consultation will be the CHEU.  The majority of these projects were residential single-family-home or commercial seawall construction projects within the CHEU, each resulted in up to a few hundred square feet of impacts to smalltooth sawfish critical habitat.  Since the designation of critical habitat on September 2, 2009, approximately 8.88 acres of shallow, euryhaline habitat and 4,907 linear feet of red mangrove essential features have been impacted in the CHEU resulting in an average loss of 2.96 acres per year of shallow, euryhaline habitat and 1,636 linear feet of red mangrove loss per year.  It is important to note that the majority of consultations are for seawall projects but that the greatest amount of impacts to essential features resulted from recent large dredging activities.  This is mainly due to public maintenance dredging required in navigation channels.  Since the designation of critical habitat, existing navigational channels that have shoaled in and required maintenance dredging are included in the impact analysis to shallow, euryhaline habitat.

As part of the protection of critical habitat in the CHEU, federal agencies must ensure that their activities are not likely to result in the destruction or adverse modification of the physical and biological features that are essential to the conservation of the species (50 CFR 424.12 (b)). Therefore, proposed actions that may impact critical habitat require an analysis of potential impacts to each "essential feature." The essential features for the conservation of smalltooth sawfish that provide nursery area functions are (1) red mangroves; and (2) shallow, euryhaline (fluctuating salinity) habitats, characterized by water depths between MHWL and 3 feet measured at MLLW. Red mangroves and shallow, euryhaline habitats provide nursery area functions that facilitate recruitment of juveniles into the adult population. Thus, these features are essential to the conservation of smalltooth sawfish. One or both of these essential features must be present in a project area for it to function as critical habitat for smalltooth sawfish. In this instance with the Heinrich project, both of these essential features are present.

*Dock and Boat Ramp Construction*

Federal agencies routinely permit residential and commercial docks and boat ramps throughout the CHEU. Docks are typically required to be constructed in accordance with *NMFS-USACE Dock Construction Guidelines in Florida for Docks or Other Minor Structures Constructed in or over Submerged Aquatic Vegetation (SAV), Marsh, or Mangrove Habitat* when possible; however, the current dock guidelines allow for some amount of mangrove removal. Typically, mangrove removal is restricted either to trimming to facilitate a dock or complete removal up to the width of the dock extending toward open water. Florida state counties have different guidelines for mangrove removal; however, all red mangrove removal permit requests within smalltooth sawfish critical habitat necessitate ESA Section 7 consultation and projected mangrove losses from such projects are cumulatively tallied by NMFS Protected Resources Division. Boat ramps are often part of a larger project such as marinas, bridge approaches, and causeways where natural and previously created deep-water habitat access channels already exist. Boat ramps can remove both the mangrove and the shallow, euryhaline habitat features of critical habitat for smalltooth sawfish.

*Marinas*

All marinas have potential to adversely affect aquatic habitats. Most existing marinas are excluded from critical habitat for smalltooth sawfish because the essential features tend to be absent. However, expansion of existing marinas and creation of new marinas are currently being considered within the action area. Marinas are typically deeper than the coastal habitat used by juvenile smalltooth sawfish as nursery areas, thus expansion of marinas can result in permanent loss of large areas of nursery habitat.

*Bulkheads and Seawalls*

Bulkheads and other shoreline stabilization structures are used to protect adjacent shorelines from wave and current action and to enhance water access. These projects may adversely impact critical habitat for smalltooth sawfish through direct filling, installation of riprap, dredging, and/or removal of red mangroves. Vegetation plantings, sloping riprap, or gabions are generally considered to be environmentally compatible as shoreline stabilization methods over vertical seawalls since they provide shoreline protection and also provide good quality fish and wildlife habitat. However, placement of riprap material removes shallow, euryhaline habitat, an essential feature, which is utilized by juvenile smalltooth sawfish for forage and refuge from predators.

*Cables, Pipelines, and Transmission Lines*
While not as common as other activities, excavation of submerged lands is sometimes required for installing cables, pipelines, and transmission lines. Construction may also require temporary or permanent filling of submerged habitats. Open-cut trenching and installation of aerial transmission line footers are activities that have the ability to temporarily or permanently impact critical habitat for smalltooth sawfish.

*Transportation*
Potential adverse effects from federal transportation projects in the action area include operations of the Federal Highway Administration, USACE, and Federal Emergency Management Agency. Construction of road improvement projects typically follow the existing alignments and expand to compensate for the increase in public use. Transportation projects may impact critical habitat for smalltooth sawfish through installation of bridge footers, fenders, pilings, and abutment armoring, or through removal of existing bridge materials by blasting or mechanical efforts.

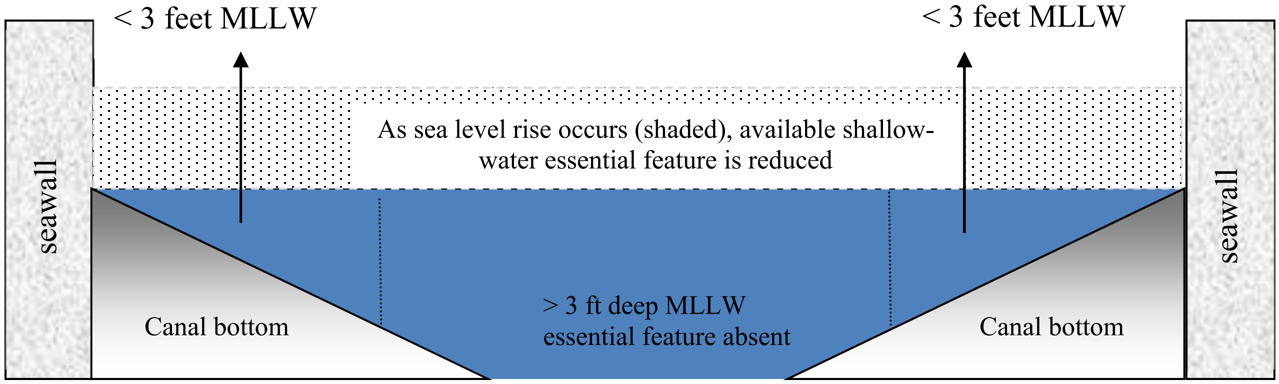
*Dredging*
Riverine, nearshore, and offshore areas are dredged for navigation, construction of infrastructure, and marine mining. The total environmental impact of dredging in the Southeast is unknown, but undoubtedly great (GMFMC 1998; GMFMC 2005; SAFMC 1998). An analysis of 18 major southeastern estuaries recorded over 703 miles of navigation channels and 9,844 miles of shoreline modifications. Habitat effects of dredging include the loss of submerged habitats by disposal of excavated materials, turbidity and siltation effects, contaminant release, alteration of hydrodynamic regimes, and fragmentation of physical habitats (GMFMC 1998; GMFMC 2005; SAFMC 1998). Cumulatively, these effects have degraded habitat areas used by juvenile and adult smalltooth sawfish. In the CHEU, dredging to maintain canals and channels, that were constructed prior to the critical habitat, limit the extent of critical habitat to the margins of many waterways, and dredging activity can disturb juveniles that are using adjacent habitats.

*Impoundments and Other Water-level Controls*
Federal agencies such as the USACE have historically been involved in large water control projects in Florida. Agencies sometimes propose impounding rivers and tributaries for such purposes as flood control, salt water intrusion prevention, or creation of industrial, municipal, and agricultural water supplies. Projects to repair or replace water control structures may affect smalltooth sawfish critical habitat by limiting sufficient freshwater discharge which could alter the salinity of estuaries. The ability of an estuary to function as a nursery depends upon the quantity, timing, and input location of freshwater inflows (USEPA 1994). Estuarine ecosystems are vulnerable to anthropogenic disturbances, primarily decreases in seasonal inflow caused by upstream withdrawals of riverine freshwater for agricultural, industrial, and domestic purposes; contamination by industrial and sewage discharges; agricultural runoff carrying pesticides, herbicides and other toxic pollutants; and eutrophication caused by excessive nutrient inputs from a variety of nonpoint and point sources. Additionally, rivers and their tributaries are susceptible to natural disturbances, such as floods and droughts, whose effects can be exacerbated by these anthropogenic disturbances. Smalltooth sawfish within the CHEU have an affinity for a particular salinity range, moving downriver during wetter months and upriver during drier months, in the Caloosahatchee River (Simpfendorfer 2011). Water management

decisions may impact the functioning of critical habitat whereby sawfish follow salinity gradients into more narrow areas of the Caloosahatchee River, for example, where less shallow-water habitat exists for them to escape predation. Furthermore, large changes in water flow over short durations would likely escalate movement patterns for sawfish, thereby increasing predation risk and energy output. The most vulnerable portion of the juvenile sawfish population to water management projects appears to be sawfish in their first year of life (Simpfendorfer 2011). Newborn sawfish remain in smaller areas irrespective of salinity, potentially exposing them to greater osmotic stress and impacting the nursery functions of sawfish critical habitat.

*Climate Change Threats*
The Intergovernmental Panel on Climate Change has stated that global climate change is unequivocal (IPCC 2007) and its impacts to coastal resources may be significant. There is a large and growing body of literature on past, present, and future impacts of global climate change induced by human activities (i.e., global warming mostly driven by the burning of fossil fuels). Some of the likely effects commonly mentioned are sea level rise, increased frequency of severe weather events, and changes in air and water temperatures. NOAA's climate change web portal provides information on the climate-related variability and changes that are exacerbated by human activities (http://www.climate.gov/#understandingClimate). The Environmental Protection Agency's climate change Web page also provides basic background information on these and other measured or anticipated effects (see www.epa.gov/climatechange/index.html). Though the impacts on smalltooth sawfish currently cannot, for the most part, be predicted with any degree of certainty, we can project some effects to sawfish critical habitat. We do know that both essential features (red mangroves and shallow, euryhaline waters less than 3 feet deep at MLLW) will be impacted by climate change. Sea level rise is expected to exceed 1 meter globally by 2100, according to the most recent publications, exceeding the estimates of the Fourth Assessment of the Intergovernmental Panel on Climate Change (Abrego et al. 2009; Acevedo 1991; Meehl et al. 2007). A one-meter sea level rise in the state of Florida is within the range of recent estimates by 2080 (Abrego et al. 2009; Adam et al. 2011). Along the Gulf coast of Florida, and south Florida in particular, rises in sea level will impact mangrove resources. As sea levels rise, sediment surface elevations for mangroves will not keep pace with conservative projected rates of elevation in sea level (Adey 1977). This net lowering in sediment elevation poses the greatest threat to mangroves, especially where they are most vulnerable such as where there is limited or no area for landward migration as sea levels rise (Adey 1978). This is the case in areas of the CHEU where mangroves are hemmed in by shoreline armoring and coastal development and will be unable to spread inland when sea level rises.

Sea level increases would also affect the shallow-water essential feature of smalltooth sawfish critical habitat within the CHEU. The effects of sea level rise on available shallow-water habitat for smalltooth sawfish would be exacerbated in areas where there is shoreline armoring (e.g., seawalls) along the sides of the canal and the centerlines of the canals that are maintenance dredged deeper 3 feet depth for boat accessibility. In these areas, as sea levels rise, the areas that are within essential feature depth (less than 3 feet at MLLW) will be reduced along the edges of the canals (see diagram below).




Other threats to mangroves resulting from climate change include: changes in precipitation amounts and distribution; changes in seawater temperature; changes in $CO_2$ levels; and damages to mangroves from increasingly severe storms and hurricanes (Aeby et al. 2006). Predictions for increases of up to 25 percent globally for precipitation are expected by 2050 (Aeby et al. 2006) but this distribution will vary, leading to increases and decreases in precipitation at the regional level. Changes in precipitation patterns caused by climate change may adversely affect the growth of mangroves and their areal extent (Adey et al. 1977; Adey and Steneck 1985). Decreases in precipitation will increase salinity and inhibit mangrove productivity, growth, seedling survival, and spatial coverage (Adjeroud 1997). Decreases in precipitation may also change mangrove species composition, favoring more salt-tolerant ones (Ellison 2004). Increases in precipitation may benefit some species of mangroves, increasing spatial coverage and allowing them to out-compete other salt marsh vegetation (Adjeroud et al. 2009). However, potential mangrove expansion necessitates suitable habitat for mangroves to expand their range, which depends to a great extent on patterns and intensity of coastal development. Seawater temperature changes will have potential adverse effects on mangroves as well. Many species of mangroves show an optimal shoot density between sediment temperatures between 15°-25°C (59°-77°F) (Adjeroud and Tsuchiya 1999). However, between 25° and 35°C (77-95°F) many species begin to show a decline in leaf structure and root and leaf formation rate (Aeby 2005), and temperatures above 35°C lead to adverse effects on root structure and survivability of seedlings (Afzal et al. 2001). Temperatures above 38°C (100.4°F) lead to a cessation of photosynthesis and mangrove mortality (Aeby 2006). Although impossible to forecast precisely, the oceans are predicted to warm by 2° to 6°C by 2100 (Agassiz 1883). If mangroves shift poleward in response to temperature increases, they will be limited by cold events and available recruitment area. This is especially true when considering already armored shorelines in residential communities such as those within and surrounding the CHEU of critical habitat for smalltooth sawfish. As atmospheric $CO_2$ levels increase, mostly resulting from anthropogenic causes (e.g., burning of fossil fuels), the world's oceans will absorb much of this $CO_2$, causing potential increases in photosynthesis and mangrove growth rates. However, this increase in growth rate would be limited by lower salinities expected from $CO_2$ absorption in the oceans (Agegian 1985), and also limited by available undeveloped coastline for mangroves to expand their range. A secondary effect of increased $CO_2$ concentrations in the oceans is the deleterious effect this would have on coral reefs' ability to absorb calcium carbonate (Hoegh-Guldberg et al.

2007), leading eventually to reef erosion and thereby reducing the buffer that coral reefs provide to mangrove habitats from waves, especially during storm/hurricane events.

Finally, the anticipated threat to mangroves resulting from climate change may result from an increase in the severity of storms and hurricanes. Houghton et al (1883) predict that wind intensities will likely increase from 5 to 10 percent. Additionally, tropical storms are expected to increase in intensity and/or frequency, which will directly impact existing mangroves that are already adversely impacted by increased seawater temperatures, $CO_2$, and changes in precipitation (Aeby and Santavy 2006; Aeby et al. 2011a). The height of existing mangroves may be reduced as a response to increased tropical storm intensity as well (Ainsworth and Hoegh-Guldberg 2009). More severe storm surges that lead to flooding events are also expected and would lead to potential changes in mangrove community composition, mortality, and recruitment (Aeby et al. 2011b), in addition to affecting mangroves' ability to photosynthesize (Ainsworth et al. 2011) and affecting oxygen concentrations in the mangrove lenticels (Ellison 2004).

### 3.2.8 Johnson's Seagrass Critical Habitat

NMFS designated Johnson's seagrass critical habitat on April 5, 2000 (65 FR 17786; see also, 50 CFR 226.213). 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 (I) essential to the conservation of the species and (II) 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.

The specific areas occupied by Johnson's seagrass and designated by NMFS as critical habitat are those with one or more of the following criteria:

1. Locations with populations that have persisted for 10 years.
2. Locations with persistent flowering populations.
3. Locations at the northern and southern range limits of the species.
4. Locations with unique genetic diversity.
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 (see Table 18). The total acreage of critical habitat for Johnson's seagrass range-wide is roughly 22,574 acres (NMFS 2002). SAJ-17, 20, 33, and 34 are allowed within all of the Johnson's seagrass critical habitat Units.

**Table 18: Designated critical habitat units for Johnson's seagrass.**

| | |
|---|---|
| Unit A | A portion of the Indian River, Florida, north of the Sebastian Inlet Channel. |
| Unit B | A portion of the Indian River, Florida, south of the Sebastian Inlet Channel. |
| Unit C | A portion of the Indian River Lagoon, Florida, in the vicinity of the Fort Pierce Inlet. |
| Unit D | A portion of the IRL, Florida, north of the St. Lucie Inlet. |
| Unit E | A portion of Hobe Sound, Florida, excluding the federally-marked navigation channel of the Intracoastal Waterway (ICW). |
| Unit F | A portion of the south side of Jupiter Inlet, Florida. |
| Unit G | A portion of Lake Worth, Florida, north of Bingham Island. |
| Unit H | A portion of Lake Worth Lagoon, Florida, located just north of the Boynton Inlet. |
| Unit I | A portion of northeast Lake Wyman, Boca Raton, Florida, excluding the federally-marked navigation channel of the ICW. |
| Unit J | 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 ICW, and all existing federally-authorized navigation channels, basins, and berths at the Port of Miami. |

Unit J is by far the largest of the designated critical habitat units, making up approximately 83 percent of total designated critical habitat, by area, for Johnson’s seagrass throughout its 200-km range. The majority of projects authorized in Unit J are covered under SAJ-42 and not by the general permits considered in this consultation.

Critical habitat determinations focus on those physical and biological features that are essential to the conservation of the species (50 CFR 424.12). Federal agencies must ensure that their activities are not likely to result in the destruction or adverse modification of critical habitat through adverse effects to the essential features within defined critical habitat areas. Therefore, proposed actions that may impact designated critical habitat require an analysis of potential impacts to each essential feature. The essential features of Johnson’s seagrass critical habitat are (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 four essential features must be present in an area for it to function as critical habitat for Johnson’s seagrass.

### 3.2.9 Cumulative effect of all 12 general permits to listed species and critical habitat

Section 3 addressed the individual and cumulative effect of each of the types of actions that can be authorized by each of the 12 general permits and their likelihood to be adversely affected by the action. This section addresses the cumulative ecological impact to each of the species and critical habitat from the combination of all of the actions over the next five years.

After looking at the effects of construction impacts from all activities covered under these general permits and the likelihood that projects will not occur simultaneously in the same area, we have determined that most of the direct impacts from construction are not likely to adversely impact listed species in Florida. Those that are likely to adversely impact species or critical habitat are discussed below. The types of activities covered under these permits are not likely to change the landscape of Florida near shore waters. These permits allow the continued development of Florida while protecting species and critical habitat because project impacts are minimized by the PDCs. This is confirmed through the Tier II process defined in this opinion.

The only direct construction impacts of concern in this opinion are impacts to smalltooth sawfish critical habitat and Johnson's seagrass critical habitat. Activities authorized under these general permits can result in both individual and project level loss and a cumulative loss that can result in a loss of ecological function of these critical habitats. This loss is discussed further in the following sections.

The direct effects of noise generated from construction of these projects was also considered and determined to be insignificant or discountable based on the PDCs. Of concern was the effect that noise would have on juvenile smalltooth sawfish. Because impacts to juvenile sawfish or deterrent of adult female smalltooth sawfish from pupping could have an ecological impact on the recovery of the species, the USACE agreed to add PDCs that prohibit activities that could impact these species.

Indirect effects from activities authorized under these general permits were also analyzed in this section along with their individual and cumulative impact on species and critical habitat. An indirect impact of concern is the cumulative increase in vessel traffic resulting from the construction of a large number of docks authorized under these general permits. Section 5 discusses the potential mortality of turtles from this increased vessel traffic and its impact on the recovery of the species.

## 4. Environmental Baseline

This section is an analysis of the effects of past and ongoing human and natural factors leading to the current status of the species, its habitat (including designated critical habitat), and ecosystem, within the action area. The environmental baseline is a "snapshot" of a species' health at a specified point in time. It does not include the effects of the action under review in the consultation.

By regulation, environmental baselines for biological opinions include the past and present impacts of all state, federal, or private actions and other human activities in the action area. We identify the anticipated impacts of all proposed federal projects in the specific action area of the consultation at issue, that have already undergone formal or early Section 7 consultation as well as the impact of state or private actions which are contemporaneous with the consultation in process (50 CFR 402.02, emphasis added).

Focusing on the impacts of the activities in the action area specifically, allows us to assess the prior experience and state (or condition) of the endangered and threatened individuals, and areas of designated critical habitat that occur in an action area, and that will be exposed to effects from the action under consultation. This is important because, in some phenotypic states or life history stages, listed individuals will commonly exhibit, or be more susceptible to, adverse responses to stressors than they would be in other states, stages, or areas within their distributions. The same is true for localized populations of endangered and threatened species: the consequences of changes in the fitness or performance of individuals on a population's status depends on the prior state of the population. Designated critical habitat is not different: under some ecological conditions, the physical and biotic features of critical habitat will exhibit responses that they would not exhibit in other conditions.

*Environmental Contamination*
Coastal runoff, marina and dock construction, dredging, aquaculture, oil and gas exploration and extraction, increased under water noise and boat traffic can degrade marine habitats used by sea turtles (Colburn et al. 1996) and smalltooth sawfish. The development of marinas and docks in inshore waters can negatively impact nearshore habitats. An increase in the number of docks built increases boat and vessel traffic. Fueling facilities at marinas can sometimes discharge oil, gas, and sewage into sensitive estuarine and coastal habitats. Although these contaminant concentrations do not likely affect the more pelagic waters, sea turtles and smalltooth sawfish analyzed in this opinion travel between nearshore and offshore habitats and may be exposed to and accumulate these contaminants during their life cycles.

## 4.1 **Factors Affecting Sea Turtles in the Action Area**

As stated in Section 2.6 ("Action Area"), the proposed project is includes direct impacts to all marine inshore waters in Florida with construction along ocean beaches prohibited by the PDCs. Indirect impacts from vessel traffic occur in marine inshore and nearshore waters in Florida including the Atlantic Ocean and Gulf of Mexico. However, sea turtles found in the action area are not year-round residents of the area, and may travel widely throughout the Atlantic, Gulf of Mexico, and Caribbean Sea. Therefore, individuals found in the action area can potentially be affected by activities anywhere else within their range. Numerous activities have been identified as threats and may affect sea turtles in their respective ranges, and thus the action area (see Sections 3.2 and Appendix B). The following analysis examines actions that may affect these species' environment within the action area.

### 4.1.1 Federal Actions

In recent years, NMFS has undertaken several ESA Section 7 consultations to address the effects of federally-permitted fisheries and other federal actions on threatened and endangered species. Each of those consultations sought to develop ways of reducing the probability of adverse effects of the action on sea turtles and/or smalltooth sawfish. Similarly, recovery actions NMFS has undertaken under the ESA are addressing the problem of take of sea turtles in the fishing and oil and gas industries, vessel operations, and other activities such as USACE dredging operations.

#### 4.1.1.1 Construction and Operation of Public Fishing Piers

Several public fishing piers have been constructed within the state of Florida over the past ten years. Most of these have been constructed following the active hurricane seasons of 2004 and 2005, which resulted in damage to the then existing piers. All public fishing piers but two were constructed along the Gulf coast of Florida; only the Jacksonville and Flagler Beach fishing pier was constructed along the Atlantic coast of Florida. A list of fishing piers that NMFS has consulted on in the U.S. Atlantic and Gulf of Mexico are included in Appendix B along with the annual incidental take level anticipated for each project.

#### 4.1.1.2 Dredging

Marine dredging vessels are common within U.S. coastal waters. Although the underwater noises from dredge vessels are typically continuous in duration (for periods of days or weeks at a time) and strongest at low frequencies, they are not believed to have any long-term effect on sea turtles. However, the construction and maintenance of federal navigation channels and dredging in sand mining sites ("borrow areas") have been identified as sources of sea turtle mortality. Hopper dredges in the dredging mode are capable of moving relatively quickly compared to sea turtle swimming speed and can thus overtake, entrain, and kill sea turtles as the suction draghead(s) of the advancing dredge overtakes the resting or swimming turtle. Entrained sea turtles rarely survive. NMFS completed regional opinions on the impacts of USACE's hopper-dredging operation in 1997 for dredging along the South Atlantic (NMFS 1997b)and in 2003 for operations in the Gulf of Mexico (NMFS 2007b). In the Gulf of Mexico regional opinion, NMFS determined that (1) Gulf of Mexico hopper dredging would adversely affect Gulf sturgeon and four sea turtle species (i.e., green, hawksbill, Kemp's ridley, and loggerheads) but would not jeopardize their continued existence and (2) dredging in the Gulf of Mexico would not adversely affect leatherback sea turtles, smalltooth sawfish, or ESA-listed large whales. An ITS for those species adversely affected was issued. In the South Atlantic regional biological opinion (SARBO), NMFS determined that (1) hopper dredging in the South Atlantic would adversely affect shortnose sturgeon and four sea turtle species (i.e., green, hawksbill, Kemp's ridley, and loggerheads), but would not jeopardize their continued existence, and (2) South Atlantic dredging would not adversely affect leatherback sea turtles or ESA-listed large whales. An ITS for those species adversely affected was issued.

The above-listed regional opinions consider maintenance dredging and sand mining operations. Numerous other stand-alone opinions have been produced that analyzed hopper dredging projects that did not fall (partially or entirely) under the scope of actions contemplated by these regional opinions. For example, numerous other opinions have been issued in the action area on the west side of Florida in the Gulf of Mexico, covering navigation channel improvements and beach restoration projects, including: East Pass dredging, Destin, Florida [to USACE in 2009 (NMFS 2009a)], dredging of City of Mexico Beach canal inlet [to USACE in 2012 (NMFS 2012)]. Similarly, in the South Atlantic, opinions issued for dredging and beach nourishment projects outside the scope of the SARBO included: use of Canaveral Shoals borrow area for a beach renourishment and protection project at Patrick Air Force Base, Cocoa Beach, Florida [2010 opinion to USAF (NMFS 2010a)], channel dredging for homeporting of carrier group surface ships at U.S. Naval Station Mayport [opinion issued to USN in 2009 (NMFS 2009b)], and Boca Raton Inlet Dredging Project [opinion to USACE, 2008 (NMFS 2008)], among others. Each of the above stand-alone opinions had its own ITS and determined that hopper dredging during the proposed action would not adversely affect any species of sea turtles or other listed species, or destroy or adversely modify critical habitat of any listed species.

4.1.1.3 ESA Section 10 Permits

The ESA allows the issuance of permits to take ESA-listed species for the purposes of scientific research, under ESA Section 10(a)(1)(A). Authorized activities range from photographing, weighing, and tagging protected species incidentally taken in fisheries, to blood sampling, tissue sampling (biopsy), and performing laparoscopy on intentionally-captured organisms. The number of authorized takes varies widely depending upon the research and species involved, but may involve the taking of hundreds of individuals annually. Most takes authorized under these permits are expected to be (and are) non-lethal. Before any research permit is issued, the proposal must be reviewed under the permit regulations (i.e., must show a benefit to the species). In addition, since issuance of the permit is a federal activity, issuance of the permit by NMFS must also be reviewed for compliance with Section 7(a)(2) of the ESA to ensure that issuance of the permit does not result in jeopardy to the species or adverse modification of its critical habitat.

### 4.1.2 State or Private Actions

4.1.2.1 Vessel Traffic

Commercial vessel traffic and recreational boating pursuits can have adverse effects on sea turtles through propeller and boat strike damage. The extent of the impact on sea turtles in the action area is not known at this time.

4.1.2.2 State Fisheries

Recreational fishing from private vessels, private and public piers (described above in Section 4.1.1.1), and from shore does occur in the area. Observations of state recreational fisheries have shown that sea turtles are known to bite baited hooks, and loggerheads frequently ingest the hooks. Hooked turtles have been reported by the public fishing from boats, piers, beaches, banks, and jetties and from commercial fishermen fishing for reef fish and for sharks with both single rigs and bottom longlines (NMFS 2001). Additionally, lost fishing gear such as line cut after snagging on rocks, or discarded hooks and line, can also pose an entanglement threat to sea turtles in the area. A detailed summary of the known impacts of hook-and-line incidental captures to loggerhead sea turtles can be found in the TEWG (1998); TEWG (2000) reports.

Although few of these state regulated fisheries are currently authorized to incidentally take listed species, several state agencies have approached NMFS to discuss applications for a Section 10(a)(1)(B) incidental take permit. Although the past and current effects of these fisheries on listed species are currently not determinable, NMFS believes that ongoing state fishing activities may be responsible for seasonally high levels of observed strandings of sea turtles on both the Atlantic and Gulf of Mexico coasts.

### 4.1.3 Other Potential Sources of Impacts in the Environmental Baseline

#### 4.1.3.1 Conservation and Recovery Actions Shaping the Environment

NMFS has implemented a series of regulations aimed at reducing potential for incidental mortality of sea turtles from commercial fisheries in the action area. These include sea turtle release gear requirements for Atlantic highly migratory species (HMS) and Gulf of Mexico reef fish fisheries, and TED requirements for the southeastern shrimp trawl fisheries. These regulations have relieved some of the pressure on sea turtle populations.

Under Section 6 of the ESA, NMFS may enter into cooperative research and conservation agreements with states to assist in recovery actions of listed species. Prior to issuance of these agreements, the proposal must be reviewed for compliance with Section 7 of the ESA.

*Outreach and Education, Sea Turtle Entanglements, and Rehabilitation*
NMFS and cooperating states have established an extensive network of STSSN participants along the Atlantic and Gulf of Mexico coasts that collects data on dead sea turtles, and also rescues and rehabilitates any live stranded sea turtles.

*Sea Turtle Handling and Resuscitation Techniques*
NMFS published a final rule (66 FR 67495, December 31, 2001) detailing handling and resuscitation techniques for sea turtles that are incidentally caught during scientific research or fishing activities. Persons participating in fishing activities or scientific research are required to handle and resuscitate (as necessary) sea turtles as prescribed in the final rule. These measures help to prevent mortality of hard-shelled turtles caught in fishing or scientific research gear.

A final rule (70 FR 42508) published on July 25, 2005, allows any agent or employee of NMFS, the USFWS, the U.S. Coast Guard, or any other federal land or water management agency, or any agent or employee of a state agency responsible for fish and wildlife, when acting in the course of his or her official duties, to take endangered sea turtles encountered in the marine environment if such taking is necessary to aid a sick, injured, or entangled endangered sea turtle, or dispose of a dead endangered sea turtle, or salvage a dead endangered sea turtle that may be useful for scientific or educational purposes. NMFS already affords the same protection to sea turtles listed as threatened under the ESA [50 CFR 223.206(b)].

On August 3, 2007, NMFS published a final rule requiring selected fishing vessels to carry observers on board to collect data on sea turtle interactions with fishing operations, to evaluate existing measures to reduce sea turtle takes, and to determine whether additional measures to address prohibited sea turtle takes may be necessary (72 FR 43176). This rule also extended from 30 to 180 days, the maximum period NMFS observers may be placed on vessels in response to a determination by the Assistant Administrator that the unauthorized take of sea turtles may be likely to jeopardize their continued existence under existing regulations.

*Other Actions*
A revised recovery plan for the loggerhead sea turtle was completed December 8, 2008 (NMFS and USFWS 2008). An updated bi-national recovery plan for the Kemp's ridley sea turtle was completed in 2011 (NMFS et al. 2011). Recovery teams comprised of sea turtle experts have been convened and are currently working towards revising other plans based upon the latest and best available information. Five-year status reviews have recently been completed for green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles. These reviews were conducted to comply with the ESA mandate for periodic evaluation of listed species to ensure that their threatened or endangered listing status remains accurate. Each review determined that no delisting or reclassification of a species status (i.e., threatened or endangered) was warranted at the time. However, further review of species data for the green, hawksbill, leatherback, and loggerhead sea turtles was recommended, to evaluate whether DPSs should be established for these species (NMFS and USFWS 2007a; NMFS and USFWS 2007b; NMFS and USFWS 2007c; NMFS and USFWS 2007d; NMFS and USFWS 2007e). The Services published a final rule on September 22, 2011, listing the global population of loggerhead sea turtles as nine separate DPSs.

## 4.2 Factors Affecting Smalltooth Sawfish within the Action Area

### 4.2.1 Federal Actions

As discussed in Section 3.2, between September 2009 and October 16, 2012, NMFS completed 78 consultations with the USACE on activities that may affect critical habitat for smalltooth sawfish with the CHEU. By comparison, only 9 projects have occurred with the Ten Thousand Island/Everglades Unit and only 3 of these resulted in impacts to critical habitat. Because of the comparatively few number of projects within the Ten Thousand Island/Everglades Unit, the focus of this consultation will be the CHEU. The majority of these projects were residential single-family-home or commercial seawall construction projects within the CHEU, each resulted in up to a few hundred square feet of impacts to smalltooth sawfish critical habitat. Since the designation of critical habitat on September 2, 2009, approximately 8.88 acres of shallow, euryhaline habitat and 4,907 linear feet of red mangrove essential features have been impacted in the CHEU resulting in an average loss of 2.96 acres per year of shallow, euryhaline habitat and 1,636 linear feet of red mangrove loss per year.

### 4.2.2 State or Private Actions

A number of non-federal activities that may adversely affect designated critical habitat for smalltooth sawfish in the action area include impacts from wastewater systems, aquaculture facilities, and residential shoreline stabilization activities that do not require, or do not obtain, federal permits (i.e., seawall, riprap). The direct and indirect impacts from some of these activities are difficult to quantify. However, where possible, conservation actions through the ESA Section 10 permitting, ESA Section 6 cooperative agreements, and state permitting programs are being implemented or investigated to monitor or study impacts from these sources. There are numerous shoreline stabilization projects that have occurred and continue to occur within the smalltooth sawfish critical habitat that have completed the Section 7 consultation process.

4.2.2.1 State Fisheries

Recreational fishing from private vessels, private and public piers (described above in Section 4.1.1.1), and from shore does occur in the area. Observations of state recreational fisheries have shown that smalltooth are known to bite baited hooks. Hooked smalltooth sawfish have been reported by the public fishing from boats, piers, beaches, banks, and jetties and from commercial fishermen fishing for reef fish and for sharks with both single rigs and bottom longlines (NMFS 2001). Additionally, lost fishing gear such as line cut after snagging on rocks, or discarded hooks and line, can also pose an entanglement threat to smalltooth sawfish in the area. Although few of these state regulated fisheries are currently authorized to incidentally take listed species, several state agencies have approached NMFS to discuss applications for a Section 10(a)(1)(B) incidental take permit.

4.2.2.2 Other Potential Sources of Impacts in the Environmental Baseline

*Natural Disturbances*
Stochastic (i.e., random) events, such as hurricanes, are common throughout the range of the smalltooth sawfish, especially in the current core of its range (i.e., south and southwest Florida). These events are by nature unpredictable, and their effect on the recovery of the species is unknown. However, they have the potential to impede recovery directly if animals die as a result of them, or indirectly if important habitats are damaged as a result of these disturbances. In 2005, Hurricane Charley damaged habitat within smalltooth sawfish critical habitat, which has seemed to recover.

### 4.2.3 Conservation and Recovery Actions Shaping the Environmental Baseline

Federal Essential Fish Habitat (EFH) consultation requirements pursuant to the Magnuson-Stevens Fishery Conservation and Management Act minimize and mitigate for losses of wetlands and preserve valuable foraging and developmental habitat for juvenile smalltooth sawfish. The Magnuson-Stevens Act defines EFH as “those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity” (16 U.S.C. §1802(10)). ESA-designated critical habitat for smalltooth sawfish also fall under the jurisdiction of the Gulf of Mexico Fishery Management Council (GMFMC). NMFS has designated mangrove and estuarine habitats as EFH, as recommended by the GMFMC. Both essential features (shallow, euryhaline water less than 3 feet MLLW and red mangroves) are critical components of areas designated as EFH and receive a basic level of protection under the Magnuson-Stevens Act to the extent that the Act requires minimization of impacts to EFH resources.

NMFS is currently coordinating with the FDEP regarding Florida Statute 373.414(5)(c), which requires (or provides an exemption) to persons repairing or replacing a seawall in Florida to place riprap at the toe of the new structure. The intent of the statute is to provide structure for benthic organisms, crustaceans, and fish to occupy, which would help to mitigate for natural habitat removed by vertical seawalls. In situations where a living shoreline is not feasible, placement of riprap in front of vertical seawalls is generally desirable in most cases. However, in areas designated as smalltooth sawfish critical habitat, riprap may impact essential features, thus removing nursery function of the critical habitat from the unit. NMFS is working with FDEP and local county governments (Charlotte, Lee, Collier, Monroe, and Miami-Dade) to ensure that riprap is not required in areas designated as critical habitat for smalltooth sawfish. None of the general permits proposed in this consultation allow the placement of riprap in front of seawalls in smalltooth sawfish critical habitat.

## 4.3 Factors Affecting Johnson's seagrass Critical Habitat in the Action Area

A wide range of activities funded, authorized, or carried out by federal agencies may affect the essential habitat requirements of Johnson's seagrass. These include dredging, dock/marina construction, boat shows, bridge/highway construction, residential construction, shoreline stabilization, breakwaters, and the installation of subaqueous lines or pipelines. Other federal actions (or actions with a federal nexus) that may affect Johnson's seagrass include actions by the Environmental Protection Agency and the USACE to manage freshwater discharges into waterways; regulation of vessel traffic by the U.S. Coast Guard; management of national refuges and protected species by the USFWS; management of vessel traffic (and other activities) by the U.S. Navy; and authorization of state coastal zone management plans by NOAA's National Ocean Service. Although these actions have probably removed Johnson's seagrass and affected its critical habitat, none of these past actions have jeopardized the continued existence of Johnson's seagrass, or destroyed or adversely modified its critical habitat.

Between January 1, 2005 and November 1, 2012, according to NMFS' Public Consultation Tracking System database, ESA consultation was completed on a total of 41 proposed activities, which had the potential to affect Johnson's seagrass critical habitat. Of these consultations, 17 were concluded formally (i.e., with issuance of a biological opinion). The majority of these projects were single- or multi-family dock construction projects that each resulted in a few square feet to a few hundred square feet of impacts to Johnson's seagrass and/or its designated critical habitat. Other types of projects fall into one of the categories listed in the previous paragraph and the majority of these projects resulted in impacts to less than 0.1 acre of Johnson's seagrass or its designated critical habitat. However, a few projects resulted in more significant impacts. These included a two marinas each resulting in approximately 0.60 acres of impact to critical habitat and a marina resulting in approximately 12 acres of impact to critical habitat.

### 4.3.1 Federal Actions

4.3.1.1 Programmatic Consultation on Army Corps Permitting of Marine Construction and Dredge and Fill Projects in Miami-Dade County (SAJ-42)

As discussed in Section 2, NMFS received a request for Section 7 consultation on the reauthorization of SAJ-42 for Miami-Dade County on March 31, 2008. PGP SAJ-42 has been reissued three times since 1981 (i.e., 1986, 1994, and 2002) and cover a period of five years. NMFS issued a programmatic opinion on January 10, 2011. It is based on a review of impacts associated with the reissuance of the PGP, which gives general authority to the Miami-Dade County's DERM to administer SAJ-42 for several in-water construction activities in Miami-

Dade County, Florida. The in-water construction activities include shoreline stabilization projects, maintenance dredging, and repair, replacement, or installation of single-family piers. The USACE's Jacksonville District is the permitting authority. The opinion analyzed project effects on sea turtles, smalltooth sawfish, Johnson's seagrass, elkhorn and staghorn corals, and designated critical habitat for Johnson's seagrass and elkhorn and staghorn corals in accordance with Section 7 of the ESA and concluded Johnson's seagrass may be adversely affected by the proposed action but is not likely to be jeopardized. The impacts from SAJ-42 are important to all species considered in this opinion but most important to Johnson's seagrass and critical habitat and have the largest impact on their baseline. As stated earlier, the majority of Johnson's seagrass critical habitat falls within the jurisdiction of SAJ-42. Therefore, most of the development that will impact this species and critical habitat will be addressed under SAJ-42 versus the general permits considered under this opinion.

Dock construction, dredging, etc. within the range of Johnson's seagrass will continue, as the shoreline is highly prized for residential and commercial development. While newer construction is encouraged to follow the NMFS-USACE dock construction guidelines and the Johnson's seagrass key in order to minimize shading impacts to Johnson's seagrass and its critical habitat, loss of Johnson's seagrass will continue due to shading and the installation of pilings, even if docks are designed in full compliance with the dock construction guidelines.

### 4.3.2 State or Private Actions

#### 4.3.2.1 *Miami Boat Show*

Other projects of interest involve temporary, but recurring impacts. The international boat shows held in Miami Beach affect large areas of shallow seagrass habitat. The Miami Beach Yacht and Brokerage show project area is located within Johnson's seagrass designated critical habitat. The shows have been occurring annually for over 20 years. Impacts occur during the installation and removal of the pilings used to hold temporary floating docks in place during the events. Barges install pilings using a vibratory hammer and can cause adverse effects that disturb bottom sediments while driving the pilings into the substrate, and also from propeller wash while maneuvering into position for pile driving. Approximately 600 yachts up to 180 feet in length are showcased during the events. The docks are in place for less than 30 days, but together with the moored boats, cause large-scale, albeit temporary, shading impacts to approximately 34 acres of Johnson's seagrass and its designated critical habitat. While piling installation and shading cause event-related impacts, the greatest impact to seagrass habitat may occur from propeller dredging when the boats are backing into their slips and then later when exiting the slips following conclusion of the events. Propeller dredging can occur when large deep-draft vessels, such as the type on exhibit, are moored in shallow waters. Surveys conducted from 2003-2006 in the Miami project area found Johnson's seagrass growing in patches adjacent to the seawall out to approximately 40 feet from the seawall in depths ranging from 3 to 8 feet. Johnson's seagrass was not found in deeper depths in the Miami action area and subsequent surveys performed in 2007 to 2009 did not document the presence of Johnson's seagrass, and observed an overall decrease in abundance of all species of seagrass formerly noted. During the event, some of the vessels are moored in slips along the seawall and may cause destabilization of bottom sediments when the boats are moved into and out of their slips. Previous permits issued for the events (permits for these events are 5 years in duration), stipulated that pre-and post-show seagrass surveys were a condition of the permit. However, the surveys did not have a good sampling design and have not provided a good spatial account of the occurrence of Johnson's seagrass within the action areas. Using the results of surveys conducted by previous researchers, impacts associated with the shows over the course of the permitted action (5 years) have been estimated at 1.46 acres. NMFS determined that the Miami show may affect Johnson's seagrass but is not likely to jeopardize its continued existence. The action is also likely to adversely affect its designated critical habitat, but will not result in its destruction or adverse modification. To date, no mitigation has been proposed for the impacts to Johnson's seagrass or its critical habitat, although current permit applications for future boat shows scheduled for the next 5 years propose a compensatory mitigation component.

#### *4.3.2.2 Urban Development*

Urban development since the 1960s has affected inshore water quality throughout the range of Johnson's seagrass. However, Woodward-Clyde Consultants (1994) stated that improvements in erosion and sediment control in association with urban development in the 1980s and 1990s may have been responsible for reduced turbidity in those decades as compared to the previous two decades of development. Reductions in seagrasses were apparent in the 1970s, along with areas of highly turbid water. Increases in submerged aquatic vegetation were noted until coverage and density peaked in 1986, albeit at levels remaining below those observed in the decades prior to 1960. In association with upland development, water quality and transparency within the range of Johnson's seagrass are affected by stormwater and agricultural runoff, wastewater discharges, and other point and non-point source discharges.

The most clearly identified and manageable threat to the persistence and recovery of Johnson's seagrass is the possibility of mortality due to reduced salinity over long periods of time (NMFS 2007a). High-volume freshwater discharges from Lake Okeechobee flow downstream to the mouth of the St. Lucie River and have the potential to adversely affect Johnson's seagrass. The Comprehensive Everglades Restoration Plan may help to alleviate the frequency of high-volume freshwater discharges from Lake Okeechobee. However, the success of Comprehensive Everglades Restoration Plan is uncertain because many of the projects are still in the planning phase or early implementation phase.

#### 4.3.2.3 Recreational Vessel Traffic

Increasing recreational vessel traffic in the range of Johnson's seagrass results in marina and dock construction, improper anchoring, and propeller scarring. Propeller scarring and improper anchoring are known to adversely affect seagrasses (Kenworthy et al. 2002; Sargent et al. 1995). These activities can severely disrupt the benthic habitat by uprooting plants, severing rhizomes, destabilizing sediments, and significantly reducing the viability of the seagrass community. Propeller dredging and improper anchoring in shallow areas are a major disturbance to even the most robust seagrasses. A number of local, state, and federal statutes and conservation measures prohibit damaging seagrasses through vessel impacts. These include designation of vessel restriction zones and speed reduction zones to limit vessel access to seagrass beds, fines to those that damage seagrass beds in aquatic preserves, informational signage, mooring fields, and public awareness campaigns. Despite these efforts, vessel damage can have significant local and small-scale (1 meter$^2$ to 100 meter$^2$) impacts on seagrasses (Kirsch et al. 2005), but there is no direct evidence that these small-scale local effects are so widespread that they are a threat to the survival of Johnson's seagrass.

### 4.3.3 Other Potential Sources of Impacts in the Environmental Baseline

4.3.3.1 Natural Disturbances

A discussion of how natural disturbances (e.g., tropical storms and hurricanes) affect Johnson's seagrass is found in Section 3.2.

4.3.3.2 State and Federal Activities That May Benefit Johnson's Seagrass

As discussed above, 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). Conservation includes boater restriction zones, protection under SAJ-42 in Miami-Dade County, protections of seagrass beds under Florida manatee designated critical habitat, and local grassroot organizations working to protect seagrasses. 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 Action

### 5.1 Effects to Sea Turtles

Sea turtles may be accidently injured or killed by the potential increase of 20,456 vessels moored at docks authorized under these general permits (see Table 9). As discussed in Section 3.1, increased boat traffic could increase the probability of collisions between vessels and sea turtles. Three studies have been completed in the state of Florida that evaluated recreational boater usage for Sarasota County (Sidman et al. 2006), Charlotte Harbor (Sidman et al. 2005)), and Brevard County (Sidman et al. 2007). NMFS has previously analyzed the probability of vessel strikes to sea turtles in Florida (Barnette 2009) using a combination of these three studies, vessel registration data from the Florida Department of Motor Vehicles (DMV), and turtle stranding data from the STSSN, and the likelihood of turtles struck by vessels being undetected or unreported. This analysis was completed in 2009 using data from 2005 to 2007. Still, this study represents the most conservative estimate of vessel strikes available because vessel registration with the Florida DMV (and likely vessel usage in the state of Florida) has decreased each year since 2007. For comparison, the NMFS study determined that one turtle was struck by a vessel every 149,877 trips made from recreational coastal registered vessels in the state of Florida.

We assume these general permits will result in an increase of 20,456 vessels in Florida (see Table 9). This is likely an overestimate as many of these slips will either not have vessels stored at each individual project location, vessels stored at these locations will be relocated from an existing location (marina or previously trailered), or the permit will be issued for repairs to structures not resulting in new construction. If we assume that the average recreational boater in

Florida makes 52 trips per year (Barnette 2009), this would equal 1,028,872 vessel trips made by recreational boaters in Florida from structures built under these general permits.

An increase of 1,028,872 vessel trips made per year from structures authorized under these general permits can then be divided by the number of trips assumed to result in a vessel strike to a sea turtle (1 strike per 149,877 trips). *The results in the likelihood of 7 turtles being struck by vessels stored at structures authorized under these general permits.*

By looking at all of the sea turtles that have been reported to the STSSN in Florida in the last ten years (see Figure 7), we see a breakdown of the percentage of each of the species that are killed in Florida waters. This is not a representation of just turtles killed by vessel strikes but provides a species composition of turtles in Florida waters in the last ten years. *Using these percentages, it is estimated that the 7 turtles that may be taken by vessel strikes from vessels stored at structures approved under these general permits will be a likely combination of 3 green (42 percent), 3 loggerhead (41 percent), and 1 Kemp's ridley (11 percent).* Potential vessel strikes to leatherback and hawksbill sea turtles are not being considered further because they each represented only 3 percent of the strandings in the state of Florida (see Figure 2) and the likelihood of vessel interaction with these two species is low due to their limited distribution in the action area.

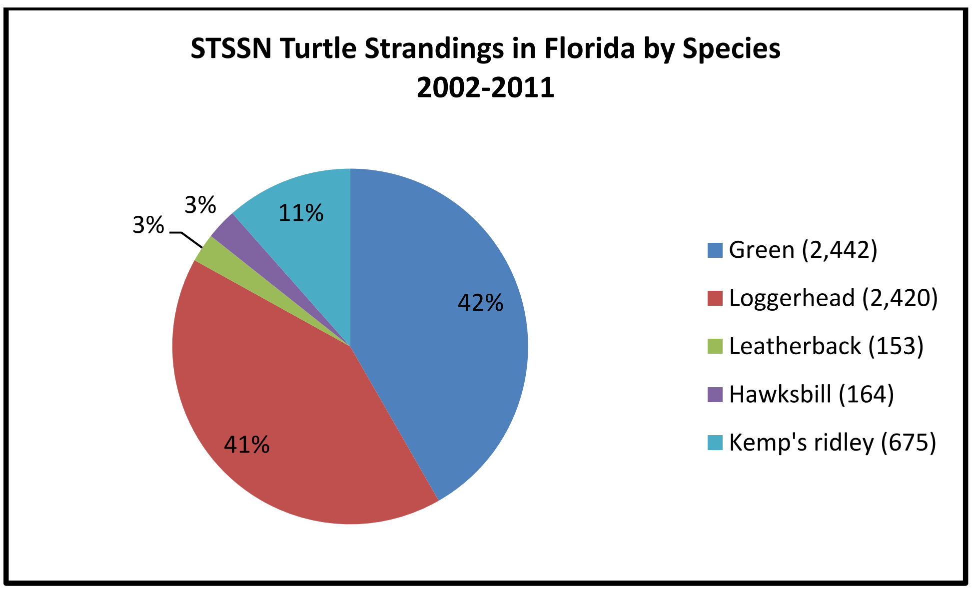



**Figure 7: STSSN Turtle Strandings in Florida by Species (2002-2011).**

### 5.2 Effects to Smalltooth Sawfish and Smalltooth Sawfish Critical Habitat

Of the two essential features to smalltooth sawfish critical habitat, only the shallow, euryhaline waters characterized by depths between the MHWL and 3 feet measured at MLLW will adversely affected from direct effects of actions authorization of these general permits. Potentially removing 5.17 acres of shallow, euryhaline habitat in the CHEU, over the next 5-year authorization period, will result in the permanent loss of loss of this critical habitat's essential feature (see Section 3.1.2 and Table 10). This equates to approximately one acre per year.

Impacts to adult and juvenile sawfish from this loss of this particular piece of habitat will be insignificant since each project area will be small as the PDCs limit construction from extending more than 18 inches from the existing structure or MHWL. Projects will only remove a thin area along the shoreline and will not impact red mangroves since the PDCs prohibit mangrove removal. Juvenile smalltooth sawfish that may inhabit the construction are, will likely be able to move to adjacent properties during construction, away from the construction activity, and return once the in-water construction is finished, without traversing deeper waters that could increase predation risk. Also, the amount of critical habitat lost is an extremely small fraction (0.006 percent) of the total critical habitat remaining in the CHEU. Based on this information, we believe all habitat-related effects of the proposed action on juvenile smalltooth sawfish will be insignificant or discountable.

Indirect impacts to smalltooth sawfish and their use of critical habitat may be adversely impacted by the noise generated from the construction of these projects. Of concern are the noise impacts associated with deterring reproductive females from parturition or harming juveniles unable to easily avoid the construction noise. As discussed in Section 3, a statistically high number of very small juveniles are found in areas defined as hotspots and reproductive females are likely using these areas to pup. NMFS compared the areas defined as hotspots by researches (Poulakis 2012; Poulakis et al. 2011) to areas with the highest density of juvenile sawfish encounters from the NSED. This data was used to define areas that require greater protection from noise generating construction in order to protect smalltooth sawfish and support the recovery of the species and its critical habitat. Hotspot boundaries were drawn around the highest density of encounters using natural geographic features used by smalltooth sawfish (e.g., shallow, euryhaline habitat, mangrove shoreline, canals with high encounter rates, etc.). Below are the coordinates and maps showing these hotspots. As research continues, these boundaries may change and other hotspots may be added or removed.

## 5.3 Effects to Johnson's Seagrass Critical Habitat

The PDCs for SAJ-17, 20, 33, and 34 do not allow direct or indirect impacts to Johnson's seagrass but do allow for construction within Johnson's seagrass critical habitat. Because of concerns about adverse impacts to Johnson's seagrass, the PDCs for these permits include the requirement to use the construction guidelines titled *"Key for Construction Conditions for Docks or Other Minor Structures Constructed in or Over Johnson's Seagrass (Halophila johnsonii) NMFS/USACE - February 2002",* for dock construction in the lagoon (as well as canal) systems on Florida's east coast from Sebastian Inlet (Brevard County) south to and including central Biscayne Bay (Miami-Dade County).

Based on the number of piling structures installed during the last five years, we can estimate the amount of impact anticipated from the authorization of these general permits over the next five years. These impacts include direct impacts from piling placement (see Table 19) and indirect impacts from the shading created by docks and vessels stored at the docks (see Table 20). We believe that the proposed action is likely to adversely affect the water transparency essential feature and the unconsolidated sediments essential feature. We believe that there will be no effects to the adequate salinity essential feature. Likewise, the adequate water quality feature is not likely to be adversely affected by the proposed action because there will be no significant effects resulting from any of the elements of the proposed action (i.e., dock construction and vessel mooring). However, a permanent loss of any one essential feature renders the area incapable of supporting Johnson's seagrass.

Piling installation will result in permanent impacts to 80 square feet of critical habitat through removal of substrate. Vessel shading may preclude future growth and recruitment of Johnson's seagrass in the shaded area underneath the vessel (or vessels) when not in use, which is presumed to be most of the time. Based on the assumed number of vessels that may be stored at docks authorized under these general permits (see Table 9), we can estimate that vessel storage would create shading over 25,520 square feet of Johnson's seagrass critical habitat. An additional 29,000 square feet of critical habitat may be affected by shading from the dock; however, Johnson's seagrass may colonize some of the areas under the dock due to the use of grated decking with a minimum 43 percent light transmittance. As stated earlier, the PDCs prohibit dock construction that will directly or indirectly impact Johnson's seagrass. In a recent study, Johnson's seagrass was found to persist under docks constructed of grated decking versus non-grated decking. Johnson's seagrass was observed in higher densities under grated versus non-grated docks, although it was reduced in frequency under grated docks (Landry et al. 2008). Therefore, Johnson's seagrass may be able to utilize some of the shaded areas of critical habitat post-construction (although possibly at a reduced density) at the project site, and should be able to recruit under the structures in the future, due to the agreed-upon conservation measures (i.e., use of grated decking over the entire dock). Thus, we conclude that the critical habitat under the vessel (25,520 square feet) and under the pilings (80 square feet) may be permanently lost to Johnson's seagrass, but that the critical habitat under the grated dock (29,000 square feet) will continue to provide critical habitat services to the species in the future. Therefore, the net loss of critical habitat from the proposed action is 25,600 square feet (0.59 acres).

**Table 19: Impacts to Johnson's seagrass critical habitat.**

| General Permit | Assumption[18] | Number times issued 2006-2010 | Impact |
|---|---|---|---|
| SAJ-17<br>Minor piling structure | (4) 10-inch pilings = 40 square inches | 27 | 1,080 square inches |
| SAJ-20<br>Single family dock | (45) 8-inch pilings = 360 square inches | 27 | 9,720 square inches |
| SAJ-33<br>Private multi-family dock less than 1000 square feet | (45) 8-inch pilings = 360 square inches | 2 | 720 square inches |
| SAJ-34 | (45) 8-inch pilings = | 0 | 0 square inches |

[18] The number of piles is based on information provided by the USACE. More accurate piling information will be collected as part of the Tier II reporting for the next renewal process.

| | | | |
|---|---|---|---|
| Commercial dock less than 1000 square feet | 360 square inches | | |
| Total | 1,120 square inches | 56 | 11,520 square inches = 80 square feet |

**Table 20: Johnson's Seagrass Critical Habitat Impacts from vessels and shading.**

| General Permit | Shading from docks | Shading from Vessels[19] | Piling impacts | Impacts from vessels and pilings |
|---|---|---|---|---|
| SAJ-17 Minor piling structure | Docks not permitted under this general permit | 1 vessel x 27 times authorized x 176 square feet= 4,752 square feet | 1,080 square inches (7.5 square feet) | 4,759.5 square feet |
| SAJ-20 Single family dock | 1,000 square feet x 27 times authorized = 27,000 square feet | 4 vessels x 27 times authorized x 176 square feet = 19,008 square feet | 9,720 square inches (67.5 square feet) | 19,075.5 square feet |
| SAJ-33 Private multi-family dock less than 1000 square feet | 1,000 square feet x 2 times authorized = 2,000 square feet | 5 vessels x 2 times authorized x 176 square feet = 1,760 square feet | 720 square inches (5 square feet) | 1,765 square feet |
| SAJ-34 Commercial dock less than 1000 square feet | Not used to authorize permits in Johnson's CH during the last 5 years. | Not used to authorize permits in Johnson's CH during the last 5 years. | 0 square inches | 0 |
| Total | 29,000 square feet | 25,520 square feet | 80 square feet | 25,600 square feet (0.59 acres) |

## 6. Cumulative Effects

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

[19] The average vessel stored at a residential dock is 22 feet long and 8 feet wide which creates a shadow of 176 square feet, based on information from the USACE. This dimension is multiplied by the estimated number of vessels anticipated to be stored at the dock per general permit and the number of times the permit was authorized during the last five years (see Table 9).

## 6.1 Cumulative Effects to Sea Turtles

Cumulative effects from unrelated, non-federal actions occurring in the action area may affect sea turtles. Stranding data indicate sea turtles in the action area die of various natural causes, including cold stunning and hurricanes, as well as human activities, such as incidental capture in state fisheries, ingestion of and/or entanglement in debris, ship strikes, and degradation of nesting habitat. The cause of death of most sea turtles recovered by the stranding network is unknown.

The fisheries described as occurring within the action area (see Sections 3 and 4, the Status of the Species and the Environmental Baseline, respectively) are expected to continue as described into the foreseeable future, concurrent with the proposed action. NMFS is not aware of any proposed or anticipated changes in these fisheries (excluding the southeastern shrimp fisheries) that would substantially change the impacts each fishery has on sea turtles covered by this opinion.

## 6.2 Cumulative Effects to Smalltooth Sawfish and Smalltooth Sawfish Critical Habitat

Smalltooth sawfish habitat has been degraded or modified throughout the southeastern United States from agriculture, urban development, commercial activities, channel dredging, boating activities, and the diversion of freshwater runoff. While the degradation and modification of habitat is not likely the primary reason for the decline of smalltooth sawfish abundance and their contracted distribution, it has likely been a contributing factor.

No categories of effects beyond those already described are expected in the action area. The smalltooth sawfish critical habitat units will likely continue to experience the same types of actions described in the status of critical habitat in Section 3. These threats include shoreline armoring, canal dredging, and dock construction. The additive effect of these actions to the essential features of critical habitat will continue to be assessed by the USACE to ensure that they either meet the PDCs defined by SAJ-17, 20, 33, 34, and 91 or will require review by NMFS on a project-level basis through the Section 7 process. The effects of these actions are tracked cumulatively through an improved tracking and reporting system internally by NMFS and by the reporting requirements set forth under the Tier II requirements of this consultation.

Although the vast majority of these future activities will have a federal nexus (i.e., USACE permit requirement) and thus will be subject to ESA Section 7 consultation, the total losses of critical habitat that may accrue over time could at some point have measurable adverse impacts on the conservation function of critical habitat. Since the time of critical habitat designation in 2009, NMFS has completed Section 7 consultations on projects that have resulted in the loss of approximately 2.96 acres per year of shallow, euryhaline habitat and 1,636 linear feet per year of red mangrove shoreline in the CHEU, as of October 16, 2012. Compared to 78 projects that have undergone Section 7 consultation in the CHEU, the Ten Thousand Islands critical habitat unit has only had 10 projects. The amount of impact anticipated in the next five years is based on the assumption that the amount of impact from the last five years reported to have occurred in smalltooth sawfish critical habitat will be the same with the potential of up to a 10 percent increase (see the assumptions made in Section 2.7). However, the USACE did not define which critical habitat unit in which these impacts occurred (i.e., CHEU or Ten Thousand Islands).

Since only 11 percent (i.e., 10 of the 88 completed projects) of the projects have occurred in the Ten Thousand Islands critical habitat unit, we are going to assume that all of the projects that will be approved under these general permits will occur in the CHEU. According to the Smalltooth Sawfish Recovery Plan (NMFS 2009c), the species recovery is expected to take approximately 100 years (4 generations), assuming that all recovery actions are fully funded and implemented. Using data gathered from projects that have been consulted on by this office and applying this number as the expected rate of critical habitat loss per year (2.96 acre per year) extrapolated out 100 years would result in a loss of shallow, euryhaline habitat of 296 acres or 0.35 percent of total available shallow, euryhaline habitat, and a loss of 191,000 linear feet or 3.46 percent of total available mangrove habitat, in the CHEU. It is important to note that these losses do not include impacts from actions that do not have a federal nexus and would not be subject to ESA Section 7 consultation; however, as previously noted, most activities occurring in CHEU do have a federal nexus.

## 6.3 Cumulative Effects to Johnson's Seagrass Critical Habitat

No categories of effects beyond those already described are expected in the action area. Dock construction will likely continue, with concomitant loss and degradation of seagrass habitat, including Johnson's seagrass; however, these activities are subject to USACE permitting and/or ESA Section 7 consultation. NMFS and the USACE have developed and are working on updating protocols to encourage the use of light-transmitting materials in future construction of docks within the range of Johnson's seagrass, as defined in the PDCs of these general permits. However, even if all new docks are constructed in full compliance with the dock construction guidelines, there will still be shading impacts to Johnson's seagrass and its designated critical habitat from all new docks (but shading impacts would be significantly reduced if guidelines are followed). Landry et al. (2008) found that Johnson's seagrass persisted under docks constructed of grated decking versus non-grated decking. Although it was reduced in frequency under grated docks, Johnson's seagrass was observed in higher densities under grated versus non-grated docks. NMFS acknowledges that shading impacts to Johnson's seagrass and its designated critical habitat will continue via dock construction; however, if NMFS and the USACE continue to encourage permit applicants to design and construct new docks in full compliance with the dock construction guidelines, the Johnson's Seagrass Key, and the recommendations in Landry et al. (2008) and Shafer et al. (2008), NMFS believes that shading impacts to Johnson's seagrass and its designated critical habitat will be reduced in the short- and long-term.

The creation, widening, and deepening of inlets and channels will continue to remove and/or bury Johnson's seagrass and its designated critical habitat, destabilize sediments, and decrease water transparency. However, dredge/fill activities that may affect Johnson's seagrass and/or its designated critical habitat are subject to USACE permitting and ESA Section 7 consultation.

Upland development and associated runoff will continue to degrade water quality and decrease water clarity necessary for growth of seagrasses. Flood control and imprudent water management practices will continue to result in freshwater inputs into estuarine systems, thereby degrading water quality and altering salinity. Long-term, large-scale reduction in salinity has been identified as a potentially significant threat to the persistence and recovery of Johnson's seagrass

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. However, it is expected that ongoing boater education programs and posted signage about the dangers to seagrass beds from propeller scarring and improper anchoring may reduce impacts to Johnson's seagrass and its designated critical habitat.

## 7. Jeopardy Analysis and Destruction/Adverse Modification Analysis

The analyses conducted in the previous sections of this opinion serve to provide a basis to determine whether the proposed action would be likely to jeopardize the continued existence of loggerhead, green and Kemp's ridley. In Section 6.0, we outlined how the proposed action can affect these sea turtles. Now we turn to an assessment of the species response to these impacts, in terms of overall population effects, and whether those effects of the proposed action, when considered in the context of the status of the species (Section 3.0), the environmental baseline (Section 4.0), and the cumulative effects (Section 6.0), will jeopardize the continued existence of the affected species.

This section evaluates whether the proposed action is likely to jeopardize the continued existence of loggerhead, green, and Kemp's ridley sea turtles in the wild. To *jeopardize the continued existence of* is defined as "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR 402.02). Section 5 ("Effects of the Action") describes the effects of the proposed action on Kemp's ridley, loggerhead, and green sea turtles, and the extent of those effects in terms of an estimate of the number of sea turtles that would be captured or killed.

As discussed in Section 2.7, we looked at the number of vessels registered in the state of Florida over the last ten years to determine trends. Since there was a 10 percent fluctuation in vessel registration (probably due to changes in the economy), we assume that the number of vessels that may occur in Florida waters over the next five years could increase by up to 10 percent. Therefore, we look at the number of turtles estimated to be captured or killed from Section 5 and add 10 percent. Since the numbers are low per species, this does not change the estimate of numbers for the jeopardy analysis.

The following jeopardy analyses first consider the effects of the action to determine if we would reasonably expect the action to result in reductions in numbers, reproduction, or distribution of the affected sea turtle species. The analyses next consider whether any such reduction(s) would in turn result in an appreciable reduction in the likelihood of survival of these species in the wild, and the likelihood of recovery of these species in the wild. In sum, we evaluated whether or not any anticipated take of sea turtle species will result in any reduction in reproduction, numbers, or distribution that may appreciably increase any species' risk of extinction, or appreciably interfere with achieving recovery objectives, in the wild.

In the following analyses, we find that although some reduction in numbers and reproduction is expected for sea turtles species, the anticipated take of Kemp's ridley, loggerhead, and green sea turtles will not appreciably increase the risk of extinction of these species in the wild, or appreciably interfere with achieving recovery objectives for the species.

All life stages are important to the survival and recovery of the species; however, it is important to note that individuals of one life stage are not equivalent to those of other life stages. For example, the take of male juveniles may affect survivorship and recruitment rates into the reproductive population in any given year, and yet not significantly reduce the reproductive potential of the population. A very low percent of hatchlings is typically expected to survive to reproductive age. The death of mature, breeding females can have an immediate effect on the reproductive rate of the species. Sub-lethal effects on adult females may also reduce reproduction by hindering foraging success, as sufficient energy reserves are probably necessary for producing multiple clutches of eggs in a breeding year. Different age classes may experience varying rates of mortality and resilience.

For this analysis, we acknowledge that the loss of reproductive female sea turtles would have the greatest effect on the overall genetic diversity of each species. The impact resulting from the loss of a reproductive female is discussed in greater detail below for each species. However, it is reasonable to assume that reproductive female will not be the only sea turtles that would be impacted since approximately 50 percent of the population is male, based on the sex ratio of any species. Furthermore, since juveniles comprise a portion of the population (albeit a currently unknown quantity) the likelihood that a mature female would be captured is even less. Therefore, we analyze the possible worst case scenario of the loss of reproductive female(s) but cannot anticipate and do not define the age or gender of the sea turtle that may be lethally taken indirectly by the proposed action. We do not believe the potential impacts discussed below will have a measurable effect on the species' overall genetic diversity or species recovery.

## 7.1 **Loggerhead Sea Turtles**

The maximum potential lethal take of 3 loggerhead sea turtles is a reduction in numbers. These lethal takes would also result in a reduction in reproduction as a result of lost reproductive potential, as some of these individuals would be females who would have survived other threats and reproduced in the future, thus eliminating each female individual's contribution to future generations. For example, an adult female loggerhead sea turtle can lay 3 or 4 clutches of eggs every 2 to 4 years, with 100 to 130 eggs per clutch. The annual loss of adult female sea turtles, on average, could preclude the production of thousands of eggs and hatchlings of which a small percentage would be expected to survive to sexual maturity. Because all the potential interactions are expected to occur at random throughout the proposed action area and sea turtles generally have large ranges in which they disperse, the distribution of loggerhead sea turtles in the action area is expected to be unaffected.

Whether or not the reductions in loggerhead sea turtle numbers and reproduction attributed to the proposed action would appreciably reduce the likelihood of survival for loggerheads depends on what effect these reductions in numbers and reproduction would have on overall population sizes and trends, i.e., whether the estimated reductions, when viewed within the context of the environmental baseline and status of the species, are of such an extent that adverse effects on population dynamics are appreciable. In Section 3.1, we reviewed the status of the species in terms of nesting and female population trends and several recent assessments based on population modeling [e.g., (Conant et al. 2009; NMFS-SEFSC 2009a)]. Below we synthesize what that information means in general terms and also in the more specific context of the proposed action and the environmental baseline.

Loggerhead sea turtles are a slow growing, late-maturing species. Because of their longevity, loggerhead sea turtles require high survival rates throughout their life to maintain a population. In other words, late-maturing species cannot tolerate much anthropogenic mortality without going into decline. Conant et al. (2009) concluded loggerhead natural growth rates are small; natural survival needs to be high; and even low to moderate mortality can drive the population into decline. Because recruitment to the adult population is slow, population modeling studies suggest even small increased mortality rates in adults and sub-adults could substantially impact population numbers and viability (Chaloupka and Musick 1997; Crouse et al. 1987; Crowder et al. 1994; Heppell et al. 1995).

The best available information indicates that the NWA DPS of loggerheads is still large, but is possibly experiencing more mortality than it can withstand. All of the results of population models in both NMFS SEFSC (2009a) and Conant et al. (2009) indicated western North Atlantic loggerheads were likely to continue to decline in the future unless action was taken to reduce anthropogenic mortality. With the inclusion of newer nesting data beyond the 2007 data used in those analyses, the status of loggerhead nesting is beginning to show improvement. As previously described in the Status of the Species section, in 2008 nesting numbers were high, but not enough to change the negative trend line. Nesting dipped again in 2009, but rose substantially in 2010. The 2010 Florida index nesting number was the largest since 2000. With the addition of data through 2010, the nesting trend for the NWA DPS of loggerheads is only slightly negative and not statistically different from zero (no trend) (NMFS and USFWS 2010). Additionally, although the best-fit trend line is slightly negative, the range from the statistical analysis of the nesting trend includes both negative and positive growth (NMFS and USFWS 2010). The 2011 nesting was on par with 2010, providing further evidence that the nesting trend may have stabilized. It is important to note, however, that even if the trend has stabilized, overall numbers have a long way to go to meet the goals of the recovery plan.

NMFS SEFSC (2009a) estimated the minimum adult female population size for the western North Atlantic in the 2004-2008 time frame to likely be between 20,000 to 40,000 (median 30,050) individuals, with a low likelihood of being as many as 70,000 individuals. Estimates were based on the following equation: Adult females = (nests/(nests per female)) x remigration interval. The estimate of western North Atlantic adult loggerhead female was considered conservative for several reasons. The number of nests used for the western North Atlantic was based primarily on U.S. nesting beaches. Thus, the results are a slight underestimate of total nests because of the inability to collect complete nest counts for many non-U.S. nesting beaches. In estimating the current population size for adult nesting female loggerhead sea turtles, NMFS SEFSC (2009a) simplified the number of assumptions and reduced uncertainty by using the minimum total annual nest count over the relevant 5-year period (2004-2008) (i.e., 48,252 nests). This was a particularly conservative assumption considering how the number of nests and nesting females can vary widely from year to year (cf., 2008's nest count of 69,668 nests, which would have increased the adult female estimate proportionately, to between 30,000 and 60,000). Also, minimal assumptions were made about the distribution of remigration intervals and nests per female parameters, which are fairly robust and well known parameters.

Although not in NMFS SEFSC (2009a), NMFS SEFSC, in conducting its loggerhead assessment also produced a much less robust estimate for total benthic females in the western North Atlantic, with a likely range of approximately 60,000 to 700,000, up to less than one million. This estimate was discussed during the SEFSC's presentation on the loggerhead assessment to the Gulf Council's Reef Fish Committee at its June 16, 2009, meeting (NMFS-SEFSC 2009b). The estimate of overall benthic females is considered less robust because it is model-derived, assumes a stable age/stage distribution, and is highly dependent upon the life history input parameters. Relative to the more robust estimate of adult females, this estimate of total benthic female population is consistent with our knowledge of loggerhead life history and the relative abundance of adults and benthic juveniles: the benthic juvenile population is an order of magnitude larger than adults. Therefore, we believe female benthic loggerheads number in the hundreds of thousands, and therefore smaller pelagic stage individuals would occur in similar or even greater numbers.

Recent studies (Conant et al. 2009; Merrick et al. 2008; NMFS-SEFSC 2009a; NMFS and USFWS 2008; TEWG 2009; Witherington et al. 2009)] have all concluded that loggerhead nesting and adult female populations in the western North Atlantic are in decline and likely to continue to decline, as detailed previously, more recent analyses have indicated that the trend may have stabilized (NMFS and USFWS 2010). As discussed in Section 3 and TEWG (2009), there is information on increases of abundance in some juvenile age classes, which makes an assessment of overall population trends more difficult. The population is clearly not at a stable age distribution, given past population perturbations. It is possible that observed declines may be transitory effects, which will be compensated for by a wave of recruitment, which may be what we are seeing with the latest data. However, the fact remains that NMFS-SEFSC (2009b), even though it was completed prior to nesting data from 2008-2010, is still the most comprehensive demographic model to date and predicted that a continued decline in the total population is likely, given our present knowledge of loggerhead life history parameters. Therefore, we believe a conservative assessment of the NWA DPS is to consider the effects of the action as if the population is still in an overall minor declining trend.

Despite the recently observed decline of the NWA DPS, its total population remains large. Adult female population size is conservatively estimated, based on the minimum nesting year of 2007, in the range of 20,000 to 40,000. The adult male population would be similar. Benthic juveniles number into the hundreds of thousands. We believe the currently large population is still under the threat of possible future decline until large mortality reductions in fisheries and other sources of mortality (including impacts outside U.S. jurisdiction) are achieved and/or the impacts of past protection and conservation efforts are realized within the population. However, over at least the next several decades, we expect the NWA population of adult females to remain large and to retain the potential for recovery. The effects of the proposed action will have an instantaneous effect on the overall size of the population, which we believe will remain sufficiently large for several decades to come even if the population were still in a minor decline, and the action will not measurably reduce the size of the population, cause the population to lose genetic heterogeneity or broad demographic representation, impede successful reproduction, nor affect loggerheads' ability to meet their life cycle requirements, including reproduction, sustenance, and shelter.

The Services' recovery plan for the NWA population of the loggerhead turtle (NMFS and USFWS 2008) which is the same population of turtles as the NWA DPS, provides additional explanation of the goals and vision for recovery for this population. The objectives of the recovery plan most pertinent to the threats posed by the proposed action are numbers 1 and 2:

- Ensure that the number of nests in each recovery unit is increasing and that this increase corresponds to an increase in the number of nesting females.
- Ensure the in-water abundance of juveniles in both neritic and oceanic habitats is increasing and is increasing at a greater rate than strandings of similar age classes.

Recovery objective 1, "Ensure that the number of nests in each recovery unit is increasing…," is the plan's overarching objective and has associated demographic criteria. Currently, none of the plan's criteria are being met, but the plan acknowledges that it will take 50-150 years to do so. Further reduction of multiple threats throughout the North Atlantic, Gulf of Mexico, and Greater Caribbean will be needed for strong, positive population growth, following implementation of more of the plan's actions. Although any continuing mortality in what might be an already declining population can affect the potential for population growth, we believe the effects of the proposed action would not impede or prevent achieving this recovery objective over the anticipated 50-150 year time frame.

Recovery objective 2, "Ensure the in-water abundance of juveniles in both neritic and oceanic habitats is increasing and is increasing at a greater rate than strandings of similar age classes." Currently, there are not enough data to determine if this objective is being met. The NWA DPS nesting trend for loggerhead sea turtles remains slightly negative, although as mentioned above the trend has likely stabilized. Overall, loggerhead populations have a long way to go before the population decline is reversed and numerical increases in population meet the goals of the recovery plan. As with recovery objective 1 above, continuing mortality in what might still be a declining population resulting from the proposed action would not impede or prevent achieving this recovery objective over the anticipated 50-150 year time frame.

We believe that the proposed action is not reasonably expected to cause an appreciable reduction in the likelihood of recovery of the NWA DPS of loggerheads. Recovery is the process of removing threats so self-sustaining populations persist in the wild. The proposed action would not impede progress on achieving the identified relevant recovery objectives or achieving the overall recovery strategy.

## 7.2 **Green Sea Turtles**

The maximum potential lethal take of 3 green sea turtles is a reduction in numbers. These lethal takes would also result in a potential reduction in future reproduction, assuming some individuals would be females and would have survived otherwise to reproduce. For example, an adult green sea turtle can lay 1-7 clutches (usually 2-3) of eggs every 2 to 4 years, with 110-115 eggs/nest of which a small percentage is expected to survive to sexual maturity. Green sea turtles are highly migratory, and individuals from all Atlantic nesting populations may range throughout the Gulf of Mexico, Atlantic Ocean, and Caribbean Sea. While the potential lethal take and relocation of turtles captured in trawls would result in a displacement of individuals from important developmental habitat, the loss is not significant in terms of local, regional, or global distribution as a whole. The majority of reproductive effort for green sea turtles comes from Florida and the Florida population distribution would be expected to remain the same. Therefore, we believe the anticipated impacts will not affect the species' distribution.

Whether the reductions in numbers and reproduction of green sea turtles species would appreciably reduce the species' likelihood of survival depends on the probable effect the changes in numbers and reproduction would have on current population sizes and trends.

The 5-year status review for green sea turtles states that of the seven green sea turtle nesting concentrations in the Atlantic Basin for which abundance trend information is available, all were determined to be either stable or increasing (NMFS and USFWS 2007a). That review also states that the annual nesting female population in the Atlantic basin ranges from 29,243-50,539 individuals. Additionally, the pattern of green sea turtle nesting shows biennial peaks in abundance, with a generally positive trend during the ten years of regular monitoring since establishment of index beaches in Florida in 1989. An average of 5,039 green turtle nests were laid annually in Florida between 2001 and 2006 with a low of 581 in 2001 and a high of 9,644 in 2005 (NMFS and USFWS 2007a). Data from the index nesting beaches program in Florida substantiate the dramatic increase in nesting. In 2007, there were 9,455 green turtle nests found just on index nesting beaches, the highest since index beach monitoring began in 1989. The number fell back to 6,385 in 2008, further dropping under 3,000 in 2009, but that consecutive drop was a temporary deviation from the normal biennial nesting cycle for green turtles, as 2010 saw an increase back to 8,426 nests on the index nesting beaches (FWC Index Nesting Beach Survey Database). Modeling by Chaloupka et al. (2008) using data sets of 25 years or more resulted in an estimate of the Tortuguero, Costa Rica, population growing at 4.9 percent annually.

For a population to remain stable, sea turtles must replace themselves through successful reproduction at least once over the course of their reproductive lives, and at least one offspring must survive to reproduce itself. If the hatchling survival rate to maturity is greater than the mortality rate of the population, the loss of breeding individuals would be exceeded through recruitment of new breeding individuals from successful reproduction of non-taken sea turtles. Since the abundance trend information for green sea turtles is clearly increasing, we believe the lethal interactions attributed to the proposed action will not have any measurable effect on that trend. Therefore, we conclude the proposed action is not likely to appreciably reduce the likelihood of survival of green sea turtles in the wild.

The Recovery plan for the population of Atlantic green sea turtles (NMFS and USFWS 1991) lists the following relevant recovery objectives over a period of 25 continuous years:

- The level of nesting in Florida has increased to an average of 5,000 nests per year for at least 6 years;
    - Status: Green sea turtle nesting in Florida between 2001-2006 was documented as follows: 2001 – 581 nests, 2002 – 9,201 nests, 2003 – 2,622, 2004 – 3,577 nests, 2005 – 9,644 nests, 2006 – 4,970 nests. This averages 5,039 nests annually over those 6 years (2001-2006) (NMFS and USFWS 2007a). Subsequent nesting has shown even higher average numbers (i.e., 2007 – 9,455 nest, 2008 – 6,385, 2009 – 3, 000, 2010 – 8,426 nests, 2011 – 10,701), thus, this recovery criterion continues to be met.
- A reduction in stage class mortality is reflected in higher counts of individuals on foraging grounds.
    - Status: Several actions are being taken to address this objective; however, there are currently no estimates available specifically addressing changes in abundance of individuals on foraging grounds. Given the clear increases in nesting, however, it is likely that numbers on foraging grounds have increased by at least the same amount. This opinion's effects analysis assumes that in-water abundance has increased at the same rate as Tortuguero nesting.

Lethal interactions of green sea turtles attributed to the proposed action are not likely to reduce population numbers over time due to current population sizes, nesting increases and expected recruitment. Thus, the proposed action is not likely to impede the recovery objectives above and will not result in an appreciable reduction in the likelihood of green sea turtles' recovery in the wild.

## 7.3 Kemp's Ridley Sea Turtles

The maximum potential lethal take of 1 Kemp's ridley sea turtle is a reduction in numbers. This lethal take would also result in a potential reduction in future reproduction, assuming some individuals would be females and would have survived otherwise to reproduce. For example, females lay approximately 2.5 nests per season with each nest containing approximately 100 eggs, though only a small percentage is expected to survive to sexual maturity. Kemp's ridleys are wide ranging throughout the Gulf of Mexico and along the Atlantic coast, and while the potential lethal take would result in a displacement of individuals from important developmental habitat, the loss is not significant in terms of the species' rangewide distribution as a whole.

The proposed action's reductions in numbers and reproduction would reduce the species' population compared to the number that would have been present in the absence of the proposed action, assuming all other variables remained the same. Whether the reductions in numbers and reproduction of Kemp's ridley sea turtles species would appreciably reduce this species' likelihood of survival depends on the probable effect the changes in numbers and reproduction would have on current population sizes and trends.

Heppell et al. (2005) predicted in a population model that the Kemp's ridley sea turtle population is expected to increase at least 12-16 percent per year and that the population could attain at least 10,000 females nesting on Mexico beaches by 2015. NMFS et al. (2011) contains an updated model which predicts that the population is expected to increase 19 percent per year and that the population could attain at least 10,000 females nesting on Mexico beaches by 2011. Approximately 25,000 nests would be needed for an estimate of 10,000 nesters on the beach, based on an average 2.5 nests/nesting female. In 2009 the population was on track with 21,144 nests, but an unexpected and as yet unexplained drop in nesting occurred in 2010 (13,302), deviating from the NMFS et al. (2011) model prediction. A subsequent increase to 20,570 nests in 2011 occurred. Though we will not know if the population is continuing the recovery trajectory and timeline predicted by the model until future nesting data is available, there is nothing to indicate the trend of increases in this species' population will cease.

The recovery plan for the Kemp's ridley sea turtle (NMFS et al. 2011) lists the following relevant recovery objectives:

- A population of at least 10,000 nesting females in a season (as measured by clutch frequency per female per season) distributed at the primary nesting beaches (Rancho Nuevo, Tepehuajes, and Playa Dos) in Mexico is attained. Methodology and capacity to implement and ensure accurate nesting female counts have been developed.

The recovery plan states average nests per female is 2.5 and sets a recovery goal of 10,000 nesting females that would be represented by 25,000 nests in a season. As discussed above, nesting levels had been steadily increasing to a high of 21,144 nests in 2009, exhibited a substantial decline in 2010, but rebounded markedly in 2011 to 20,570 nests. The lethal take of 1 Kemp's ridleys by the proposed action will not affect the overall level or trend in adult female nesting population numbers or number of nests per nesting season. Thus, the proposed action will not result in an appreciable reduction in the likelihood of Kemp's ridley sea turtle recovery in the wild.

## 7.4 Smalltooth Sawfish Critical Habitat

This section analyzes the effects of this action, in the context of the status of the critical habitat, the environmental baseline and cumulative effects, to determine whether the adverse effects are likely to destroy or adversely modify smalltooth sawfish critical habitat. When determining the potential impacts to critical habitat this biological opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.02. Instead we have relied upon the statutory provisions of the ESA to complete the following analysis with respect to critical habitat. Ultimately, we seek to determine if, with the implementation of the proposed action, critical habitat would remain functional (or retain the current ability for the essential features to be functionally established) to serve the intended conservation role for the species. Thus, we evaluate whether the essential features will continue to provide juvenile smalltooth sawfish with nursery habitat functions after implementation of the proposed action and whether the project will impede (i.e., delay or limit) the conservation of the smalltooth sawfish.

NMFS designated critical habitat to protect juvenile nursery areas and assist in the recovery of the species by facilitating recruitment into the adult population. Impacts to designated critical habitat have the potential to further destabilize recovery efforts and stymie chances for recovery. The recovery strategy in the smalltooth sawfish recovery plan focused on three main objectives (1) minimize human interactions and associated injury and mortality; (2) protect and/or restore smalltooth sawfish habitats; and (3) ensure smalltooth sawfish abundance increases substantially and the species reoccupies areas from which it had previously been extirpated (NMFS 2009).

The proposed action will result in a permanent loss of designated critical habitat. Because critical habitat is designated to facilitate the conservation of the species, we must evaluate whether this loss of habitat would interfere with the conservation objective of the designated critical habitat – that is, facilitation of juvenile recruitment into a recovering adult population. The Smalltooth Sawfish Recovery Plan states that each of nine recovery regions counts toward the downlisting and delisting criteria to ensure the species is viable in the long-term and can maintain genetic diversity (NMFS 2009). For the three recovery regions with remaining high-quality juvenile habitat (recovery regions G, H, and I in southwest Florida; the CHEU is in recovery region G), juvenile habitats must be maintained and effectively protected over the long term at or above 95 percent of the acreage available at the time of listing, which occurred in April 2003. In recovery region G, the recovery objectives also require that the relative abundance of small juvenile sawfish (< 200-cm STL) either increases at an average annual rate of at least 5 percent over a 27-year period, or juvenile abundance is at greater than 80 percent of the carrying capacity of the recovery region.

We estimated that 5.17 acres of the shallow, euryhaline essential feature will be permanently lost and cease to function as critical habitat due to seawall installation authorized under SAJ-91, based on the number authorized during the last five years (see Section 3.1.2 and Section 5.2). As discussed in Section 2.7, we assume that this number could increase up to 10 percent over the next five years. *Therefore, we estimate that approximately 5.69 acres of shallow, euryhaline habitat may be lost over the next five years.*

As of 2003, the amount of shallow, euryhaline habitat in the CHEU alone was estimated to be 84,480 acres (132 square miles) and the amount of red mangrove shoreline is 5,512,320 linear feet (1,044 miles), based on remote sensing data from Florida Wildlife Research Institute . At the time of smalltooth sawfish critical habitat designation in 2009, our estimate of the current average loss of essential features (red mangrove/shallow, euryhaline habitat) was approximately 0.40 acre per year, based on USACE project applications between 2007 and 2009. Since the time of critical habitat listing in 2009 to October 16, 2012, NMFS has completed Section 7 consultations on projects that have resulted in the total loss of approximately 8.88 acres of shallow, euryhaline habitat and 4,907 linear feet of red mangrove shoreline. These total losses translate into annual rates of loss of approximately 2.96 acres of shallow, euryhaline habitat and 1,636 linear feet of red mangrove shoreline. According to the recovery plan objectives, 95 percent of this habitat (approximately 80,256 acres of shallow, euryhaline habitat and 5,236,704 linear feet of red mangrove) must be maintained and effectively protected to facilitate recovery of the sawfish. This requirement is premised on the fact that, although the CHEU is part of the larger recovery region G, designated critical habitat is currently the only area in which nursery areas have been established and are being protected specifically for that purpose. The authorization of seawall installation projects under SAJ-91 would result in the loss of 5.69 acres of shallow, euryhaline essential features and would not interfere with achieving this recovery objective.

Assessment of impacts of the project on the other relevant recovery objective, juvenile abundance, is made difficult by the state of available data. Because smalltooth sawfish critical habitat was recently designated in 2009 and the smalltooth sawfish recovery plan was also released in 2009, studies needed to assess some aspects of the recovery plan have just begun. Given the limited duration (3 years) of a current study to assess annual rates of increase within recovery regions G, H, I, and J, there is not enough data to discern the trend in juvenile abundance within the recovery region. Though species abundance is generally linked to habitat availability, the permanent loss of 5.69 acres of the shallow, euryhaline essential feature of critical is not likely to impede the 5 percent annual growth mandate for the juvenile population within recovery region G. Therefore, NMFS concludes that the proposed action's adverse effects on the essential features of smalltooth sawfish critical habitat will not impede achieving the recovery objectives listed above.

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

This section also analyzes the effects of this action, in the context of the status of the critical habitat, the environmental baseline and cumulative effects, to determine whether the adverse effects are likely to destroy or adversely modify Johnson's seagrass critical habitat.

Critical habitat determinations focus on those physical and biological features (called "essential features") that are essential to the conservation of the species. The ESA defines "conservation" 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 – when a species is judged to be recovered. Recovery of this species, as described in the recovery plan, will be achieved when the following conditions 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; and (3) populations and supporting habitat in its geographic range have long-term protection (through regulatory action or purchase acquisition). The essential features of Johnson's seagrass critical habitat are adequate water quality, adequate salinity levels, adequate water transparency, and stable, unconsolidated sediments that are free from physical disturbance. Therefore, our destruction/adverse modification analysis evaluates whether the adverse effects to the critical habitat essential features will impede achieving these recovery objectives.

In Section 5, NMFS determined that 25,600 square feet (0.59 acre) of designated critical habitat for Johnson's seagrass will be permanently lost due to impacts associated with the placement of pilings and from shading by the vessel, based on the number of docks authorized during the last five years. As discussed in Section 2.7, we assume that this number could increase up to 10 percent over the next five years due to fluctuations in the economy. *Therefore, we estimate that 28,160 square feet (0.65 acre) of designated critical habitat for Johnson's seagrass will be permanently lost over the next five years.*

These effects will not reduce or destabilize the present range of Johnson's seagrass. There are thousands of acres of unaffected designated critical habitat for Johnson's seagrass exist along the east coast of Florida between Sebastian Inlet and Biscayne Bay that will be unaffected by this action. The proposed project will not disturb designated critical habitat for Johnson's seagrass outside the action area of each individual project, and the potential for a self-sustaining population of Johnson's seagrass is not being removed from this critical habitat unit. This project will not affect the long-term protection of the species or its designated critical habitat elsewhere. Though small sections of each of the individual project site authorized under these general permits will not be available for long-term protection as described in recovery objective (3), thousands of acres of designated critical habitat are still available for long-term protection. Therefore, NMFS concludes that the proposed action's adverse effects on the essential features of Johnson's seagrass critical habitat will not impede achieving the recovery objectives listed above.

## 8. Conclusion

Using the best available data, we analyzed the effects of the proposed action in the context of the status of the species, the environmental baseline, and cumulative effects, and determined that the proposed action is not likely to jeopardize the continued existence of green, Kemp's ridley or the NWA DPS of loggerhead sea turtles. These analyses focused on the impacts to, and population responses of, sea turtles in the Atlantic basin. However, the impact of the effects of the proposed action on Atlantic sea turtle populations must be extrapolated to impacts to sea turtles throughout its global range, as the species is listed. Because the proposed action will not reduce the likelihood of survival and recovery of any Atlantic populations of sea turtles, it is our opinion that the proposed action is also not likely to jeopardize the continued existence of loggerhead, Kemp's ridley, or green sea turtles.

After reviewing the current status of smalltooth sawfish critical habitat, the environmental baseline, the effects of the proposed actions, and the cumulative effects, it is our opinion that the authorization of these general permits and the removal of approximately 5.69 acres of the shallow, euryhaline essential feature of critical habitat will not impede the critical habitat's ability to support the smalltooth sawfishes' conservation, despite permanent adverse effects. Given the nature of the project and the information provided above, we concludes that the action, as proposed, is likely to adversely affect but is not likely to destroy or adversely modify smalltooth sawfish critical habitat. Because the proposed action will not reduce the likelihood of survival and recovery of smalltooth sawfish, it is our opinion that the proposed action is likely to adversely affect but is not likely to destroy or adversely modify smalltooth sawfish critical habitat.

After reviewing the current status of Johnson's seagrass critical habitat, the environmental baseline, the effects of the proposed actions, and the cumulative effects, it is our opinion that the authorization of these general permits and the removal of approximately 0.65 acre of Johnson's seagrass critical habitat will not impede the critical habitat's ability to support the Johnson's seagrass conservation, despite permanent adverse effects. Given the nature of the project and the information provided above, we concludes that the action, as proposed, is likely to adversely affect but is not likely to destroy or adversely modify Johnson's seagrass critical habitat.

Because the proposed action will not reduce the likelihood of survival and recovery of Johnson's seagrass, it is our opinion that the proposed action is likely to adversely affect but is not likely to destroy or adversely modify Johnson's seagrass critical habitat.

It is important to note that the conclusions drawn in this opinion are based on a series of assumptions (see Section 2.7). Because a programmatic by nature covers future actions that have not been specifically identified, the analysis is based on the actions that occurred during the last five years and a prediction that actions in the next five years will be the same plus a potential increase of 10 percent, as discussed in the assumptions and the jeopardy analysis (see Section 7). A series of assumptions are made based on the best available data, PDCs are in place to define the limits of the action (see Section 2.3), and Tier II reporting is required to evaluate that the activities authorized meet the assumptions made and that the effects are consistent with the analysis in this opinion (see Section 2.4). If the assumptions are inaccurate or the effects are outside of the scope of this opinion, that consultation must be reinitiated. This determination will be made at the Tier II review between the USACE and NMFS.

## 9. Incidental Take Statement

NMFS acknowledges that 7 turtles may be injured or killed through an increase in vessel traffic from these general permits. Construction of docks and boat authorized under these general permits is under the jurisdiction of the USACE but the vessel traffic resulting from this construction is not under the jurisdiction of the USACE. Therefore, no take is authorized. If any takes of species under NMFs' purview are taken during in-water construction authorized under these general permits, it shall be immediately reported to *takereport.nmfsser@noaa.gov*, refer to the present biological opinion by title, issue date, NMFS Public Consultation Tracking System identifier number (P/SER/2011/01939), and the USACE permit number related to the specific general permit that authorized the activity, and 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 sea turtles, smalltooth sawfish critical habitat and Johnson's seagrass critical habitat. NMFS strongly recommends that these measures be considered and adopted. In order for us to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, we request notification of the implementation of any conservation recommendations.

*Noise:*

1. Determine ambient noise levels in a variety of in-water settings throughout the state of Florida. For instance, determine the ambient noise level in a man-made residential canal compared to the open water environments like the Caloosahatchee River in CHEU. These could be compared to noise levels in other rivers like the St. Johns and other estuaries like Tampa Bay.

2. Pile Driving: To better understand the cumulative effects of noise pile driving activities, the USACE should conduct an independent study to characterize all aspects of noise-producing construction activities (such as pile driving) in the state of Florida. The study should characterize both specific sources of noise, as well as ambient noise measurements in various areas throughout Florida. Major noise-producing activities should be identified and measurements of noise from these activities should be recorded and reported in appropriate units of measurement (peak levels, SELCUM, RMS, etc.) to estimate the acoustic footprint of the activities, duration, frequency, and relative contribution to ambient noise levels in the state of Florida. Methodologies of field measurements should be should be coordinated with NMFS personnel. Such data would help quantify the relative contribution of pile driving on ambient noise levels, compared to other known sources, and conduct cumulative impact analyses in the Florida waters. Following completion of such a study, the USACE should hold a joint USACE/NMFS workshop with industry representatives to cooperatively discuss the results of the study and identify any technology- or method-based recommendations to reduce ambient noise in the marine environment, and any other future actions that may be necessary to reduce noise impacts from in-water construction activities in Florida.

*Sea Turtles*

1. Provide all applicants applying for a USACE permit involving docks or boat ramps with information about the risk of vessel strikes to turtles. This should also include contact information for the sea turtle stranding network.

2. Require all multi-family or government docks be posted with signs about the risk of sea turtle vessel strikes and contact information for the sea turtle stranding network.

*Smalltooth Sawfish Critical Habitat*

1. Continue public outreach and education on smalltooth sawfish and smalltooth sawfish critical habitat, in an effort to minimize interactions, injury, and mortality.

2. Provide funding to conduct directed research on smalltooth sawfish that will help further our understanding about the species, i.e., implement a relative abundance monitoring program which will help define how spatial and temporal variability in the physical and biological environment influence smalltooth sawfish, in an effort to predict long-term changes in smalltooth sawfish distribution, abundance, extent, and timing of movements.

3. Conduct or support surveys to help acquire detailed bathymetry and mangrove coverage within smalltooth sawfish critical habitat.

4. Continue to request the removal of existing riprap from future seawall restoration/replacement projects within smalltooth sawfish critical habitat.

5. Provide funding to conduct directed research in an effort to develop new technology to support vertical seawalls other than riprap (e.g., living seawalls that incorporate mangroves).

*Johnson's Seagrass Critical Habitat*

1. NMFS recommends that the USACE conduct and support monitoring 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 GIS mapping of Johnson's and other seagrass distribution.

2. 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.

## 11. Reinitiation of Consultation

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

## 12. Literature Cited

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## 13. Appendix A

**PILE DRIVING NOISE ANALYSIS**

# I. Approach to the Pile Driving Noise Assessment

Exposure criteria were used to assess whether noise from the proposed action may adversely affect listed species. In the case of injury thresholds, establishing whether or not exposure to injurious noise levels is fairly straight forward (i.e., a likely exposure at the injury threshold equals a take). However, establishing adverse effects from behavioral noise requires further analysis. There is a dearth of information on behavioral impacts that can directly correlate noise exposure with adverse effect to listed species of fish and sea turtles. The thresholds in Table 1-1 and Table 1-2 are to be used to establish noise levels from impact and vibratory pile driving at which injury may begin to occur and behavioral effects could potentially result in adverse effects.

**Table 1-1. Impact pile driving threshold noise levels for fish and sea turtles.**

| Effect | Organism | Underwater threshold (dB) |
|---|---|---|
| Injury | All fish and turtles | 206 peak |
| | Fish ≥ 2 grams | 187 SEL |
| | Fish < 2 grams | 183 (SEL) |
| Behavior | Fish | 150 dB RMS |
| | Sea turtles | 160 dB RMS |

Thresholds are based on the most conservative criteria for hearing generalists for fish (Federal Highway Administration 2012). No data on sea turtle injury from pile driving is available. Considering animals of equal mass, fish are considered more sensitive to physical injury than sea turtles; therefore, fish thresholds are recommended as conservative thresholds for sea turtles as interim criteria.

**Table 1-2. Vibratory pile driving threshold levels for fish and turtles.**

| Effect | Animal | Threshold Level |
|---|---|---|
| Injury | Sturgeon, Sawfish, and Turtles | 206 peak |
| Injury (onset) | Fish ≤ 0.6 g | 191 $SEL_{CUM}$ |
| | Fish ≥ 102 g | 234 $SEL_{CUM}$ |
| Behavior | Fish | 150 RMS |
| | Turtles | 160 RMS |

Thresholds are based on the recommended criteria for vibratory piling found in Hastings (2010). Cumulative source levels were back calculated using 20 minutes to drive each pile and 15 logR intermediate spreading loss based on reference levels for 24-inch AZ sheet pile noise using a vibratory hammer reported in CALTRANS (2007). There are no $SEL_{CUM}$ levels established for sea turtles and fish thresholds are used as conservative indicators of potential injury.

For fish 0.6 to 102 g, the cumulative SEL threshold must be calculated independently based on fish mass by the following equation: $SEL_{CUM} = 195.28 + 19.28 \times \log10(\text{mass})$

## *Steps To Calculate Pile Driving Zones of Influence*

a. **Deconstruct the Project**

The basic information regarding the pile driving activities required to conduct effects analysis includes:

- the material composition of the piles (steel, concrete, wood, composite);
- the type of pile (e.g., sheet, H, tubular, square, etc.);
- the diameter of the piles;
- the number of piles driven;
- the number of hammer strikes per pile;
- the duration to drive a single pile;
- the number of piles driven per day;
- the time of year of the activity;
- the type of pile driving method (e.g., hydraulic, diesel, vibratory hammer);
- other pile driving methods (e.g., drilling, jetting);
- vessels required;
- the total duration of the project;
- habitat characteristics; and
- A map of the project area.

b. **Determine the Noise Reference Levels**

Noise levels produced from pile driving noise can be estimated from similar projects reported in technical papers and peer reviewed literature. Typically, the pile size, type, and pile driving method are used to characterize noise levels. Reference levels were used from (CALTRANS 2007; CALTRANS 2009).

c. **Determine Source Level: Sound Exposure Level for a Single Strike ($SEL_{SS}$)**

It is important to note the distance of the reported noise level. Many reference levels are reported at 10 m from the pile. You can back calculate noise levels from 10 m to the pile by adding 10 dB for 10 logR cylindrical loss, 15 dB for 15 log intermediate spreading loss, and 20 dB for 20 logR spherical spreading loss. Other reference level distances can easily be back-calculated by determining the dB loss for the distance using *the Spreading Loss Calculator*.

d. **Determine Source Level: Sound Exposure Level for Cumulative Strikes ($SEL_{CUM}$)**

Cumulative exposure is based on the amount of time an animal may be exposed to noise from repeated strikes of impact hammers (or the amount of time for vibratory piling). The cumulative sound exposure level ($SEL_{CUM}$) is determined by accounting for the repeated strikes of the hammer:

Daily $SEL_{CUM}$ Source Level = $SEL_{SS}$ Source Level + 10 log (# of strikes/ pile)(# of piles/day)

As a general guideline, consider the cumulative effects of noise exposure over a 24-hr period, as long as there is sufficient “quiet” recovery time between exposures. The effects of repeated daily exposures over days, weeks, or months may be considered qualitatively or quantitatively if the different noise sources and exposure levels are present over time. Note: this exposure level is realized from constant exposure to the noise, but does not account for animal movement.

NOTE: RMS levels (or root mean square) are already a time averaged level based on hearing and theoretically does not change with time. No further calculations are required for dB levels reported in RMS units based on the number of strikes per day.

e. **Choose A Spreading Loss Model**

The decrease in noise level with distance from the source (also called attenuation or spreading loss) can be estimated using a spreading loss model. A general equation to predict noise at some distance from a pile is:

TL(R) = SL – N log*R;* where

TL is the threshold level in Table 1 at a distance R from the pile in meters,
SL is the source level,
N is a coefficient for geometric spreading (e.g., spherical or cylindrical), and
R is a distance from the source.

For pile driving projects, geometric spreading (N) can range between 10 and 20, but usually takes the form of two equations based on water depth.

Spherical spreading in deep water is expressed as: TL(R) = SL – 20 log*R*
Intermediate spreading in shallower water is expressed as: TL(R) = SL – 15 log*R*

As a general assessment rule in determining which equation to use, use intermediate spreading loss if your impact zone distance is greater than the water depth. Most pile driving occurs in shallow, coastal areas so intermediate spreading loss is most common model used for coastal projects. Open water pile driving in deeper water is best modeled using spherical spreading. To find the distance of the threshold level TL(R), solve the equation by altering the distance from the pile (R), but you can use the Spreading Loss Calculator explained below in Step V. More detailed examples and discussion of determining impact zones using spreading loss equations can be found in the Federal Highway Administration (2012).

The concept of "effective quiet" assumes that energy from pile strikes that is less than 150-dB or SEL does not accumulate to cause injury. For any given condition, at some distance, sound attenuates to the level of effective quiet (i.e., 150-dB SEL). Under the concept of effective quiet, the distance to the cumulative criterion level cannot extend beyond the distance to effective quiet. For example, an $SEL_{SS}$ value of 180 dB, attenuates to the effective quiet level of 150 dB at 280 feet (1,000 meters) using a 10 logR spreading loss model. Therefore, the $SEL_{CUM}$ distance is limited to the number of strikes that meets 1000 m, but strikes beyond that do not contribute to the $SEL_{CUM}$.

NOTE: $SEL_{CUM}$ assumes constant exposure, and does not account for the movement of fish and sea turtles. Movements must be monitored during the activity, modeled, or considered qualitatively in the analysis.

f. **Determine the Impact Zones by Calculating Threshold Distances**

*Using the Spreading Loss Calculator*

In steps 3 and 4 you will have already have calculated the source level for both a single strike and for cumulative daily strikes. In step 4 you have chosen the spreading loss model appropriate for a project. A quick and effective method to calculate impact zone distances with the model is first calculate the difference in dB (-dB) between the source level and threshold level, then determine what distance that dB difference occurs with the Spreading Loss Calculator.

For example, to determine the distance of the daily cumulative level of injury, first subtract the threshold levels for each animal group in Table 1 from the $SEL_{CUM}$ source level.

Calculate the Difference (-dB) Between Source Level and Injury Threshold Levels

fish ≥ 2 grams and sea turtles = Source Level ($SEL_{CUM}$) – 187 dB
fish < 2 grams = Source Level ($SEL_{CUM}$) – 183 dB

Calculate the Difference (-dB) Between Source Level and Behavioral Threshold Levels

for all fish sizes = Source Level (RMS) – 150 dB
sea turtles = Source Level (RMS) – 160 dB

**Spherical (20 logR) and Cylindrical (10 and 15 logR) Spreading Loss**

*Instructions: Input range from source to obtain spherical and cylindrical spreading loss (- dB)*

| Range (m) | log (R) | 20 logR Spherical Spreading Loss (- dB) | 10 log R Cylindrical Spreading Loss (- dB) | 15 log R Cylindrical Spreading Loss (- dB) |
|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 0 |
| 2 | 0.301029996 | 6.020599913 | 3.010299957 | 4.515449935 |
| 4 | 0.602059991 | 12.04119983 | 6.020599913 | 9.03089987 |
| 8 | 0.903089987 | 18.06179974 | 9.03089987 | 13.5463498 |
| 10 | 1 | 20 | 10 | 15 |
| 25 | 1.397940009 | 27.95880017 | 13.97940009 | 20.96910013 |
| 50 | 1.698970004 | 33.97940009 | 16.98970004 | 25.48455007 |
| 100 | 2 | 40 | 20 | 30 |
| 1000 | 3 | 60 | 30 | 45 |
| 2000 | 3.301029996 | 66.02059991 | 33.01029996 | 49.51544993 |
| 10000 | 4 | 80 | 40 | 60 |
| 100000 | 5 | 100 | 50 | 75 |
| 500000 | 5.698970004 | 113.9794001 | 56.98970004 | 85.48455007 |
| 1000000 | 6 | 120 | 60 | 90 |

**Figure 1-1.** Screenshot of the Spreading Loss Calculator. The dB loss over any range can be determined for three types spreading loss models (10 logR, 15 logR, and 20 logR). For example, at 50 m, there is a 25.5 dB reduction in noise from a pile due to intermediate transmission loss (15 logR). The spreading loss calculator is located on the network drive at: SLS4:\NOISE EXPOSURE\SPREADING LOSS CALCULATOR

After determining the dB difference between source level and threshold level, use the Spreading Loss Calculator to input different ranges in the first column (Range) to find the distance that the -dB difference would occur. The calculator uses three spreading loss formulas to allow for quick calculations of several ranges. The equations solve for any range input by the user by automatically calculating noise reduction at those distances from a pile (-dB) using three spreading loss equations for any range input by the user.

g. **Report the Noise Levels in the Effects Analysis**

The noise levels used in the effects analysis should be tabulated for easy reference.

**Table 1-3. Example for a 24-inch diameter concrete pile using a 15 logR spreading loss. $SEL_{CUM}$ was calculated for 4 piles per day requiring 450 strikes per pile (1,800 strikes/day).**

| Reference Unit (dB) | Source Level |
|---|---|
| Peak pressure | 200 dB |
| RMS | 185 dB |
| $SEL_{SS}$ | 175 dB |
| $SEL_{CUM}$ | 207.5 dB |

Source levels back-calculated from CALTRANS (2009).

h. **Standard Impact Zone Definitions**

**Injury Zone:** the distance from pile driving within which injury (lethal or non-lethal) may occur. Onset of injury considers hearing loss, as well other effects such as gill, eye, and swim bladder damage in fishes.

**Behavioral Zone:** the distance from pile driving within which behavioral reactions may occur.

**Impact Zone:** The distance from the pile encompassing the effects of interest (i.e., the injury zone and/or the behavior zone).

**Watch Zone:** an additional buffer zone that may be monitored to detect animals that are heading towards the impacted area. The watch zone radius may vary depending on the type of project, habitat, and species potentially occurring in the project area.

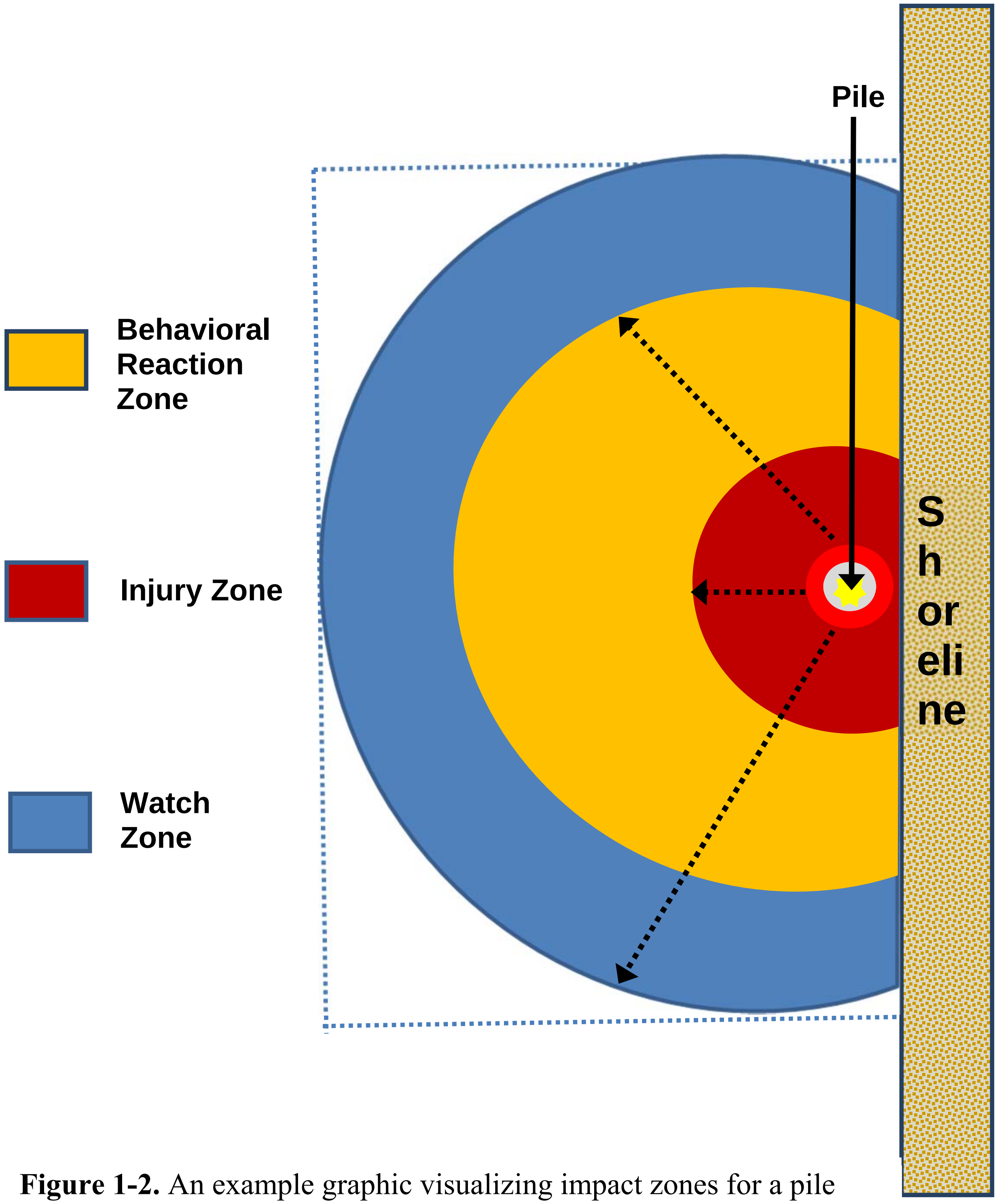


**Figure 1-2.** An example graphic visualizing impact zones for a pile driving project. Graphical representations of the impact zones are a useful analytical tool in visualizing the project impacts within the species habitat.

i. **Behavioral Effects**

The noise produced by pile driving projects may deter animals by acting as an acoustic deterrent from the construction area. Reactions may range from temporary startle responses to sudden noise, to a standoff distance, abandonment of the habitat, or even attraction to the novel sounds in the environment. In some cases avoidance responses may be beneficial if the reaction results in the animal avoiding exposure to potentially harmful noise levels. This is the strategy behind ramping up or dry-firing pile drivers.

Relatively few studies have been conducted for behavioral reactions of sea turtles (McCauley et al. 2000a; McCauley et al. 2000b), and none for species of sturgeon and smalltooth sawfish. Effects on behavior may be an important effect if it disrupts feeding, mating, migration, sheltering, or indirectly increases the risk to individuals (e,g., predation). Behavioral reactions to noise may be important if they occur in biologically important areas such as migratory pathways, foraging areas, near nesting beaches or spawning habitats, or in important developmental habitats.

Although species-specific responses to noise are expected, variable responses to noise may occur between different age classes or sexes of the same species. Some individuals may be biologically motivated to remain in a habitat for feeding, sheltering, mating, and other biologically important reasons, or may temporarily use the area as an established pathway between habitats. Other individuals may abandon use of the area altogether. Habituation and sensitization may also result from longer-term noise exposure (hours to weeks) and may result in adverse consequences on an individual. An example analytical framework is provided in Figure 1-3.

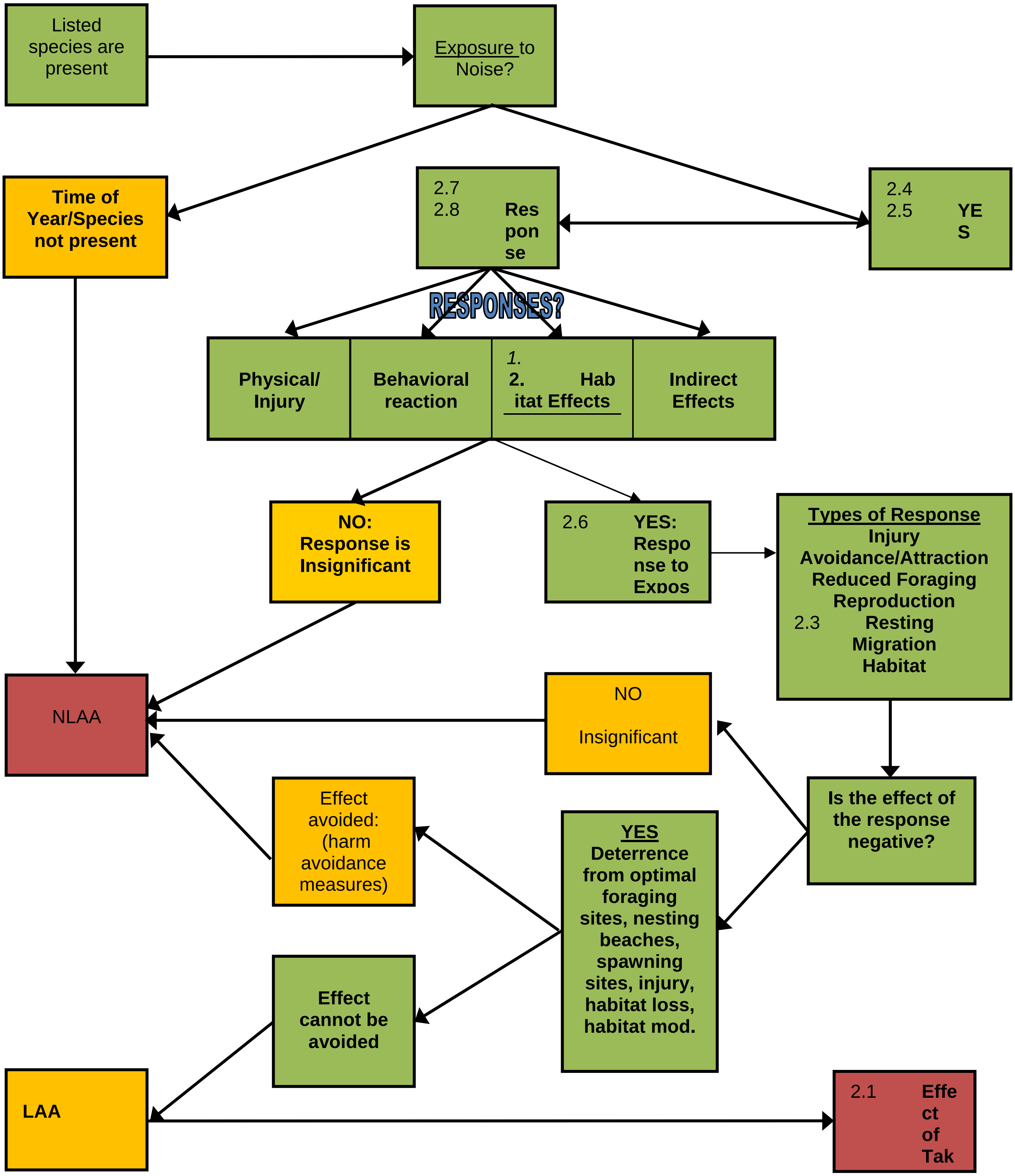


**Figure 1-3.** An example analytical framework for fish and sea turtles.

## II. Analysis of Noise from Small Dock and Sea Wall Projects

*Background*

We conducted a review of the effects of noise from residential seawall and dock construction on listed species of sea turtles, sawfish, and sturgeon occurring in the Southeast U.S. Most residential docks in Florida are constructed with either wood or concrete piles. According to the USACE, approximately 98 percent of the docks installed under their permits are constructed of 8-inch wood pilings, and the remaining 2 percent of docks are constructed of 8-inch concrete piles. A dock installers in Cape Coral, Florida estimated approximately 99 percent of residential docks constructed in Southwest Florida are constructed of wood piles (August 20, 2012 personal communication from Dan Stovall, VP of Honc Marine, to Nicole Baily, NMFS). The major difference between wood and concrete piles is the shorter longevity and lower cost of wood piles compared to concrete construction.

On water construction equipment for docks and seawalls include workboats, water jetting, auger-drilling equipment, vibratory hammers, and impact hammers. Jetting and drilling result of much lower noise levels than either impact or vibratory pile driving. In many areas, projects utilize pile jetting during the initial phases of pile installation to set the pile in place before it is driven to resistance. This method uses high-pressure water sprayed beneath the pile to excavate sediment and sand layers. Noise measurements taken with water jetting on and off during pile driving resulted in no additional noise recorded above that of the pile driving noise (CALTRANS 2007), and the source levels for jetting is believed to be well below the 150 dB re 1 $\mu Pa_{RMS}$ threshold for behavioral disturbance to fish. Auger drilling levels through rock for large piles have been measured to be above 150 dB re 1 $\mu Pa_{RMS}$ (Dazey et al. 2012); however, small-scale drilling operations that are more representative of dock construction methods have been measured to be no more than 107 dB re 1 $\mu Pa_{0\text{-peak}}$ 7.5 m from the source (Willis et al. 2010). Our back calculation resulted in an approximate source level of 120 dB re 1 $\mu Pa_{0\text{-peak}}$. Neither small-scale auger drilling nor water jetting is expected to result in noise levels that may adversely affect listed species.

Impact hammer installation generates the most in-water noise. There are two main classes of impact hammers: external combustion and internal combustion. External combustion hammers use cables, steam, compressed air or pressurized hydraulic fluid to raise the ram which is then dropped by gravity (e.g., a drop hammer). Internal combustion hammers do not rely on gravity and force the ram into the pile (e.g., a diesel hammer). During impact pile driving, noise is produced when the energy from the hammer is transferred to the pile and released into the surrounding water and sediment.

The number of piles necessary to complete construction of a residential dock varies by the size and design of the structure. A typical dock of 15 piles requires approximately 10 hours of pile driving, including placement of piles and equipment, and can take 2 or more days to complete. Some larger residential docks can use up to 70 piles and noise could be produced over a period of 2 weeks. After pile installation, it takes an additional 26 hours for above water carpenter work for framing and decking, and an additional 3 hours to install a boatlift. Pile driving for residential docks does not occur at night. Hammer drop for marina construction with timber piles has be reported to occur once or twice per minute (CALTRANS 2007).

*Assumptions of the Analyses*

- Noise spreads cylindrically in coastal waters and noise transmission is characterized by 15 logR spreading loss.
- Strike rates for dock construction with timber piles has been reported to occur once or twice per minute (CALTRANS 2007). The average number of strikes per pile is estimated as 45, calculated as 1.5 times per minute for 30 minutes.
- Concrete pile installation was estimated to take 160 strikes per pile based on data provided by a contractor in Cape Coral (pers. comm. Rocky, Turell and Associates to N. Bailey, NMFS, September 6, 2012). The applicant's contractor stated that the average pile is driven 8 feet and requires an average of 20 strikes per foot which equals 160 strikes per pile.
- CALTRANS (2007) reported that sheet piles were installed in 12 to 15 minutes, with pile strikes about once every 1.4 seconds or 43 to 44 strikes per minute (660 strikes per pile).
- An average of 10 timber or concrete piles will be installed on any given work day.
- Vibratory piling may take up to 30 minutes per pile.

## *Impact Pile Driving Noise Analysis for Small Docks and Seawalls*

**Table 2-1: Impact hammer source levels and threshold distances for injury (peak pressure) and behavioral impacts (RMS) resulting from dock, sea wall, and bulkhead construction.**

| Noise Unit | Source Level at Pile | Fish Radius (m) | Turtle Radius (m) |
|---|---|---|---|
| *12-14 inch timber pile* | | | |
| Peak pressure | 195 dB | NA | NA |
| RMS | 185 dB | 215 | 46 |
| SELss | 175 dB | NA | NA |
| *24-inch concrete pile* | | | |
| Peak pressure | 200 dB | NA | NA |
| RMS | 185 dB | 215 | 46 |
| SELss | 175 dB | NA | NA |
| *24-inch sheet pile* | | | |
| Peak pressure | 220 dB | 9 | 9 |
| RMS | 204 dB | 858 | 185 |
| SELss | 194 dB | 14 | 14 |

[a]Pile driving data derived from (CALTRANS 2007; CALTRANS 2009). Source levels were back-calculated from 10 m using 15 logR cylindrical spreading loss.

The peak pressure threshold is not exceeded from single strikes for wood or concrete, but is exceeded for sheet piles. Therefore, peak pressure is not considered further in the analysis for wood and concrete piles.

**Table 2-2. Impact hammer daily cumulative exposure ($SEL_{CUM}$) by number of piles installed per day.**

| Piles/Day | Strikes/ Timber Pile | 10Log(strikes) | Strikes/ Concrete Pile | 10Log(strikes) | Strikes/ Sheet Pile | 10Log(strikes) |
|---|---|---|---|---|---|---|
| 1 | 45 | 16.53 | 160 | 22.04 | 660 | 28.20 |
| 2 | 90 | 19.54 | 320 | 25.05 | 1,320 | 31.21 |
| 3 | 135 | 21.30 | 480 | 26.81 | 1,980 | 32.97 |
| 4 | 180 | 22.55 | 640 | 28.06 | 2,640 | 34.22 |
| 5 | 225 | 23.52 | 800 | 29.03 | 3,300 | 35.19 |
| 6 | 270 | 24.31 | 960 | 29.82 | 3,960 | 35.98 |
| 7 | 315 | 24.98 | 1,120 | 30.49 | 4,620 | 36.65 |
| 8 | 360 | 25.56 | 1,280 | 31.07 | 5,280 | 37.23 |
| 9 | 405 | 26.07 | 1,440 | 31.58 | 5,940 | 37.74 |
| 10 | 450 | 26.53 | 1,600 | 32.04 | 6,600 | 38.20 |

**Table 2-3. Impact hammer daily cumulative impact zone ranges for injury based for the number of wood piles driven per day.**

| Piles/Day | $SEL_{CUM}$ | Fish < 2 grams | | Fish ≥ 2 grams and Turtles | |
|---|---|---|---|---|---|
| | | dB Above Threshold | Impact Radius (m) | dB Above Threshold | Impact Radius (m) |
| 1 | 191.04 | 8.5 | 3.7 | 4.5 | 2 |
| 2 | 194.5 | 11.5 | 5.8 | 7.5 | 3 |
| 3 | 196.3 | 13.3 | 7.7 | 9.0 | 4 |
| 4 | 197.5 | 14.5 | 9.3 | 10.5 | 5 |
| 5 | 198.5 | 15.5 | 10.8 | 11.5 | 6 |
| 6 | 199.3 | 16.3 | 12.2 | 12.3 | 7 |
| 7 | 200.0 | 17 | 13.6 | 13.0 | 7 |
| 8 | 200.6 | 17.6 | 14.9 | 13.6 | 8 |
| 9 | 201.1 | 18.1 | 16.1 | 14.1 | 9 |
| 10 | 201.5 | 18.5 | 17.1 | 14.5 | 9 |

The peak pressure threshold is not exceeded from single timber pile strikes. The effective quiet level of 47 m is not exceeded.

**Table 2-4. Impact hammer daily cumulative impact zone ranges for injury based for the number of concrete piles driven per day.**

| Piles/Day | $SEL_{CUM}$ | Fish < 2 grams | | Fish ≥ 2 grams and Turtles | |
|---|---|---|---|---|---|
| | | dB Above Threshold | Impact Radius (m) | dB Above Threshold | Impact Radius (m) |
| 1 | 197.04 | 14.04 | 8.6 | 10.04 | 4.7 |
| 2 | 200.05 | 17.05 | 13.7 | 13.05 | 7.5 |
| 3 | 201.81 | 18.81 | 17.9 | 14.81 | 9.7 |
| 4 | 203.06 | 20.06 | 21.8 | 16.06 | 11.8 |
| 5 | 204.03 | 21.03 | 25.2 | 17.03 | 13.7 |
| 6 | 204.82 | 21.82 | 28.4 | 17.82 | 15.4 |
| 7 | 205.49 | 22.49 | 31.6 | 18.49 | 17.1 |
| 8 | 206.07 | 23.07 | 34.5 | 19.07 | 18.7 |
| 9 | 206.58 | 23.58 | 37.2 | 19.58 | 20.2 |
| 10 | 207.04 | 24.04 | 40.1 | 20.04 | 21.7 |

The peak pressure threshold is not exceeded from single concrete pile strikes. The effective quiet level of 47 m is not exceeded.

**Table 2-5. Impact hammer daily cumulative impact zone ranges for injury based for the number of sheet piles driven per day.**

| Piles/Day | $SEL_{CUM}$ | Fish < 2 grams | | Fish ≥ 2 grams and Turtles | |
|---|---|---|---|---|---|
| | | dB Above Threshold | Impact Radius (m) | dB Above Threshold | Impact Radius (m) |
| 1 | 222.20 | 39.20 | 411 | 35.20 | 223 |
| 2 | 225.21 | 42.21 | 652 | 38.21 | 353 |
| 3 | 226.97 | 43.97 | 854 | 39.97 | 462 |
| 4 | 228.22 | 45.22 | EF | 41.22 | 560 |
| 5 | 229.19 | 46.19 | EF | 42.19 | 650 |
| 6 | 229.98 | 46.98 | EF | 42.98 | 734 |
| 7 | 230.65 | 47.65 | EF | 43.65 | 813 |
| 8 | 231.23 | 48.23 | EF | 44.23 | EF |
| 9 | 231.74 | 48.74 | EF | 44.74 | EF |
| 10 | 232.20 | 49.20 | EF | 45.20 | EF |
| | **Peak Pressure** | | | | |
| | | 17.00 | 14 | 14.00 | 9 |

The effective quiet level of 858 m is exceeded at 4 piles per day for small fish and 8 piles per day for larger fish.

**Table 2-6: Impact pile driving behavioral impact zone ranges for wood, concrete, and sheet piles.**

| Piles/Day | dB Above Fish Threshold | Fish Radius (m) | dB Above Sea Turtle Threshold | Sea Turtle Radius (m) |
|---|---|---|---|---|
| *wood* | 35 dB | 215 | 25 dB | 46 |
| *concrete* | 35 dB | 215 | 25 dB | 46 |
| *sheet pile* | 44 dB | 858 | 34 dB | 185 |

## *Vibratory Pile Driving Noise Analysis for Small Docks and Seawalls*

**Table 2-7. Source levels for 8- to 10-inch diameter wood and concrete piles, and 24-inch sheet piles installed with a vibratory hammer.**

| | Source Level at Pile | Fish Radius (m) | Turtle Radius (m) |
|---|---|---|---|
| *8- to 10-inch wood or concrete* | | | |
| Peak pressure | 186 | NA | NA |
| RMS | 170 | 22 | 5 |
| SELss | 170 | NA | NA |
| | | | |
| *24-inch AZ sheet pile* | | | |
| Peak pressure | 192 | NA | NA |
| RMS | 178 | 74 | 16 |
| SELss | 178 | NA | NA |

Vibratory pile driving of wood and concrete is not common and no measurements are available. We used source levels from vibratory pile driving of a 13-inch steel pipe as a conservative upper limit of potential noise for wood and concrete.

The peak pressure threshold is not exceeded from vibratory pile driving and is not considered further in the analysis for any pile type.

**Table 2-8. Estimating the cumulative exposure ($SEL_{CUM}$) of animals to continuous noise from vibratory pile driving of wood, concrete, and sheet piles.**

| Number of Piles | Average Time to Drive a Pile (seconds) | 10 Log(time in seconds) Cumulative dB |
|---|---|---|
| 1 | 1,800 | 32.55 |
| 2 | 3,600 | 35.56 |
| 3 | 5,400 | 37.32 |
| 4 | 7,200 | 38.57 |
| 5 | 9,000 | 39.54 |
| 6 | 10,800 | 40.33 |
| 7 | 12,600 | 41.00 |
| 8 | 14,400 | 42.10 |
| 9 | 16,200 | 42.55 |
| 10 | 18,000 | 42.97 |

**Table 2-9. Vibratory hammer daily cumulative impact zone ranges for injury based on the number of wood or concrete piles driven per day.**

| Piles/Day | $SEL_{CUM}$ | Fish < 0.6 grams | | Fish ≥ 102 grams and Turtles | |
|---|---|---|---|---|---|
| | | dB Above Threshold | Impact Radius (m) | dB Above Threshold | Impact Radius (m) |
| 1 | 191.5 | 0.5 | 1.1 | NA | NA |
| 2 | 194.5 | 3.5 | 1.7 | NA | NA |
| 3 | 196.3 | 5.3 | 2.2 | NA | NA |
| 4 | 197.5 | 6.5 | 2.7 | NA | NA |
| 5 | 198.5 | 7.5 | 3.2 | NA | NA |
| 6 | 199.3 | 8.3 | 3.6 | NA | NA |
| 7 | 200.0 | 9.0 | 4.0 | NA | NA |
| 8 | 200.6 | 9.6 | 4.4 | NA | NA |
| 9 | 201.1 | 10.1 | 4.7 | NA | NA |
| 10 | 201.5 | 10.5 | 5.0 | NA | NA |

The effective quiet level of 22 m is not exceeded.

**Table 2-10. Vibratory hammer daily cumulative impact zone ranges for injury based on the number of sheet piles driven per day.**

| Piles/Day | $SEL_{CUM}$ | Fish < 0.6 grams | | Fish ≥ 102 grams and Turtles | |
|---|---|---|---|---|---|
| | | dB Above Threshold | Impact Radius (m) | dB Above Threshold | Impact Radius (m) |
| 1 | 210.55 | 19.55 | 20.1 | NA | NA |
| 2 | 213.56 | 22.56 | 31.9 | NA | NA |
| 3 | 215.32 | 24.32 | 41.8 | NA | NA |
| 4 | 216.57 | 25.57 | 50.7 | NA | NA |
| 5 | 217.54 | 26.54 | 58.8 | NA | NA |
| 6 | 218.33 | 27.33 | 66.4 | NA | NA |
| 7 | 219.00 | 28.00 | 73.6 | NA | NA |
| 8 | 220.10 | 29.10 | EF | NA | NA |
| 9 | 220.55 | 29.55 | EF | NA | NA |
| 10 | 220.97 | 29.91 | EF | NA | NA |

The effective quiet level of 74 m is exceeded at 8 piles per day for small fish, but is not exceeded for large fish.

**Table 2-11: Vibratory pile driving behavioral impact zone ranges for wood, concrete, and sheet piles.**

| Piles/Day | dB Above Fish Threshold | Fish Radius (m) | dB Above Sea Turtle Threshold | Sea Turtle Radius (m) |
|---|---|---|---|---|
| *wood* | 20 dB | 22 | 10 dB | 4.6 |
| *concrete* | 20 dB | 22 | 10 dB | 4.6 |
| *sheet pile* | 28 dB | 74 | 18 dB | 16 |

## 14. Appendix B

Summary of annual incidental take levels anticipated under the incidental take statements associated with NMFS' existing biological opinions in the U.S. Atlantic and Gulf of Mexico.

| **Federal Action** | **Sea Turtle Species**[1] | | | | |
|---|---|---|---|---|---|
| | **Loggerhead** | **Leatherback** | **Green** | **Kemp's Ridley** | **Hawksbill** |
| Coast Guard Vessel Operation | 1 (combined) | | | | |
| Navy – SE Ops Area[3] | 91 | 17 | 16 | 16 | 4 |
| Navy – NE Ops Area | 10 | 0 | 1 | 1 | 0 |
| Shipshock – Seawolf/Winston Churchill | 276 (No more than 58 lethal) | 276 (No more than 58 lethal) | 276 (No more than 58 lethal) | 276 (No more than 58 lethal) | 276 (No more than 58 lethal) |
| USACE Dredging – NE Atlantic | 27 | 1 | 6 | 5 | 0 |
| USACE Dredging – S. Atlantic | 35 | 0 | 7 | 7 | 2 |
| USACE Dredging – N & W Gulf of Mexico | 30 | 0 | 8 | 14 | 2 |
| USACE Dredging – E Gulf of Mexico | 8[4] | 5[4] | 5[4] | 5[4] | 5[4] |
| USACE Rig Removal, Gulf of Mexico | 1 | 1 | 1 | 1 | 1 |
| MMS Destin Dome Lease Sales | 1[5] | 1[5] | 1[5] | 1[5] | 1[5] |
| MMS Rig Removal, Gulf of Mexico | 10[6] | 5[6] | 5[6] | 5[6] | 5[6] |
| Dolphin/Wahoo Fishery | 16 (No more than 2 lethal) | 16 (No more than 1 lethal) | 2 (No more than 1 lethal) | 2 (No more than 1 lethal) | 2 (No more than 1 lethal) |
| NE Multispecies Sink Gillnet Fishery | 10 | 4 | 4 | 2 | 0 |
| ASMFC Lobster Plan | 10 | 4 | 0 | 0 | 0 |

| Federal Action | Sea Turtle Species[1] | | | | |
|---|---|---|---|---|---|
| | **Loggerhead** | **Leatherback** | **Green** | **Kemp's Ridley** | **Hawksbill** |
| Bluefish Fishery | 6 (No more than 3 lethal) | 0 | 0 | 6 | 0 |
| Herring Fishery | 6 (No more than 3 lethal) | 1 | 1 | 1 | 0 |
| Mackerel, Squid, Butterfish Fisheries | 6 (No more than 3 lethal) | 1 | 2 | 2 | 0 |
| Monkfish Fishery | 6 (No more than 3 lethal) | 1 | 1 | 1 | 0 |
| Dogfish Fishery | 6 (No more than 3 lethal) | 1 | 1 | 1 | 0 |
| Sargassum Fishery | 15 | 1 | 1 | 1 | 1 |
| Summer Flounder, Scup, and Black Sea Bass Fishery | 15 (No more than 5 lethal) | 3 | 3 | 3 | 3 |
| Shrimp Fishery[8] | 163,160 (No more than 3,948 lethal) | 3,090 (No more than 80 lethal) | 155,503 (No more than 4,208 lethal) | 18,757 (No more than 514 Lethal) | 640[11] (All lethal) |
| Weakfish Fishery | 20 | 0 | 0 | 2 | 0 |
| HMS – Pelagic Longline Fishery | 1,905 | 1,764 | 105 (combined) | | |
| HMS – Shark Fishery | 679 (No more than 346 lethal) | 74 (No more than 47 lethal) | 2 (No more than 1 lethal) | 2 (No more than 1 lethal) | 2 (No more than 1 lethal) |

| Federal Action | Sea Turtle Species[1] | | | | |
|---|---|---|---|---|---|
| | Loggerhead | Leatherback | Green | Kemp's Ridley | Hawksbill |
| NRC – St. Lucie, FL[10] | 1000 (No more than 10 lethal) | 1000 (No more than 1 lethal) | 1000 (No more than 10 lethal) | 1000 (No more than 1 lethal) | 1000 (No more than 1 lethal) |
| NRC – Brunswick, NC | 50 (No more than 6 lethal) | 50 | 50 (No more than 3 lethal) | 50 (No more than 2 lethal) | 50 |
| NRC – Crystal River, FL | 55 (No more than 1 lethal) | 55 (No more than 1 lethal) | 55 (No more than 1 lethal) | 55 (No more than 1 lethal) | 55 (No more than 1 lethal) |
| Navarre Beach Fishing Pier | 4 (up to 1 lethal of either loggerhead or Kemp's ridley) | 0 | 0 | 2 (up to 1 lethal of either loggerhead or Kemp's ridley) | 0 |
| Miller Fishing Pier | 4 (up to 1 lethal of either loggerhead or Kemp's ridley) | 0 | 0 | 2 (up to 1 lethal of either loggerhead or Kemp's ridley) | 0 |
| Mexico Beach Fishing Pier | 4 (up to 1 lethal of either loggerhead or Kemp's ridley) | 0 | 0 | 2 (up to 1 lethal of either loggerhead or Kemp's ridley) | 0 |

| Federal Action | Sea Turtle Species[1] | | | | |
|---|---|---|---|---|---|
| | Loggerhead | Leatherback | Green | Kemp's Ridley | Hawksbill |
| Biloxi Coliseum Fishing Pier | 2 (up to 1 lethal and 1 non-lethal of either species) | 0 | 0 | 2 (up to 1 lethal and 1 non-lethal of either species) | 0 |
| Clermont Harbor Fishing Pier | 2 (up to 1 lethal and 1 non-lethal of either species) | 0 | 0 | 2 (up to 1 lethal and 1 non-lethal of either species) | 0 |
| Washington Street Fishing Pier | 2 (up to 1 lethal and 1 non-lethal of either species) | 0 | 0 | 2 (up to 1 lethal and 1 non-lethal of either species) | 0 |
| Flagler Beach Pier | 2 (Or 1 loggerhead and 1 Kemp's ridley) | | 2 (up to 1 lethal of either Green or loggerhead species) | | |

[1]Anticipated Take level represents 'lethal' unless otherwise noted.
[2]Includes Navy Operations along the Atlantic Coasts and Gulf of Mexico, Mine warfare center, Eglin AFB, Moody AFB.
[3]Total estimated take includes acoustic harassment.
[4]Up to 8 sea turtles total, of which, no more than 5 may be leatherbacks, greens, Kemp's or hawksbill, in combination.
[5]Total anticipated take is 3 sea turtles of any combination over a 30-year period.
[6]Not to exceed 25 sea turtles, in total.
[7]Anticipated take for post-hatchlings over a 5-year period.
[8]Represents estimated take (interactions between sea turtles and trawls). Lethal take in parentheses.
[10]Annual incidental capture of up to 1,000 sea turtles, in any combination of the five species found in the action area. NOAA Fisheries anticipates 1 percent of the total number of green and loggerhead sea turtles (combined) captured (i.e., if there are 900 total green and loggerhead sea turtles captured in one year, then 9 sea turtles in any combination of greens and loggerheads are expected to be injured or killed

| Federal Action | Sea Turtle Species[1] | | | | |
| --- | --- | --- | --- | --- | --- |
| | **Loggerhead** | **Leatherback** | **Green** | **Kemp's Ridley** | **Hawksbill** |
| as a result. In cases where 1 percent of the total is not a whole number, then the total allowable incidental take due to injury or death will be rounded to the next higher whole number) will be injured or killed each year over the next 10 years as a result of this incidental capture. NOAA Fisheries also anticipates two Kemp's ridley sea turtles will be killed each year and one hawksbill or leatherback sea turtle will be injured or killed every 2 years for the next 10 years.<br>[11]Actual mortalities of hawksbills, as a result of sea turtle/trawl interactions, is expected to be much lower than this number. This number represents the estimated total number of mortalities of hawksbill sea turtles from all sources in areas where shrimp fishing takes place. | | | | | |